

ABSTRACT

Title of Dissertation: VIOLENCE AND DISORDER, SCHOOL CLIMATE, AND PBIS: THE RELATIONSHIP AMONG SCHOOL CLIMATE, STUDENT OUTCOMES, AND THE USE OF POSITIVE BEHAVIORAL INTERVENTIONS AND SUPPORTS.

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The primary purpose of this study was to examine the relationship between school climate and student outcome variables. The secondary purpose was to examine the relationship between the use of Positive Behavioral Interventions and Supports (PBIS) and the same student outcome variables. Variables depicting student perceptions of school climate, self-reported student academic achievement, student perceptions of physical safety in school, and school use of PBIS were drawn from the baseline data collection of the Maryland Safe and Supportive Schools (MDS3) Initiative. Descriptive statistics, bivariate correlations, and multilevel modeling were used to analyze the MDS3 data and to answer four research questions.

Descriptive results showed that greater risk factors including feelings of being unsafe, involvement in violence, and poor academic achievement were associated with being male, nonwhite, and in the ninth grade. Bivariate correlations showed statistically

significant relationships between student academic achievement and perceptions of school climate, race, gender, and grade level. Average academic achievement at the school level was statistically significantly associated with average school climate, school minority rate, high free and reduced meals (FARM) rate, and use of PBIS. Student perceived physical safety had statistically significant associations with perceptions of school climate, race, gender, and grade level. Average physical safety at the school level was statistically significantly associated with average school climate, school minority rate, high FARM rate, and use of PBIS. Multilevel models of academic achievement showed disparities based on race, gender, grade level, perceptions of school climate, and enrollment in schools with high FARM rate. Multilevel models of physical safety showed disparities based on gender, grade level, perceptions of school climate, enrollment in schools with high FARM rate, and average school level perceptions of school climate. The use of PBIS in schools had little impact on either multilevel model. Recommendations include examining school climate carefully and implementing practices that aim to improve school climate, particularly for those students with the most risk factors.

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RELATIONSHIP AMONG SCHOOL CLIMATE, STUDENT OUTCOMES, AND THE
USE OF POSITIVE BEHAVIORAL INTERVENTIONS AND SUPPORTS.

by

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Chapter 1

Introduction

Media coverage of high profile acts of violence in schools has heightened public concern for the safety of children. However, these acts, although gruesome and tragic, represent only a tiny fraction of the problem that schools currently face with violence and disorder. These acts of violence also serve to overshadow problems that can be found within almost any school nationwide. Bullying and other low-level forms of violence happen far more frequently inducing fear and impacting student achievement (Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Chen, 2007; Dupper & Meyer-Adams, 2002; Payne, Gottfredson, & Gottfredson, 2003) and student attendance (Cushing, Horner, & Barrier, 2003; Payne et al., 2003). These less severe behaviors may be a better indicator than violence of how safe students feel in school (Hurford et al., 2010). According to the 2011 Youth Risk Behavior Survey conducted by the Centers for Disease Control and Prevention (CDC, 2012), 5.9% of students surveyed missed at least one day of school in the month prior to the survey because they did not feel safe at school or travelling to and from school.

The first requirement for increasing achievement and decreasing antisocial behavior in schools is to provide a safe environment where students feel at ease and can focus on academics and interpersonal relationships (McEvoy & Welker, 2000). When students feel welcomed by and included in the school, they are more likely to bond with the school decreasing the likelihood that they will take part in acts of delinquency (Payne et al., 2003).

School Climate

One way to reduce violence in schools and to improve student behavior and learning is to build a more positive school climate (Cohen & Geier, 2010; Cohen, McCabe, Michelli, & Pickeral, 2009; Dupper & Meyer-Adams, 2002; Hernandez & Seem, 2004). According to the National School Climate Center (2013), school climate refers to the quality and character of school life and is based on patterns of students', parents' and school personnel's experience of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures. School climate and school culture are sometimes viewed as separate concepts and other times viewed interchangeably. However, due to the closeness of the link between the two, in this study school climate is used to capture aspects of both.

School climate can impact academic achievement and social and emotional development (Zullig, Koopman, Patton, & Ubbes, 2010). Positive school climate has been found to be associated with better academic achievement (Hopson & Lee, 2011; Ripski & Gregory, 2009), better student behavior (Battistich, Solomon, Kim, Watson & Schaps, 1995; Brand et al., 2003; Wang, Selman, Dishion, & Stormshak, 2010), increased safety (Kitsantas et al., 2004; Welsh, 2001), and greater school connectedness (McNeely et al., 2002).

Positive Behavioral Interventions and Supports

Positive approaches to behavior management have been shown to improve school climate (Gottfredson, Gottfredson, & Hybl, 1993). Likewise, school-wide approaches to improving behavior are now being seen as successful ways to improve school climate and safety (Kern & Manz, 2004). One such school-wide approach is Positive Behavioral

Interventions and Supports (PBIS). PBIS is a school-wide multi-tiered approach used to prevent disruptive behavior and improve school climate (Bradshaw et al., 2012). On the school-wide level, students are taught behavior expectations and rewarded for exhibiting them. Recognizing and rewarding positive behavior is necessary for behavior change, yet it is frequently missing from behavior instruction (Gagnon, Rockwell, & Scott, 2008). Students who do not respond to the school-wide approach are addressed in small groups and individually to further work on improving behavior. However, when students school-wide are taught behavior expectations and rewarded for exhibiting those behaviors, it is assumed that fewer students will exhibit those serious behavior problems that require individualized support.

William Glasser's (1998) Choice Theory provides a framework that links research on the relationship between violence and disorder and school climate and the use of PBIS to improve climate. Choice Theory suggests that behavior is a choice and that behaviors are intended to meet a person's basic needs of survival, love and belonging, power, freedom, and fun. Schools designed to meet those needs will have a positive climate because the students will choose pro-social behaviors that support a positive climate. Glasser's theory encompassed ideas similar to those found in Maslow's (1943) Hierarchy of Needs, which theorized the order in which human needs must be met, Hirschi's (1969) social control theory, which discussed the reasons why people avoid deviant behavior, and Hirschi's and Gottfredson's (1990) later work expanding on social control.

Purpose of the Study

The purpose of this study was to expand upon the existing research linking school climate and student outcome variables, including measures of violence, disorder, and

achievement. As PBIS is one possible way to improve school climate, a secondary purpose was to examine the strength of the relationship between the implementation of PBIS in schools and the same student outcome variables. In the sections that follow I provide evidence of the relationship between school climate and student outcome variables such as violence, disorder, and achievement. I also establish a link between the implementation of PBIS in schools and positive student outcomes in those schools.

In addition, because PBIS is becoming more popular with educators and policy makers and because the Individuals with Disabilities Education Act (IDEA) requires that “in the case of a child whose behavior impedes the child's learning or that of others, [the Individualized Education Program (IEP) team must] consider the use of positive behavioral interventions and supports, and other strategies, to address that behavior (IDEA Title I, Part B, Section 614 (d)(3)(B)(i)),” this study will help to inform those who would like to consider PBIS as a means for improving school climate, reducing violence and disorder, and meeting the requirements of the IDEA.

Research Question and Design

The research questions that this study addressed were “what is the relationship between student-perceived school climate and student outcome variables” and “what is the relationship between schools that implement PBIS and student outcome variables?” These questions do not imply directionality. It is difficult to analyze the relationship between school climate and student outcomes in a directional manner because it is hard to prove that outcomes are better due to a positive school climate or if the school climate is better due to positive student outcomes. The study focused on variables determined in the body of literature on school climate to be most representative of school climate. The

dependent variables used in this study were based on student outcomes and the independent variables were based on students' perceptions of school climate. When analyzing the data, I chose to view school climate as being the cause for student outcomes.

In order to answer the research questions, data from the Maryland Safe and Supportive Schools (MDS3) Project were analyzed using a non-experimental quantitative research design. Specifically, hierarchical linear modeling (HLM) was used due to the nested nature of the data. Because this was a non-experimental study, findings reported only address the strength of the relationship of the data, and not directional causality.

Summary

Violence and disruptive behavior in schools have a negative impact on student academic achievement and student attendance. Students who do not feel safe in their schools cannot focus on the academics and interpersonal relationships that schools strive to provide. Positive school climate has been linked with better student attendance and achievement and less violent and disruptive behavior in schools. Schools should therefore attempt to implement programs which will improve school climate. PBIS is a school-wide behavioral framework that has the potential to improve school climate. This study is designed to further examine the link between school climate and student outcome variables, and to examine the strength of the relationship between the use of PBIS and student outcome variables. This chapter has served to introduce the problem of violence and disruption in schools, the link between school climate and violence and disruption, and PBIS as a potential solution to improving school climate. It has also introduced the research design. The following chapters review the literature on the topic, establish the

theoretical framework for changing school climate, and describe methods used to collect and analyze the data.

Chapter 2

Literature Review

School violence is a significant educational problem (Scheckner & Rollin, 2003) facing school administrators across the country. Students are victimized in schools across the nation, and many who are not victimized are aware of the victimization suffered by their peers (Astor, Benbenishty, Zeira, & Vinokur, 2002). According to the 2011 Youth Risk Behavior Survey (CDC, 2012), 7.4% of students surveyed reported being threatened or injured with a weapon on school grounds, and 12% reported having been in a physical fight on school property in the 12 months prior to the survey. It seems unlikely that students who fear violence in the school environment would be able to focus on academics (Griffin, Chen, Eubanks, Brantley, & Willis, 2007). Others fail to attend school at all due to the fear of being victimized (Astor et al., 2002). Because violence detracts from the educational mission of schools, it seems reasonable that schools should provide students access to some means of violence prevention (Scheckner & Rollin, 2003). Many students who commit violent acts in adolescence had never committed a violent act in the past and showed no signs of risk (Breunlin, Cimmarusti, Bryant-Edwards, & Hetherington, 2002), so these means of violence prevention need to address the entire student body through policies and/or programs.

Zero tolerance policies are often employed by schools to prevent violence. Zero tolerance in schools originated with the 1980s' war on drugs, but found its way into legal language with the Gun Free Schools Act of 1994 (Fuentes, 2003). Originally intended to protect schools from students carrying dangerous weapons or attempting to distribute narcotics, zero tolerance has grown to encompass much more. In some places zero

tolerance rules are enforced so strictly as to include seemingly innocuous items as over-the-counter medications or tools for manicuring nails. Although reports show a significant decline in school violence between the early 1990s and today, zero tolerance policies continue to become tougher and more rigid (Martin, 2001). These and other harsh disciplinary practices have been shown to make problem behavior worse (Kern & Manz, 2004). Although these policies are designed to make schools safer, schools with harsh zero-tolerance policies often leave students feeling less safe than their peers in schools with more moderate discipline policies (McNeely, Nonnemaker, & Blum, 2002).

The question of balancing the rights of students with disabilities with school safety presents many challenges in this age of zero tolerance. According to Turnbull, Wilcox, Turnbull, Sailor, and Wickham (2001) this question can be misleading and dangerous. Zero tolerance policies leave no room for individualization or for the discretion of decision-makers. They simply provide an often too harsh one-size-fits-all approach that is more likely to have adverse impacts on those whose judgment is not as good or whose disabilities stand in the way of always making good decisions. These students need to be considered when planning to prevent violence.

Metal detectors, security guards, and surveillance cameras are also used in schools to prevent violence. Hankin, Hertz, and Simon (2011) found the data on the efficacy of metal detectors reducing violence to be inconclusive, and they noted that evidence existed that the presence of metal detectors negatively impacted students' perceptions of safety. Each of these methods may promote safety in some schools, but they add to an atmosphere of fear and intimidation in others (Peterson & Skiba, 2001). As this fear increases, students' confidence in adults weakens leaving some feeling that

they need to handle situations themselves (Welsh, 2001). According to Maslow's Hierarchy of Needs, people who do not feel safe cannot focus on other needs such as positive social experiences and personal accomplishments (Maslow, 1943). When disorder and risk become common in the school, academics become secondary concerns (Plank, Bradshaw, & Young, 2009). By providing a safe school environment, schools can help students return their focus to academic achievement (Kitsantas, Ware, & Martinez-Arias, 2004). This can be accomplished by improving a school's climate.

Positive school climate has been found to be associated with lower victimization (Astor et al., 2002; Battistich & Horn, 1997; Gottfredson et al., 2005; Payne et al., 2003; Sprott, 2004; Welsh, 2001), less substance use (Battistich & Horn, 1997; Brand et al., 2003; Kitsantas et al., 2004), decreased delinquency (Battistich & Horn, 1997; Brand et al., 2003; Gottfredson et al., 2005; Payne et al., 2003, Sprott, 2004; Welsh, 2001), and fewer incidents of minor school misconduct (Brand et al., 2003; Wang et al., 2010; Welsh, 2001).

Specific elements of school climate have been found to be related to specific outcomes. Positive personal interactions in school were found to be positively related to safety (Welsh, 2001), behavior (Brand et al., 2003; Wang et al., 2010; Welsh, 2001), and socioemotional adjustment (Brand et al., 2003), and negatively associated with violence (Sprott, 2004; Welsh, 2001) and school avoidance (Welsh, 2001). Better attitudes and beliefs about academics were found to be positively related to academic achievement (Brand et al., 2003) and behavior (Welsh, 2001), and negatively related to delinquency (Sprott, 2004; Welsh, 2001). Fairness and clarity of the school's discipline policy was found to be positively related to safety (Kitsantas et al., 2004; Welsh, 2001) and student

behavior (Welsh, 2001), and negatively related to substance use (Kitsantas et al., 2004), delinquency (Gottfredson et al., 2005; Welsh, 2001), and victimization (Gottfredson et al., 2005; Welsh, 2001).

School climate and specific student outcomes have been determined in the literature to be related. However, the literature does not specify that positive school climate causes better student outcomes or if better student outcomes cause a positive school climate. This is because the two concepts are interwoven. It is possible that a positive school climate would improve students' attitudes and perceptions allowing them to feel safer, relate better with peers and staff, and try harder academically. However, it is also possible that in schools where students feel safer, relate better with their peers and staff, and try harder academically the climate is better. The directionality of the two is difficult if not impossible to prove. The implied direction of the relationship in the literature appears to be that school climate impacts student outcomes. For this reason, I have also chosen to view the relationship in this way.

Theoretical Framework

In order to maintain a positive school climate, schools must reduce or eliminate the factors that are destructive to school climate. Violence, delinquency, substance abuse, bullying, and other risk behaviors undermine school climate. There are several theories that deal directly with these undermining effects. In 1943 Abraham Maslow proposed a hierarchy of human needs. He believed that the most basic human needs must be met before individuals would strive to meet higher needs. At the base of his hierarchy was physiological needs including basic nutrition and other necessary life functions. Next he believed humans strive for safety physically and emotionally. With these

achieved they seek love and belonging, esteem and respect, and self-actualization.

Without meeting the lower needs, few humans are able to concern themselves with the higher needs. And it is those higher needs that help to manifest positive school climate.

Travis Hirschi (1969) developed his own theory on deviant behavior in which he purported that an individual's connection with society keeps him or her from committing deviant behaviors. Hirschi suggested that an individual who has strong attachments to others, is committed to conventional values, is involved in conventional activities, and believes in societal norms is unlikely to be involved in deviant behavior. However, without these social controls, individuals are likely to gravitate toward deviant behavior. Hirschi later amended this with the help of Michael Gottfredson to include that self-control plays a role and that deviant behavior is often in pursuit of pleasure or avoidance of pain (Gottfredson & Hirschi, 1990).

However, the theories of Maslow, Hirschi, and Gottfredson and Hirschi can all be tied into the work of William Glasser. In 1998 Glasser published his Choice Theory. Choice Theory suggests that all human behavior is a choice and that behaviors are intended to meet basic needs. Those needs include survival (similar to Maslow's physiological and safety needs), love and belonging, power (similar to Maslow's esteem), freedom, and fun. Because all behavior is with the intention of meeting those needs, schools must be designed to help students meet those needs. Students cannot be externally motivated by punishments or rewards unless those consequences in some way meet one or more of the student's needs. A positive school climate is one that is designed to meet students' needs for survival (safety and discipline), love and belonging (positive peer and staff relations, connectedness, involvement), and power (respect and support

from staff, influence on school policies, achievement). If those needs are met, students will be more likely to choose pro-social behaviors that help to improve school climate rather than choosing negative behaviors that are destructive to school climate.

Based on researchers' findings and behavioral theory, developing a positive school climate should be one of the foremost goals of school administrators. The question then facing administrators is how to develop a positive school climate. This review of the literature will help to establish the link between school climate and many of the above outcomes. It will then propose PBIS as a means to improve climate in schools.

Methods for Selecting Literature

I started my search for studies for inclusion in this review by examining the reference list from an article on the relationship between school violence and school climate (Greene, 2008). From this source I found five references that I thought would be useful to my review (Battistich & Horn, 1997; Cook, Murphy, & Hunt, 2000; McNeely, Nonnemaker, & Blum, 2002; Payne et al., 2003; Sprott, 2004). I then conducted a preliminary internet search using Google Scholar. I first used the search terms "school climate and school violence" and received over 300,000 returns. I only examined abstracts from the first few pages of those returns, but stopped when I found that the returns were less and less relevant. I found eight references that I thought would be useful to my review, three of which were not included in the Greene (2008) reference list (Astor, Benbenishty, Zeira, & Vinokur, 2002; Gottfredson et al., 2005; Wilson, 2004). I then entered the search terms "school climate and school disorder" and received more than 115,000 returns. Again, I only reviewed abstracts from the first few pages of terms before I felt that most returns were not relevant to my research. I found only two

references that were not discovered in my previous searches (Stewart, 2003; Welsh, 2001). I then entered the search terms “school climate and school safety” and received more than 325,000 returns. I again reviewed abstracts from only the first few pages of returns and only one was added to reference list (Brand et al., 2003).

I continued my search for references through EBSCO Host. I conducted an advanced search using multiple databases (Education Research Complete, Academic Search Premier, ERIC, PsychARTICLES, PsychINFO, and Psychology and Behavioral Sciences Collection) that could be accessed at once using EBSCO Host. I limited my search to articles published in peer reviewed journals, with reference lists available, and published since 2000. I chose the year 2000 as my starting point both to limit the volume of school climate studies returned and to keep data as current as reasonable while still being thorough. In my first search I entered the terms “school climate and disorder” and received 598 returns. I reviewed titles for key terms and read abstracts of those that were most relevant. Of those, five references appeared to be of use and had not been discovered in my previous searches (Chen, 2007; Chen & Weikart, 2008; LeBlanc, Swisher, Vitaro, & Tremblay, 2007; Plank, Bradshaw, & Young, 2009; Wang, Selman, Dishion, & Stormshak, 2010). I then searched “school climate and violence” and received 403 returns, again reviewing titles for key terms and reading abstracts of those that were most relevant. In this search I found six additional studies (Bradshaw, Koth, Thornton, & Leaf, 2009; Cushing et al., 2003; DeRosier & Newcity, 2005; Kitsantas et al., 2004; Koth, Bradshaw, & Leaf, 2008; Ripski & Gregory, 2009). I then searched “school climate and safety” and received 469 returns, again reviewing titles for key terms

and reading abstracts of those that were most relevant. Only one of these added to my review (Brand, Felner, Seitsinger, Burns, & Bolton, 2008).

I used ancestry to search for other studies in the reference lists of the references already discovered. I only found one additional reference that I believed would add something to my review (Battistich, Solomon, Kim, Watson, & Schaps, 1995).

Finally, I requested sources from colleagues familiar with the school climate and its impact on violence and safety. I was referred to four articles that I had not previously seen (Caldarella, Shatzer, Gray, Young, & Young, 2011; Hopson & Lee, 2011; Hurford et al., 2010; Mitchell, Bradshaw, & Leaf, 2010).

Selection criteria. In order to be used in the corpus of my review, I selected studies based on several criteria. Studies had to examine the link of school climate with school disorder, school violence, or school safety, or the link between school climate and PBIS. I ruled out studies that focused on bullying or bully prevention, dropout rate, violence in relationships, and lesbian, gay, bisexual, and transgender issues. Each of these issues has its own body of literature, and is focused on that issue rather than on school climate.

In my search I discovered several articles that discussed the relationship between school climate and school safety or the efficacy of PBIS that provided no original data. I used some of them as references to inform my review, but they were not themselves reviewed as I was only looking at studies that used quantitative methods to analyze original data.

Search results. Based on my selection criteria, I found 29 studies to review. Twenty-five of the studies compared a measure of school climate with measures of

violence, disorder, or student achievement. One discussed a program designed to change the climate of schools, and three looked at the results of implementation of PBIS.

Twenty-four of the studies used non-experimental designs and simply measured correlations between predictor and outcome variables. Two studies used randomized effectiveness trials, and one attempted to use a randomized control trial, but fell short due to attrition and other factors. Two studies used pre-test post-test designs to test interventions. Twenty-six of the studies employed data collected in the United States, two from Canada, and one from Israel. Eight studies used elementary school populations, nine used middle school populations, and seven used high school populations separately, while one used elementary and middle school populations, three used middle school and high school populations, and the last used elementary, middle, and high school populations.

School Climate

School climate is feelings that students and staff have about the school environment (Peterson & Skiba, 2001). It consists of attitudes, norms, and beliefs throughout the school (McEvoy & Welker, 2000). Although no singular definition of school climate exists (Cohen et al., 2009; Zullig et al., 2010), the National School Climate Center (2013) website states:

School climate refers to the quality and character of school life. School climate is based on patterns of students', parents' and school personnel's experience of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures.

A sustainable, positive school climate fosters youth development and learning necessary for a productive, contributing and satisfying life in a democratic society. This climate includes:

- Norms, values and expectations that support people feeling socially, emotionally and physically safe.
- People are engaged and respected.
- Students, families and educators work together to develop, live and contribute to a shared school vision.
- Educators model and nurture attitudes that emphasize the benefits and satisfaction gained from learning.
- Each person contributes to the operations of the school and the care of the physical environment.

The construct of school climate includes components such as students' perceptions of the fairness of school rules, students' perceptions of the clarity of rules, positive peer relationships, staff respect for students, and student influence in the school (Brand et al., 2003; Cushing et al., 2003; Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Welsh, 2001). In her 1982 review of research on school climate, Anderson pointed out several differing constructs of school climate that she had found. Cohen et al. (2009) reviewed research and determined that safety, teaching and learning, relationships, and environmental or structural aspects were the key areas of school climate. Zullig et al. (2010) determined that the best construct of school climate included order, safety, and discipline, academic outcomes, social relationships, school facilities, and school connectedness. Fan, Williams, and Corkin (2011) found order, safety, and

discipline, teacher-student relationships, and fairness and clarity of school rules to be three important aspects of school climate. Although researchers do not always use the same construct for school climate, they almost always take into consideration the feelings that staff and/or students have about the school environment, and they frequently utilize similar elements of school climate.

School climate is a concept that has been recognized by educators since the early 1900s and studied since the 1950s (Cohen & Geier, 2010; Cohen et al., 2009; Zullig et al., 2010). The methods, theories, and instruments used to measure school climate came from the business world where organizational climate was determined to impact employee morale and productivity (Anderson, 1982). These methods continued to develop in universities and in individual classrooms in schools (Anderson, 1982). School climate at the building level became a focus because classrooms are nested within schools, and their climate is influenced by the climate of the school (Anderson, 1982).

School climate versus school culture. School climate and school culture are terms that are often used interchangeably. However, many authors argue that they are distinctive concepts (Glover & Coleman, 2005; Gruenert, 2008; Stover, 2005; van Houtte, 2005). Stover (2005) put the distinction most succinctly in stating that school climate is how staff and students feel about their school while school culture is why they feel that way. School climate is about feelings or perceptions while school culture is about norms, beliefs, and practices. Climate is a school's mood while culture is a school's personality (Gruenert, 2008).

Although it has been argued that the two concepts are distinct, the body of literature on school climate contains elements both of school climate and school culture

in the same conceptualization. Even the National School Climate Center's (2013) definition of school climate contains elements of climate (e.g. people's experiences and feelings) and elements of culture (e.g. norms, values, expectations) despite differentiating between the two in their literature.

Because the two concepts are so intertwined, and because the body of literature does not make a clear distinction between which constructs represent culture and which represent climate, for the purposes of this study I use the concept of school climate to capture both climate and culture.

Elements of school climate. Numerous studies have analyzed the impact of school climate on achievement, violence, misconduct, and safety. Most studies have measured climate using surveys. Some have viewed school climate through student surveys, others using school staff surveys, and others using parent surveys. Some studies have used data from surveys on two or more of those groups. In other cases school climate has been measured by objective data such as student attendance rates, school size, school office referrals, suspensions, and expulsions. Although different studies construct school climate differently, many elements are common among studies.

Some elements are more common than others. A variable that depicts relationships between staff and students is common among studies. This can be measured as teacher support of students (Astor et al., 2002; Battistich & Horn, 1997; Battistich et al., 2005; Brand et al., 2003), teacher respect for students (Kitsantas et al., 2004; Welsh, 2001), or personal relationships between students and staff (Battistich & Horn, 1997; Battistich et al., 2005; Cook, Murphy, & Hunt, 2000; Cushing et al., 2003; Wilson, 2004). A measure of peer relations is also quite common among the studies

(Battistich & Horn, 1997; Battistich et al., 2005; Brand et al., 2003; Cook et al., 2000; Cushing et al., 2003; DeRosier & Newcity, 2005; Sprott, 2004; Stewart, 2003; Wilson, 2004). Student knowledge of, understanding of, and belief in the rules system of the school is common and is represented by measures such as fairness of rules (Astor et al., 2002; Brand et al., 2003; Cushing et al., 2003; Gottfredson et al., 2005; Kitsantas et al., 2004; McNeely et al., 2002; Welsh, 2001; Wilson, 2004), clarity of rules (Astor et al., 2002; Brand et al., 2003; Gottfredson et al., 2005; Welsh, 2001; Wilson, 2004), and belief in rules (Payne et al., 2003; Stewart, 2003). Concerns about safety and discipline in the school are also commonly considered (Brand et al., 2003; Cushing et al., 2003; DeRosier & Newcity, 2005; Kitsantas et al., 2004; Koth, Bradshaw, & Leaf, 2008; LeBlanc, Swisher, Vitaro, & Tremblay, 2008; McNeely et al., 2002; Welsh, 2001; Wilson, 2004). Student commitment to school and academics is a common element that can be measured as commitment to academic achievement (Brand et al., 2003; Cook et al., 2000; DeRosier & Newcity, 2005; Kitsantas et al., 2004; Koth et al., 2008; LeBlanc et al., 2008; Sprott, 2004) or commitment to school (Kitsantas et al., 2004; Payne et al., 2003; Stewart, 2003).

Some of the less common elements that are considered a part of climate include student influence on policies (Astor et al., 2002; Battistich & Horn, 1997; Battistich et al., 2005; Brand et al., 2003; Welsh, 2001), the physical structure and maintenance of the school (Astor et al., 2002; McNeely et al., 2002; Wilson, 2004), participation in school activities (DeRosier & Newcity, 2005; McNeely et al., 2002; Stewart, 2003), and parental involvement in the school (Cook et al., 2000; Stewart, 2003). And still more elements are considered in individual studies. Each of these elements plays a role in school climate and has an impact on student behavior and student achievement.

Relationship of school climate with violence, disorder, and achievement. The association between school climate and variables such as violence, disorder, and academic achievement has been established in the literature. Although the constructs of variables are different in various studies, the general concept of a positive climate is a relatively consistent one. A positive climate is associated with positive interpersonal relationships among those in the school, and there is a high level of commitment to the school when the climate is positive. Students who perceive that school is supportive and caring and who feel that they have some influence in school will become more attached to school and accept school norms and values (Battistich et al., 1995). Students who feel cared for and who feel like they are a part of the school are less likely to engage in risk behaviors such as substance abuse, violence, or early sexual activity (McNeely et al., 2002). When students feel safe in school they are able to better focus on academic activities (Chen & Weikert, 2008). When these factors exist in the eyes of staff or students, higher achievement and lower violence and disorder tend to be present. The construct of climate and the interpretations drawn from it can differ depending upon whether that measure of climate is from extant school data or from the perspective of staff or students.

Extant data measures of climate. Data based on the opinions or perceptions of individuals can be erroneous in that those perceptions are colored by their own past experience (Anderson, 1982). Existing data that does not mix the opinions of individuals would seem to be the most objective means to assess school climate. Two studies relied on extant school data to construct variables of school climate. Each used similar methods

based on schools at different levels in New York City to examine the connection among school climate, school disorder, and student achievement.

Chen (2007) examined the associations among student background, school disorder, school climate, and student achievement. To do so he employed data collected by the New York City Department of Education on aggregate student demographics, student achievement, school behavioral incidents, school size, and student attendance. He used data from 613 elementary schools in New York City to construct his variables and test his hypotheses. He constructed a student achievement variable using fourth grade math and English Language Arts exams. School disorder consisted of measures of school safety incidents. School climate was constructed from total student enrollment and student attendance rate. Student background was constructed from the percentage of white students in the school and percentage of students receiving free and reduced lunches in the school. He analyzed his data using structural equation modeling.

The author constructed and tested a structural equation model. His model accounted for 71% of the variance in student achievement. He found that student poverty had a significant direct effect on disorder ($\beta = .26, p = .003$) and on achievement ($\beta = -.32, p < .001$), and an indirect effect on achievement mediated by student attendance. Because student attendance serves as a mediator for much of the total effect of student poverty on student achievement (approximately 42%), high poverty schools can have an impact on achievement by improving student attendance rate. He also found that school size ($\beta = -.11, p < .001$) and student attendance ($\beta = .39, p < .001$) had significant direct effects on student achievement. In addition, he found that school disorder had significant

direct effects on achievement ($\beta = -.17, p < .001$) and attendance ($\beta = -.37, p < .001$), and indirect effects on achievement mediated by student attendance.

Chen and Weikart (2008) studied the associations among student background, school disorder, school climate, and student achievement in 212 middle schools in New York City. They employed the same methods and variables as Chen (2007), but used middle school data rather than elementary school data. The student achievement variable was based on eighth grade math and English Language Arts exams.

The authors constructed a structural equation model which accounted for 82% of the variance in average student achievement. They found that student background had a significant direct effect on attendance rate ($\beta = .43, p < .001$), on school disorder ($\beta = -.42, p < .001$), and on student achievement ($\beta = .42, p < .001$). School disorder had a direct effect on student achievement that was not significant ($\beta = -.07, p = .163$), but had a significant total effect ($\beta = -.33, p < .001$) when the indirect effect mediated by attendance rate ($\beta = -.26$) is added. This implies that disorder detracts from student attention to academics in school, but that it also keeps students from attending school which combine for a total effect of lower achievement.

Existing data can prove to be a more objective means of determining school climate than using opinions of teachers or students. However, these data are not without limitations. Often more objective data may not be closely linked to outcomes (Anderson, 1982). Existing data may not fit the accepted constructs of school climate. In the cases of these studies, school climate is constructed by variables that many other studies control for when measuring the effects of their school climate variables. If these are considered by many to be variables that confound the effects of school climate, they may not be the

best variables to use to construct a school climate variable. Furthermore, the importance of school climate is in the way that people view their school. An individual's perception of his surroundings controls how he responds to those surroundings (Anderson, 1982). That would imply that a better way to measure school climate would be through the opinions of the staff and students who experience it.

Staff measured climate. Two studies conducted in Canada examined the connection between teachers' views of school climate and antisocial behavior in adolescents. Both studies relied on longitudinal data for their analysis.

LeBlanc, Swisher, Vitaro, and Tremblay (2008) examined the connection between adolescent antisocial behavior and high school social climate. The authors relied on longitudinal data that were collected from the time the students were kindergarten. The sample consisted of 1233 students from 217 high schools. Researchers collected data on antisocial behavior from the students, and data on school climate variables from the teachers. Control variables included students' disruptive behaviors in elementary school and students' family adversity. They analyzed the data using hierarchical linear modeling.

The elements of school climate employed by the authors included teachers' perceptions on classroom behavior problems, the schools' academic focus, the teachers' professional autonomy, and the teachers' job satisfaction. These were then correlated with students' violent and nonviolent antisocial behavior. After controlling for individual and family variables in the students, only teachers' perceptions on classroom behavior problems was found to be associated with students' violent ($\beta = .294, p < .01$) and

nonviolent ($\beta = .740, p < .05$) antisocial behavior. The other three teacher measures of school climate were not found to have a significant association with antisocial behavior.

Sprott (2004) investigated the link between school and classroom climates and the development of delinquency in children. The author examined data from the Canadian National Longitudinal Study of Children and Youth (NLSCY). She compared classroom data from 1996-1997 (Time 1) to offending behavior in 1998-1999 (Time 2). Her sample included 1311 cases. The dependent measures included the number of times in the previous year that the student had perpetrated an act of violence (Violence) and the number of times in the previous year that the student had committed a property offense (e.g. theft, vandalism - Property). The independent measures were an accumulation of the child's negative individual and environmental factors, the child's overall ability, the child's previous history of aggression, the child's academic focus and classroom social interactions as measured by the teacher, and a series of teacher ratings regarding teacher/administration relations and teacher involvement in the school.

The author used an ordinary least squares regression to analyze the effects of classroom and school climate on both violent offending and property offending. Positive social interactions in the classroom had a strong negative association with violent offending ($\beta = -.097, p < .01$). Classrooms with more positive social interactions at Time 1 had students with significantly lower violent offending at Time 2 than classrooms with fewer positive social interactions. Academic focus was found to have a strong negative association with property offending ($\beta = -.103, p < .01$). Classrooms with greater Academic Focus at Time 1 had students with significantly lower property offending at Time 2 than classrooms with less Academic Focus. The combination of these results

showed that when controlling for student risk factors, elements of classroom climate were significantly related to delinquent behavior.

In both of these studies, the independent variable was measured by teachers and the dependent variable was measured by students. Both studies found that teachers' perceptions of climate in the classroom were related to students' violent and nonviolent offending behavior. One possible drawback to this type of analysis is that teachers and students may view climate variables differently. According to Hurford et al. (2010), student and staff reports of the threat of violence sometimes differ by up to 40%. If that is the case, then using predictor variable data from one group and outcome variable data from another may not produce optimal results. Considering predictors and outcomes from both groups might paint a clearer picture of a school's climate.

Staff and student measured climate. Using the perceptions of both staff and students as they relate to the construct of school climate provides a more complete view of climate in that more stakeholders' views are represented, and each group's perceptions of climate might be more closely related to their own school experiences. Five studies used elements of school climate from both staff perspective and student perspective.

Brand, Felner, Seitsinger, Burns, and Bolton (2008) set out to develop a tool to measure teacher –perceived climate, test that against a similar tool measuring student-perceived climate, and examine the relationship of teacher-rated climate and students' academic achievement and adjustment. They first developed and piloted Inventory of School Climate – Teacher (ISC-T), a 60 item tool measuring teacher-perceived school climate. After pilot surveys and analyses, they narrowed the tool to 29 items which loaded onto 6 factors. They then conducted the survey with a sample of 3312 teachers in

187 schools in the first year of implementation, 5475 teachers in 301 schools in the second year of implementation, and 6209 teachers in 312 schools in the third year of implementation. In year two, 173 schools were still involved from the original 187, and in year three, 144 schools were still involved. Of the 187 schools from year one, 185 administered the Inventory of School Climate – Student (ISC-S) to almost 104,000 students. In order to test the stability of teacher ratings over time, they used correlations in the ratings between years one and two and years two and three. They also used correlations to examine the relationships between teacher and student ratings of school climate.

Between years one and two, teacher climate ratings were stable across all measures (correlations between $r=.46$ and $r=.72$) as they were between years two and three (correlations between $r=.48$ and $r=.67$). Correlations between teacher- and student-rated climate were statistically significant for variables measuring similar constructs (e.g. teacher safety problems and student safety problems $r=.44$, $p<.001$).

The researchers used hierarchical linear modeling to examine the relationship between teacher-rated school climate and student academic achievement and adjustment. They measured academic adjustment with standardized tests, grade point average, academic potential, student-rated academic expectations, aspirations, and efficacy. Behavioral adjustment was measured with teacher classroom behavior ratings and student-reported delinquency and substance use. Socio-emotional adjustment was measured with student-reported self-esteem, depression, and anxiety. The teacher climate variable Achievement Orientation was the strongest predictor of student academic achievement accounting for approximately 4% of the between-school variance

in reading scores ($\beta=28.3, p<.05$) and approximately 11% of the between-school variance in math scores ($\beta=60.7, p<.001$). Peer sensitivity and Disruptiveness were the strongest predictors of student behavioral adjustment. Peer sensitivity accounted for 19.6% of the between-school variance in Delinquency, and Disruptiveness accounted for 16.2% of the between-school variance in Delinquency. Student socio-emotional adjustment was best predicted by Academic Orientation and Disruptiveness, as both had statistically significant associations with Self-Esteem and Depression.

Gottfredson, Gottfredson, Payne, and Gottfredson (2005) examined the association of school organizational characteristics and elements of school disorder. The authors used data from the National Study of Delinquency Prevention in Schools for their analyses. Their sample consisted of 254 secondary schools in the United States. They collected data on measures of school disorder including teacher victimization, student victimization, and student delinquency. They correlated that data with school climate variables including student-rated fairness of rules and clarity of rules, and teacher-rated organizational focus, morale, planning, and administrative leadership. They controlled for a variety of demographic variables. The authors analyzed the data using ordinary least squares regression and structural equation modeling.

The model employed by the authors explained 46% of the variance in student delinquency, 14% of the variance in student victimization, and 13% of the variance in teacher victimization. The authors found that Discipline Management variables (fairness of rules and clarity of rules) had strong negative associations with Student Victimization ($\beta = -.36, p < .01$) and Student Delinquency ($\beta = -.68, p < .01$), and that Psychosocial Climate variables (organizational focus, morale, planning, and administrative leadership)

had a strong negative association with Teacher Victimization ($\beta = -.46, p < .01$). Student measured climate variables had strong associations with student measured disorder variables and teacher measured climate variables had strong associations with teacher measured disorder variables. The authors ruled out a pattern of correlations due to measurement artifacts. It does make sense, however, that students' views of climate will relate to their views of disorder, the same holding true for teachers.

Koth, Bradshaw, and Leaf (2008) examined the relationship that individual-, classroom-, and school-level factors have with school climate. The data that the authors utilized were from a larger study on Positive Behavioral Interventions and Supports (PBIS). The sample included 2468 fifth-grade students from 37 elementary schools in Maryland. The students completed surveys on school climate which measured order and discipline in the school and academic motivation of the students. The teachers completed questionnaires on personal demographics as well as surveys on students' disruptive behaviors. The authors also used school characteristics in their analysis. They analyzed their data using hierarchical linear modeling.

The authors found that the variance in academic motivation was not significantly explained by differences among schools ($r^2 = .05$), but was significantly explained by differences among students ($r^2 = .86$). The variance in order and discipline was explained mostly by differences among students ($r^2 = .65$), but the differences among schools ($r^2 = .27$) also explained a significant portion of the variance. In classrooms where there were more behavior problems, students rated school climate significantly lower ($\beta = -.27, p < .01$) than students in the same school from classes with fewer behavior problems. The interaction of class size and teacher experience also had a significant negative

relationship with order and discipline ($\beta = -.98, p < .01$). The authors also found that larger schools had significantly lower levels of academic motivation ($\beta = -.02, p < .01$), and schools with greater teacher turnover had lower scores on order and discipline ($\beta = -.25, p < .01$).

Mitchell, Bradshaw, and Leaf (2010) examined student and teacher perceptions of school climate and academic emphasis to determine what factors led to differences in those perceptions. The researchers gathered data from 1881 fifth graders and 90 fifth-grade teachers from 37 elementary schools in Maryland. The data were cross-sectional in nature. Data included measures of school climate gathered from students through the School Climate Survey and from teachers through the Organizational Health Inventory. Additionally, data were collected on classroom management, disruptive behavior, individual demographic data, and school demographic data. The researchers used hierarchical linear modeling to analyze their data.

The researchers found that poor classroom management had a negative association with teacher-rated climate ($\beta = -.008, p < .001$) and academic emphasis ($\beta = -.007, p < .01$). Disruptive behavior also had a negative association with teacher-rated climate ($\beta = -.004, p < .05$) and academic emphasis ($\beta = -.012, p < .001$). At the student level, disruptive behavior had a negative association with student-rated overall climate ($\beta = -.175, p < .01$) and academic emphasis ($\beta = -.106, p < .10$), but there was not a statistically significant association with poor classroom management and either outcome variable. When comparing student and teacher ratings, there was not a statistically significant association in student- and teacher-rated overall climate, but there was a negative

association between student- and teacher rated academic emphasis ($\beta=-4.035, p<.05$) when adjusting for student-, classroom-, and school-level variables.

Payne, Gottfredson, and Gottfredson (2003) studied the effects of communal organization in schools and student bonding on school disorder. Their study followed the idea in previous studies that schools that serve as communities help to increase student bonding to and investment in the school. They analyzed data from the National Study of Delinquency Prevention in Schools. Their sample consisted of 254 secondary schools in the United States. They used data on measures of school disorder including teacher victimization, student victimization, and student delinquency. They correlated those data with communal school organization variables including supportive and collaborative relations and common goals and norms, and with student bonding variables including attachment to school, belief in rules, and commitment to academics. They controlled for demographic variables and employed a structural equation model to analyze the data.

The authors found that in schools that were more communally organized there were significantly lower levels of teacher victimization ($\beta = -.41, p < .05$) and student delinquency ($\beta = -.11, p < .05$). Although student victimization was also lower, the results were not statistically significant ($\beta = -.06, p > .05$). They also found that in schools with higher communal organization there was greater student bonding ($\beta = .15, p < .05$). The authors determined that the relationship between communal school organization and student delinquency is mediated by student bonding and that student bonding has a significant direct effect on student delinquency ($\beta = -.79, p < .05$).

In each of the studies that considered climate data from both staff and students, a more complete idea of those schools' climate was available. However, in each study the

students' perception of school climate appeared to be more closely linked with student outcomes. If the goal of improving school climate is to improve student outcomes, then studies that focus primarily on students' perceptions of climate may be the most appropriate way to meet those ends.

Student measured climate. The way in which students perceive the climate of their school is linked to their behavior and their academic achievement (Brand et al., 2003; Chen, 2007; Dupper & Meyer-Adams, 2002; Koth et al., 2008; McEvoy & Welker, 2000; Wilson, 2004). Students' perceptions of climate may also be a better predictor of safety than actual incidents of violence (Furlong, Morrison, Cornell, & Skiba, 2004). It then would seem that a measure of school climate that only considered student perspectives would be the most appropriate in order to make connections between school climate, behavior, and safety. Sixteen studies reviewed measured student perceptions of school climate.

Astor, Benbenishty, Zeira, and Vinokur (2002) studied how students' perceptions of school climate, observed risk behaviors at school, and personal victimization at school impacted their perceptions of violence at their school. The researchers drew their data from a nationwide survey on school violence in Israel. They used only the data from tenth and eleventh grade high school students. Their final sample was 3518 students from 78 high schools. They then correlated data on school climate, observed risk behaviors, and victimization with perceptions of violence and missing school due to fear of violence. They employed a structural equation model to analyze the data.

The model that the authors used explained 23% of the variance in fear of attending school and 32% of the perceived seriousness of school violence. The authors

found that a positive school climate was negatively associated with perceptions of risk behaviors ($\beta = -.49, p < .01$), victimization by teachers ($\beta = -.36, p < .01$), and victimization by students ($\beta = -.18, p < .01$). There was a strong positive relationship between students who miss school due to the fear of violence and students who had been victimized at school ($\beta = .31, p < .01$). They also noted that the variable perceived seriousness of school violence problem was strongly associated with observed risk behaviors in school ($\beta = .55, p < .01$). The authors suggest that by improving climate schools could decrease observed risk behaviors and victimization in school and increase students' perceptions of their school as being safe.

Battistich and Horn (1997) examined the link between social context in school and elementary school students' involvement in problem behaviors. The sample included 1434 fifth and sixth grade students chosen from 24 elementary schools representing six school districts around the United States. Data on sense of community were collected from the three highest grades at the participating schools, but problem behavior data were only collected for students in the highest grade level in the school. Sense of school as a community was assessed through 38 questions that fell under the broad categories of caring and supportive interpersonal relationships and student autonomy and influence. Student problem behavior was assessed with questions about individual substance use, delinquent behaviors, and victimization at school. The authors analyzed the data using hierarchical linear modeling. The authors found that between schools sense of school as a community was negatively associated with drug use ($\beta = -.122, p < .05$) and delinquency ($\beta = -.105, p < .05$), and that within schools sense of school as a community

was negatively associated with drug use ($\beta = -.137, p < .001$), delinquency ($\beta = -.183, p < .001$), and victimization ($\beta = -.160, p < .001$).

Battistich, Solomon, Kim, Watson, and Schaps (1995) studied the impact of sense of school as a community on students in upper elementary grades in the United States. The authors used data from a larger study on students and teachers from six school districts across the United States. For this study they focused on student data. The sample consisted of 4515 students from the upper three grades of the 24 schools used in the study. The measures included student perceptions of school as a community (caring relationships in the classroom, caring relationships throughout school, and student autonomy and influence), poverty level, academic attitudes and motives, social and personal attitudes, motives, and behavior, cognitive/academic performance, academic achievement, and demographic measures. The authors used hierarchical linear modeling to analyze their data.

The authors found significant positive associations between how students viewed school as a community and enjoyment of class ($\beta = .590, p < .01$), liking for school ($\beta = .665, p < .01$), trust in and respect for teachers ($\beta = .767, p < .01$). They found that poverty had a significant negative association with performance in writing ($\beta = -.838, p < .01$), reasoning ($\beta = -.851, p < .001$), reading ($\beta = -.922, p < .001$), and math ($\beta = -.868, p < .001$), and that sense of school has a community only had a moderate positive association with one element of achievement (basic reading comprehension; $\beta = .448, p < .05$). Students' sense of school as a community also had a significant positive association with conflict resolution skills ($\beta = .940, p < .001$), prosocial motivation ($\beta = .843, p < .01$), and altruistic behavior ($\beta = .770, p < .01$).

Brand, Felner, Shim, Seitsinger, and Dumas (2003) examined the relationships among school climate, academic achievement, behavior problems, and socioemotional adjustment. The authors set out to develop a tool to reliably measure school climate in secondary schools. In order to do so, they conducted three separate studies. The first was to pilot the tool. The second was to confirm the tool's validity with a larger sample and to measure its consistency with diverse populations. In the third study, they examined the role that school climate played in students' academic achievement, behavior problems, and socioemotional adjustment after controlling for demographic factors. The data on school climate from study two were also used for study three. The authors also collected data from students, teachers, and archival sources to provide information on student adjustment and academic achievement. The authors examined several variables related to student adjustment, behavior, and achievement. Academic achievement was determined using standardized test scores. A measure of GPA was determined by a question on the student survey asking them to rate their grades on a five-point scale (1 = Ds and lower; 5 = As and Bs). Academic potential was assessed for each student by teacher survey. Academic expectations were determined by student survey of what their own expectations were and what they perceived the expectations of their teachers to be. Academic aspirations were measured by student survey of how important high school graduation and college attendance were to them and their families. Classroom behavior was determined by the teacher ratings of students. Delinquency, drug attitudes, substance use, self-esteem, anxiety, and depression were all determined by the results of student self-ratings. The authors analyzed the data using hierarchical linear modeling.

Student commitment to academic achievement had a significant positive relationship with standardized test scores (reading $\beta = 49.8$, $p < .05$; math $\beta = 94.5$, $p < .001$) after controlling for SES, and it was the strongest predictor of test scores accounting for 4.6% of the between-schools variance in reading achievement and 11.7% of the between-schools variance in math achievement after considering SES. Student commitment to academic achievement was also the strongest predictor for GPA accounting for 15% of the between-schools variance after considering SES, for 14.7% of the variance in academic expectations, for 18.5% of the variance in academic aspirations, and for 6.1% of the variance in teacher ratings of academic potential. Student behavior was best predicted by the school climate variable negative peer interactions as it accounted for 10.9% of the variance in classroom aggression, for 26% of the variance in delinquency, for 6.6% of the variance in drug use, and for 7.9% of the variance in alcohol use. Other variables that were related to student behavior problems included negative relationships with teacher support, student commitment to academic achievement, and instructional innovation, and a positive correlation with safety. Students' reports of higher levels of self-esteem and lower levels of depression were associated with higher levels of teacher support, structure, student commitment to academic achievement, positive peer interactions, and instructional innovation, and with lower levels of safety problems.

Cushing, Horner, and Barrier (2003) examined the impact of peer-delivered social consequences on student behavior by developing and testing a tool to measure student social climate by direct observation of behavior. The first of two studies examined the adequacy of the assessment instrument for student social climate. The second was to

compare data collected from this tool with that of a previously validated tool used to measure climate. The sample consisted of 572 students from 12 elementary schools and 3 middle schools in the Pacific Northwest. The data collected included staff observation data on ten targeted behaviors (e.g. running, littering, teasing, etc.) and the peer social consequences that followed those behaviors, and climate surveys completed by the students. The authors analyzed the data using Pearson product-moment correlation analyses.

The authors found that school climate had a significant negative association with problem behaviors in school ($r = -.52, p < .05$). Specifically, they found that schools that were rated high on fairness had lower rates moderate problem behavior (e.g. teasing, verbal disruption, profanity, etc., $r = -.55, p < .05$). They also found that schools with better student relationships had fewer problem behaviors overall ($r = -.60, p < .05$) and fewer moderate-intensity behaviors specifically ($r = -.62, p < .05$). Higher scores in school leadership were also associated with fewer behavior problems ($r = -.53, p < .05$). As all of these associations are bivariate correlations, they fail to account for interactions with or to control for each other.

DeRosier and Newcity (2005) studied the relationship between several character traits which served as school climate indicators and students' perceptions of school safety. They administered questionnaires to a sample of schools within the Pittsburgh Public School District that included 64 students from two elementary schools, 132 students from one regular middle school and one alternative middle school, and 27 students from one vocational high school. The students completed surveys that measured students' perceptions of school climate and students' perceptions of school safety. Safety

measures were divided into three categories: interpersonal safety, environmental safety, and criminal or delinquent behavior. Interpersonal safety included student fights, student and adult fights, expected to work/learn, counselors to talk to, teachers care, teachers teach so students learn, teachers are role models, parents involved, consistent discipline. Environmental safety included student perceptions that there was enough supervision, that they were safe during school, that they were safe at school events, that they were safe going to and from school, that there were after-school activities, that there was a safety plan, and that graffiti/vandalism was present. Criminal or delinquent behavior included trespassing, guns or other weapons, gang symbols or violence, truancy, suspensions or expulsions, trouble with police, drugs or alcohol, and stealing property. The authors indicated that they used “correlational analyses” to investigate the association of students’ perceptions of school climate with school safety, but they did not specify what type of correlational analyses they used.

The authors found many interpersonal safety variables significantly correlated with school climate scales. The variable student fights had significant negative associations with nine of the character traits, and the variables teachers are role models and teachers teach so students learn each had significant positive associations with nine of the character traits. They also found that several measures of environmental safety were significantly correlated with school climate. The variable enough supervision had significant positive associations with eight character traits, and graffiti/vandalism had significant negative associations with nine of the character traits. Few criminal or delinquent behavior variables were significantly correlated with school climate variables. Because the authors failed to specify the type of correlation analyses they were using and

because they included no p-values with their data, the results that they present are difficult to analyze with any certainty.

Hopson and Lee (2011) tried to determine if school climate moderated the effects of poverty on grades and behavior. They used a cross-sectional design in which students attending the middle school and the high school in a small school district completed the School Success Profile (SSP), a survey that measured risk and protective factors associated with academic outcomes. The vast majority of the students in the district were white (86%) and 52% received free or reduced lunches. A total of 485 students from the two schools completed surveys. The researchers employed hierarchical linear modeling to analyze the relationships between predictor and outcome variables.

The researchers used items from the SSP to construct several predictor and outcome variables. Family poverty was determined by one item asking if the student did or did not qualify for free or reduced meals. Perceptions of school climate ($\alpha=.84$) included seven items about their feelings about the quality of their school and the relationships in the school. Parent support ($\alpha=.90$), neighbor support ($\alpha=.86$), and friend support ($\alpha=.88$) each were constructed from multiple items asking students the amount of support they feel they receive in each of those domains. Trouble avoidance behavior ($\alpha=.85$) consisted of eleven items asking about students engagement in problem behaviors. Grades were self-reported on a five-point scale (mostly As and Bs to mostly Ds and Fs). Two hierarchical linear models were conducted with grades and trouble avoidance behavior as the outcome variables.

In the first step of the model predicting grades, students with lower family income ($\beta=-.23, p<.001$) and male students ($\beta=-.23, p<.001$) reported lower grades. However,

when social support variables were added the effects from family income ($\beta=-.20$, $p<.001$) and gender ($\beta=-.19$, $p<.001$) were both reduced. Parental support ($\beta=.15$, $p<.01$) and friend support ($\beta=.13$, $p<.01$) were both significantly associated with better grades. When perceptions of school climate were added to the model, parent support and friend support were no longer significant. Perceptions of school climate ($\beta=.15$, $p<.01$) were significant in this model, but did not significantly impact the effects of family poverty and gender. The model explained 15% of the variance in grades ($R^2=.15$).

In the first step of the model predicting trouble avoidance behavior, students with lower family income ($\beta=-.20$, $p<.001$) and male students ($\beta=-.28$, $p<.001$) reported less avoidance of problem behavior. When parent support, neighbor support, friend support were added, family poverty ($\beta=-.16$, $p<.01$) and gender ($\beta=-.25$, $p<.001$) remained significant, but the effects of both were reduced. Parent support ($\beta=.15$, $p<.01$) and neighbor support ($\beta=.11$, $p<.05$) had a significant positive association with trouble avoidance behavior. When perceptions of school climate were added, family poverty and gender remained significant, but the effects of social supports were no longer significant. Perceptions of climate ($\beta=.35$, $p<.001$) had a significant positive association with trouble avoidance behavior. Family poverty and perceptions of climate had a significant interaction ($\beta=.51$, $p<.05$) suggesting that perceptions of climate do moderate the relationship between family poverty trouble avoidance behavior. This model explained 25% of the variance in trouble avoidance behavior ($R^2=.25$).

Hurford et al. (2010) set out to examine the validity of a web-based survey, and to compare students' perceptions of school climate variables and violence. They surveyed 806 students from two middle schools and two high schools in the Midwest using a paper

version of the School Violence Survey (SVS). They later had 130 of the students from the same sample complete a web-based version of the survey. They tested the instruments for reliability and compared them to ensure that they were producing similar results. When they compared the two instruments, they found only one variable for which there were significant differences in student responses based on administration type. They found both the paper version ($\alpha=.738$) and the web-based version ($\alpha=.733$) to have high internal consistency.

The researchers' next goal was to compare measures of school climate with violence. For this they used the results of the paper version of the SVS. The SVS consisted of 56 items about demographics, school climate, and violence. The authors used factor analysis to group the individual items into constructed variables and found five usable factors. School participation measured student engagement in school activities and feelings of social involvement. Demographic information included students' grades and ages. Social sensitivity-school measured how students felt about the school, their peers, and the staff. Group control measured students' feelings that specific social groups within the school were allowed by the administration to control other groups. Adult effectiveness measured students' beliefs that adults knew and supported them. Those five factors accounted for 89.6% of the variance.

The group control variable had the strongest relationships with dependent variables. Where group control was high, students felt less safe, felt that bullying was a problem, and reported more threats with weapons in school. Group control explained 11% of the variance in safety ($R^2=.1121$), 6% in bullying ($R^2=.064$), and 5% in threats

($R^2=.053$). In addition, when students did not feel supported by adults (adult effectiveness), students felt less safe in school.

Kitsantas, Ware, and Martinez-Arias (2004) used data from the School Safety and Discipline component of the 1993 National Household Education Survey (NHES) to test their hypothesis that students' perceptions of community safety and relative school safety would be related to their perceptions of school climate, fairness of rules, and school safety plans. A demographically representative sample of 3092 sixth, seventh, and eighth graders was selected from the larger sample. The variable categories selected for the purpose of this study were school safety, fairness of school disciplinary code, school climate, school safety actions, school substance abuse, community safety, and relative school safety. The authors used path analysis to analyze their data and to determine the effects of mediating variables.

In the model that the authors used 6% of the variance in fairness of disciplinary code was explained by relative school safety and community safety, 31% of the variance in school climate was explained by fairness of disciplinary code, relative school safety, and community safety, and only 1% of the variance in school safety actions was explained by community safety. The full model explained 14% of the variance in school substance use and 15% of school safety. Relative school safety (fairness of disciplinary code, $\beta = .23$, $p < .05$; school climate, $\beta = .11$, $p < .05$; substance use, $\beta = .19$, $p < .05$) had a stronger relation to school environment variables than did community safety (fairness of disciplinary code, $\beta = .14$, $p < .05$; school climate, $\beta = .09$, $p < .05$; substance use, $\beta = .09$, $p < .05$). Relative school safety had a significant indirect relationship with substance use ($\beta = .07$, $p < .05$) and school safety ($\beta = .08$, $p < .05$) through school

climate and fairness of disciplinary code. Community safety also had a significant indirect relationship with school substance use ($\beta = .05, p < .05$) and school safety ($\beta = .06, p < .05$) through school climate, fairness of disciplinary code, and school safety actions.

McNeely, Nonnemaker, and Blum (2002) studied the relationship between school connectedness and elements of the school environment. The researchers employed data from the National Longitudinal Study of Adolescent Health (Add Health), which used a nationally representative sample of seventh to twelfth graders in the United States. The sample included 83,074 students from 127 high schools. The data were drawn from surveys completed by students as part of the Add Health study. The authors measured school connectedness by using questions related to interpersonal relationships in school, feelings of safety in school, and belief in the fairness of adults in the school. Predictor variables included demographic data, harshness of discipline policies, teacher qualifications, and physical characteristics of the school. The authors analyzed their data using hierarchical linear modeling.

The authors found that 41.8% of the total variance in school connectedness was due to between-school variance. School connectedness had a negative association with harsh discipline policies ($\beta = -.143, p < .01$) and with school size ($\beta = -.089, p < .001$). They also found a positive association between school connectedness and extracurricular activity participation (i.e. percent in no extracurricular activities, $\beta = -.027, p < .05$).

Plank, Bradshaw, and Young (2009) used the “broken windows” theory to examine the idea that physical disorder in a setting can lead to social disorder. They used data collected from an anonymous survey that a school system developed and

administered annually to its students. The authors used data from a two-year period from students in grades six through eight at 33 schools that served those three years. Because the surveys were anonymous, the school was the unit of measurement rather than individual students. The authors used survey items to construct five variables: structural characteristics of the school, physical disorder, social disorder, collective efficacy, and fear. Because of limitations in the data including low power and problems caused by the anonymity of survey results, the authors used an ordinary least squares path analysis to analyze their data.

Using a series of models to test their hypotheses, the authors examined the relationships between physical disorder and social disorder. The third and fourth models of the four models explored each accounted for approximately 87% of the variance in social disorder in the second year, therefore explaining slightly more of the variance than the two previous models. With the third model they found structural characteristics had a significant direct negative association with social disorder in the second year ($\beta = -.28$, $p < .01$). Structural characteristics had a significant negative association with fear in the second year ($\beta = -.25$, $p < .05$). Physical disorder in the first year had a significant negative association with collective efficacy in the second year ($\beta = -.78$, $p < .001$) and a significant positive association with fear in the second year ($\beta = .67$, $p < .001$). Fear in the second year had a significant positive association with social disorder in the second year ($\beta = .51$, $p < .001$) and collective efficacy in the second year had a significant negative association with social disorder in the second year ($\beta = -.28$, $p < .05$). The fourth model only slightly rearranged the paths examined. With all models the authors

concluded that there was a strong association between physical disorder and social disorder even when accounting for prior social disorder and collective efficacy.

Ripski and Gregory (2009) investigated the impact of school climate variables at the individual and collective level on engagement, reading achievement, and math achievement. They used data from the Educational Longitudinal Study of 2002 (ELS:2002) which surveyed tenth grade students and their teachers from 752 public and private schools nationwide. From those schools the surveyors selected a sample of approximately 15,000 students. The authors selected survey items that measured student perceived unfairness of the school, hostility of the school, victimization in the school. These were considered the school climate variables, and they were compared with teacher perceived engagement of the students and standardized reading and math scores. The authors used hierarchical linear modeling to analyze their data.

The authors found that school climate at the individual and collective levels were associated with engagement and achievement. After considering demographic factors, individual student perceptions of unfairness ($\beta = -.10, p < .01$) and victimization ($\beta = -.24, p < .01$) were significantly related to student engagement. Individual student perceptions of unfairness ($\beta = .38, p < .05$), hostility ($\beta = -2.17, p < .01$), and victimization ($\beta = -1.157, p < .01$) were significantly related to student reading achievement. Individual student perceptions of unfairness ($\beta = .56, p < .01$) and hostility ($\beta = -2.12, p < .01$) were significantly related to math achievement. The authors noted that, unexpectedly, student perceptions of unfairness had a positive relationship with reading and math achievement scores, even though it had a negative relationship with engagement. The authors also found that collective student perceptions of hostility had a

significant relationship with engagement ($\beta = -.09, p < .05$) and reading achievement ($\beta = -1.42, p < .01$), but not math achievement ($\beta = -1.14, p = .16$). Collective student perceptions of neither unfairness nor victimization had significant relationships with engagement, reading achievement, or math achievement.

Stewart (2003) set out to investigate the association between school misbehavior and a variety of school- and individual-level factors. In order to do so, he used data from the National Educational Longitudinal Study which employed a nationally representative sample of 10,578 students from 528 schools in the United States. He compared data on student violation of school rules with a series of individual-level (attachment, involvement, commitment, belief in rules, positive peer involvement, parent involvement, and demographics) and school-level (school social problems and school cohesion) variables. He used hierarchical linear modeling to analyze his data.

The author found a significant negative association between student misbehavior and school attachment ($\beta = -.212, p < .01$), school commitment ($\beta = -.145, p < .01$), belief in school rules ($\beta = -.397, p < .01$), association with positive peers ($\beta = -.431, p < .01$), and parental school involvement ($\beta = -.138, p < .01$). The strongest relationships were with association with positive peers and belief in school rules. He also found that there was more school misbehavior in larger schools ($\beta = .197, p < .01$) and schools in urban areas ($\beta = .173, p < .01$).

Wang, Selman, Dishion, and Stormshak (2010) studied the impact of student's perceptions of school climate in sixth grade on their engagement in problem behaviors in seventh and eighth grades. They employed a longitudinal design and used data that were collected on school climate and engagement in problem behavior as part of the Next

Generation Project over a period of three years. A cohort of 677 participants from eight middle schools in the same district were included in this study because they participated in the study for all three years of middle school. Approximately 76% of the participants were white, 54% female, and 25% on free or reduced lunches. The researchers used Tobit regression to analyze the data.

To measure student engagement in problem behavior students completed nine survey items on externalizing behavior from the Social Skills Rating System. To measure school climate students completed seventeen survey items from the Social Nomination Measure which included subscales on academic focus, discipline and order, peer relationships, and student-teacher relationships. The researchers found that time had significant effects on perceptions of school climate ($F=257.76, p<.001$) and on engagement in problem behavior ($F=57.89, p<.001$). Gender also had significant effects on perceptions of school climate ($F=0.75, p<.10$) and on engagement in problem behavior ($F=45.42, p<.001$). At each grade level, less engagement in problem behavior was associated with more positive perceptions of school climate, although the strength of the relationship increased with grade level. Students who perceived a more positive school climate in sixth grade were less engaged in problem behaviors in seventh ($\beta=-.07, p<.01$) and eighth ($\beta=-.08, p<.001$) grades. This amounted to a 7% decrease in problem behavior in seventh grade for each standard deviation of more positive perception of school climate in sixth grade. On the climate subscales, student-teacher relationships and discipline and order had the strongest associations with engagement in problem behavior. Furthermore, when considering only students who engaged at least one time in problem behavior, those students who perceived a more positive school climate in sixth grade had

fewer incidents of problem behavior in seventh and eighth grades. Again, the relationship was stronger for the subscales student-teacher relationships and discipline and order.

Welsh (2001) studied the correlation of student demographic and school climate factors with school disorder. Two forms were used to survey the students. The first was a school climate measure that asked questions both about the school structure and about characteristics of students and student interactions within the school. The other measure asked questions pertaining to the individual regarding self-reported behaviors of offending, victimization, and avoiding. The sample consisted of 4640 students from 11 public middle schools in Philadelphia. The school climate variables were respect for students, planning and action, fairness of rules, clarity of rules, and student influence. Student characteristic variables included school effort, school rewards, positive peer associations, involvement, and belief in rules. The dependent variables included misconduct, school safety, avoidance, offending, and victimization. The author analyzed the data using multivariate analysis of variance (MANOVA) and multivariate analysis of covariance (MANCOVA).

Differences in offending and misconduct between schools were best explained by fairness of rules (offending, $\beta = .088$, $p < .05$; misconduct, $\beta = .078$, $p < .05$) and respect for students (offending, $\beta = .093$, $p < .05$; misconduct, $\beta = .100$, $p < .05$) in those schools (e.g. higher fairness of rules and respect for students meant lower offending and misconduct). Respect for students also had the greatest impact on victimization ($\beta = .116$, $p < .05$) with planning and action ($\beta = .033$, $p < .05$), fairness of rules ($\beta = .048$, $p < .05$), and clarity of rules ($\beta = .398$, $p < .05$) all contributing to a lesser degree. Clarity of

rules was the greatest predictor for avoidance ($\beta = .093, p < .05$) with respect for students ($\beta = .055, p < .05$) and student influence ($\beta = -.049, p < .05$) contributing. Safety was best predicted by respect for students ($\beta = .120, p < .05$) and clarity of rules ($\beta = .077, p < .05$). Students who scored high on positive peer associations showed low levels of misconduct ($\beta = .111, p < .05$), offending ($\beta = .268, p < .05$), victimization ($\beta = .153, p < .05$), and avoidance ($\beta = .143, p < .05$), and perceived their school as safer (high safety; $\beta = .071, p < .05$). Overall, the school climate variables investigated in this study significantly predicted all measures of school disorder.

Wilson (2004) examined the relationship of school connectedness and school climate with aggression and victimization. The data for this study were drawn from surveys conducted as part of the Safe Communities-Safe Schools Initiative in Colorado. The sample included 1357 students from nine middle schools and 970 students from ten high schools. The author compared data on student physical aggression, relational aggression, and victimization with data on student perceptions of school connectedness and school climate. The author noted that school connectedness and school climate used some of the same measures, but that school climate was an aggregate of the entire school and should not interfere with school connectedness. Three regression models were used to analyze the data.

Wilson found that school connectedness had a significant negative association with physical aggression ($\beta = -.344, p < .001$), relational aggression ($\beta = -.600, p < .001$), and victimization ($\beta = -.576, p < .001$). School climate also had a significant negative association with relational aggression ($\beta = -.181, p < .01$). However, school connectedness had a stronger association with the outcome variables than school climate.

In each of these studies students' perceptions of school climate or similarly constructed predictor variables (e.g. school connectedness, school as a community) were compared with students' perceptions of outcome variables representing safety and achievement. The researchers in these studies found that when students viewed that school climate as being positive, attendance (Astor et al., 2002; Welsh, 2001), behavior (Battistich et al., 1995; Brand et al., 2003; Cushing et al., 2003; DeRosier & Newcity, 2005; Stewart, 2003; Welsh, 2001; Wilson, 2004), self-esteem (Brand et al., 2003), academic attitudes (Battistich et al., 1995), and academic achievement (Battistich et al., 1995; Brand et al., 2003) were all better. They also found that when climate was positive there was less victimization (Astor et al., 2002; Battistich & Horn, 1997; Welsh, 2001; Wilson, 2004), drug use (Battistich & Horn, 1997; Kitsantas et al., 2004), delinquency (Battistich & Horn, 1997), and perception of risk in school (Astor et al., 2002; Welsh, 2001).

Methodological notes on climate studies. When analyzing the studies on school climate, I considered the methods of statistical analysis when determining the value of findings. Most of the studies held up to methodological standards.

Although the construct of school climate was not exactly the same in each study, the constructs were well defined and set up with a compelling rationale. Furthermore, the constructs had enough common elements that they all appeared to be measuring the same phenomenon. The exceptions to this were Chen (2007) and Chen and Weikert (2008) who used school size and attendance rate to measure school climate. Most studies considered those variables separately from school climate.

Because correlation does not prove causation, none of the studies can say with certainty that positive school climate caused better outcomes. Although no correlation studies can rule out all possible third variables, using a means of statistical analysis to rule out some of the known possible third variables can eliminate alternative explanations. Most of the studies ruled out some of the alternative explanations. And, as Stanovich and Cunningham (2004) point out, the more alternative explanations that researchers rule out, the more plausible it becomes that the researcher's explanation is correct. The exceptions to this were Cushing et al. (2003) and DeRosier and Newcity (2005) who relied on bivariate correlations. Since this means of analysis looks at variables individually, it provides no means to rule out alternate explanations. That is a questionable means of analysis, and it does weaken the conclusions that can be drawn from Cushing et al. and DeRosier and Newcity.

The most commonly used means of data analysis among this group of studies was hierarchical linear modeling (Battistich et al., 1995; Battistich & Horn, 1997; Brand et al., 2003; Hopson & Lee, 2011; Koth et al., 2008; LeBlanc et al., 2008; McNeely et al., 2002; Ripski & Gregory, 2009; Stewart, 2003), which is used to determine the effect of control variables before considering the predictor variables. Other means of data analysis employed included multivariate analysis of variance and covariance (MANOVA and MANCOVA; Welsh, 2001), path analysis (Kitsantas et al., 2004; Plank, Bradshaw, & Young, 2009), structural equation modeling (Astor et al., 2002; Chen, 2007; Chen & Weikart, 2008; Gottfredson et al., 2005; Payne et al., 2003), and ordinary least squares regression (Gottfredson et al., 2005; Sprott, 2004).

None of the studies reported that they checked for violations of statistical assumptions, and none compared effect sizes with similar studies. Only Battistich et al. (1995) and Welsh (2001) reported effect size. Battistich and Horn (1997) and Battistich et al. used measures that restricted range.

All of the studies that I examined defined their sample and setting well enough to improve their external validity. Only Brand et al. (2003) used replication to help show generalizability. And only four studies used a random sample (Astor et al., 2002; Kitsantas et al., 2004; McNeely et al., 2002; Sprott, 2004).

Summary of school climate measures. Whether viewed from the perspective of school staff, staff and students, or only students, school climate is a variable that is positively linked to multiple desirable outcomes in schools. Studies have shown that school climate and similarly constructed variables have a positive association with safety, behavior, attendance, and achievement, and a negative association with violence and risk behaviors. Specific elements of school climate have also linked to positive outcomes. Clearly defined rules that the students are aware of and believe in have been linked to better behavior (Stewart, 2003; Welsh, 2001), more safety (Kitsantas et al., 2004; Welsh, 2001), less substance abuse (Kitsantas et al., 2004), less violence (Gottfredson et al., 2005; Welsh, 2001), and greater connectedness to school (McNeely et al., 2002). Positive relationships in the school have been found to be associated with greater safety (Welsh, 2001), better behavior (Brand et al., 2003; Welsh, 2001), less violence (Sprott, 2004; Welsh, 2001), and less school avoidance (Welsh, 2001). With these outcomes in mind, school administrators need to seek ways to improve the climate in their schools.

Improving school climate. Dupper and Meyer-Adams (2002) have argued that school staff must implement interventions to change school climate in order to reduce school violence. With reduced violence and increased perceptions of safety, students are more likely to focus on academic endeavors (Kitsantas et al., 2004; McEvoy & Welker, 2000). Kilian, Fish, and Maniago (2006) found behavioral and climate improvements across the board at one school when they implemented Project ACHIEVE, but the methods that they employed were not rigorous. In fact, although researchers believe in the importance of improving school climate, few rigorous experimental studies have been conducted on changing school climate.

Cook, Murphy, and Hunt (2000) studied the Comer School Development Program in Chicago schools over a four-year period. The concept that drives Comer Schools is that student academic focus and achievement can be improved by first improving their interpersonal relationships and the social climate of the school. Three teams are established representing all stakeholders in the school and collectively they establish goals for the school and procedures to achieve them. They rely on cooperation, problem-solving, and consensus to establish and achieve these goals.

The authors used an experimental design to determine if the Comer Schools showed greater improvements in school climate and achievement than did the control schools. Twenty-four schools were selected to take part in three phases of the experiment. Four schools were used as pilot programs, eight were selected for phase one and divided between program and control schools, and twelve were selected for phase two and divided between program and control. Before the experiment could fully get under way, five of the 24 schools dropped out. Because the drop out was uneven, the

rules for a randomized experiment were violated. However, data were still collected and analyzed. Cross-sectional data were collected from 10,306 students in grades five through eight and longitudinal data were collected from 1685 students who were in fifth or sixth grade and remained in the same school through eighth grade. Data were collected on student climate (social relationships with adults, social climate among students, academic relationships with adults in school, and academic values among students), student outcomes (mental health, negative social behaviors, positive social behaviors, and academic achievement), and student background. In addition, 968 staff members completed surveys annually during the study. The data collected included staff ratings of program implementation and staff climate ratings (school social climate, school academic climate, and parental involvement). The data were analyzed using hierarchical linear modeling.

The authors found that overall staff-measured school climate showed no significant difference between control schools and Comer schools. Student-measured social climate was consistently higher in Comer schools than in control schools. At the school level, Comer schools improved significantly over control schools in social skills of students ($\beta = .11$, $p < .05$) and attachment to school ($\beta = .15$, $p < .10$). At the individual level, students in Comer schools saw significant gains in social skills of students ($\beta = .11$, $p < .01$), attachment to school ($\beta = .13$, $p < .01$), and pride in school ($\beta = .08$, $p < .05$).

Student-measured academic climate also improved in Comer schools. At the individual level, students in Comer schools saw significant improvement over students in control schools in beliefs that teachers were trying to motivate students ($\beta = .10$, $p <$

.001), teachers were concerned with student learning ($\beta = .07, p < .01$), student devaluing of academic success (reverse coded; $\beta = .12, p < .001$), and student acceptance of school values ($\beta = .11, p < .001$). Overall students viewed academics as being more important and were more inclined to achieve. In addition, Comer schools saw an improvement in both math and reading scores of 3 points over control schools.

At the individual level students in Comer schools saw fewer negative social behaviors over the time of the study than the students in control schools. Acting out ($\beta = -.43, p < .01$) and disapproval of behavior ($\beta = -.12, p < .01$) decrease in Comer schools compared with control schools, and students in Comer schools also reported feeling angry less frequently (lack of anger, $\beta = .16, p < .01$) over the period of the study. In addition to the problems caused by attrition, there is some question as to whether the results were confounded by the stability of the school administrators in the Comer schools.

Strengths and weaknesses of school climate measures. In the preceding studies, school climate was measured in a variety of ways. Two studies constructed climate using school size and student attendance rate (Chen, 2007; Chen & Weikart, 2008). Although the authors provided a compelling rationale for the use of these variables to construct a school climate variable, for the purposes of investigating student outcomes they appear to be weak. It can be argued that student attendance rate is more likely an outcome of school climate and thus not part of the construct of school climate (Astor et al., 2002). If it is seen as an indicator of school climate, and therefore an acceptable way to measure climate, other reasons that impact attendance would need to be ruled out for this to truly be considered a measure only of climate. School size as a measure of climate appears

weak regardless of explanation. A large school does not necessarily have a poor climate and a small one does not necessarily have a good climate. In some studies, school size is used as a predictor of climate (McNeely et al., 2002; Ripski & Gregory, 2009). However, Koth, Bradshaw, and Leaf (2008) determined that school size sometimes impacts students' perceptions of school climate, and sometimes it does not. And more often than not, studies consider school size or total enrollment to be a potentially confounding variable that must be ruled out before considering the effects of climate (Bradshaw et al., 2009; Gottfredson et al., 2005; Payne et al., 2003; Stewart, 2003; Wilson, 2004).

Two studies compared teachers' perceptions of school climate with student behavior outcomes (LeBlanc et al., 2008; Sprott, 2004). Although each found that elements of teacher-measured climate were associated with student behavior, few areas had strong correlations. This could be because teachers and students may view climate differently. Teacher perceptions of climate are more likely to be correlated with teacher outcome variables, and student perceptions of climate with student outcome variables (Gottfredson et al., 2005). This would suggest that when the goal is to predict student outcomes, it is best to consider student perceptions of school climate.

Three studies considered both student and staff perceptions of school climate (Gottfredson et al., 2005; Koth et al., 2008; Payne et al., 2003). Since each of these found the strongest associations to be between teacher perceptions and teacher outcomes or student perceptions and student outcomes, it still appears that the best means for predicting student outcomes would be to measure student perceptions of climate.

Sixteen studies measured student perceptions and compared them with student outcomes (Astor et al., 2002; Battistich & Horn, 1997; Battistich et al., 1995; Brand et al.,

2003; Cushing et al., 2003; DeRosier & Newcity, 2005; Hopson & Lee, 2011; Hurford et al., 2010; Kitsantas et al., 2004; McNeely et al., 2002; Plank et al., 2009; Ripski & Gregory, 2009; Stewart, 2003; Wang et al., 2010; Welsh, 2001; Wilson, 2004).

Summary of school climate. Many studies have established the link between school climate, violence, safety, and achievement. Researchers agree that a positive school climate is important to establishing an environment in which students are comfortable to develop socially and academically. Some of the common elements of school climate which have been associated with positive student outcomes include clarity and fairness of school rules (Astor et al., 2002; Brand et al., 2003; Cushing et al., 2003; Gottfredson et al., 2005; Kitsantas et al., 2004; McNeely et al., 2002; Welsh, 2001; Wilson, 2004), students' belief in school rules (Payne et al., 2003; Stewart, 2003), positive relationships with peers and with adults (Battistich & Horn, 1997; Battistich et al., 2005; Brand et al., 2003; Cook et al., 2000; Cushing et al., 2003; DeRosier & Newcity, 2005; Sprott, 2004; Stewart, 2003; Wilson, 2004), students' belief that they are respected by adults (Kitsantas et al., 2004; Welsh, 2001), and high expectations for all students (McEvoy & Welker, 2000; Wilson 2004). Cook et al. (2000) established a link between the correlation of school climate with positive outcomes and actual programming to improve school climate and student outcomes. The literature has also established that harsh disciplinary practices can be detrimental to a positive school climate (Dupper & Meyer-Adams, 2002; Kern & Manz, 2004; Wilson, 2004). In order to improve school climate, efforts must be school-wide to improve outcomes for all students (Dupper & Meyer-Adams, 2002).

Positive Behavioral Interventions and Supports

Research has shown that students who feel connected with their school are more likely to have higher achievement and fewer behavioral problems (Battistich & Horn, 1997; Battistich et al., 2005; McNeely et al., 2002; Payne et al., 2003; Stewart, 2003). But in schools that have extremely strict rules and overly punitive discipline policies students tend to be less connected (Wilson, 2004). Behavior interventions that focus on punishment and exclusion tend to cause a more negative climate in schools (Peterson & Skiba, 2001). Research continues to show that letting go of reactive and punitive discipline in favor of positive practices such as teaching positive expectations and praising and rewarding appropriate behaviors are associated with fewer behavior problems (Kern & Manz, 2004). More frequently schools and school districts have begun to use Positive Behavioral Interventions and Supports (PBIS) to improve school climate and to reduce problem behaviors (Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008; Bradshaw, Reinke, Brown, Bevans, & Leaf, 2008; Bradshaw et al., 2009).

Depending upon the literature describing it, PBIS may be referred to as positive behavior supports (PBS), school-wide positive behavior supports (SWPBS), or school-wide positive behavioral interventions and supports (SWPBIS). To save confusion, the present review will refer to each of these as PBIS.

Description of PBIS. PBIS is a proactive system for managing student behavior school-wide. The system targets changes in staff behavior (Bradshaw et al., 2008; Bradshaw & Pas, 2011; Bradshaw et al., 2012), who in turn focus on teaching appropriate behaviors to students and reward them for meeting behavioral expectations rather than waiting and reacting to occurrences of negative behavior. Research has shown that these

positive proactive practices improve climate and reduce problem behavior (Gottfredson et al., 2005; Kitsantas et al., 2004; McNeely et al., 2002). Once the positive expectations have been established and practiced, occurrences of negative behavior are expected to drop to a level that is more manageable, allowing for more individualized support of those students presenting the most challenging behavioral problems. PBIS is not a scripted, “one size fits all” system. It is based on the existing behavior plan and school culture of the school which chooses to implement it. In this way, schools of all varieties can effectively use the system.

According to Dupper and Meyer-Adams (2002) effective programs for behavior intervention must occur at multiple levels including the whole school level. PBIS is a stratified system of behavior management for the entire school. Within these strata, schools implement research proven interventions and collect data to measure the impacts of the interventions on the targeted behaviors (Kelm & McIntosh, 2012). The first stratum is referred to as Primary Prevention, which deals with the entire school. All students are taught behavioral expectations throughout the school, and they are rewarded for meeting those expectations. The second is Secondary Prevention, which deals with those students who have not responded to Primary Prevention. These students receive more attention for their behavioral needs including interventions in small groups that address their problem behaviors. The third is Tertiary Prevention, which deals individually with students who have responded to neither Primary Prevention nor Secondary Prevention. Students who have not responded to either Primary Prevention or Secondary Prevention receive more intensified individual interventions including

behavior intervention plans (U. S. Department of Education, Office of Special Education Programs, n.d.b).

Primary prevention. Primary Prevention is a universal approach to behavior management and thus it impacts all students and staff in the school where it is implemented. No students need to be identified as being in need of support or as being at-risk for problem behavior. This is important as many students who present new cases of problem behavior have not previously exhibited this behavior and they have shown no signs of risk (Breunlin et al., 2002). This level is intended to reduce new cases of problem behavior and it can be expected to maintain student behavior at an acceptable level such that approximately 80% of the student body will not be referred for serious behavioral problems (Sugai et al., 2000). It is at this level where the process of developing a school-wide system of positive behavioral interventions and supports begins. Positive behavioral expectations are determined and taught to all students in the school. These behaviors are modeled and encouraged by staff, and a system of rewards for following these positive expectations is put in place. Students are discouraged from rule breaking behavior with a system of disincentives or deterrents. The system is monitored closely to ensure that it is achieving the goals that were established when it was put in place, and modifications are made based on data collection and analysis. Due to availability of resources, schools tend to focus on the school-wide level of intervention (Bradshaw et al., 2012).

Secondary prevention. Students who are consistently referred for behavioral infractions or who are referred for more serious problems are in the group targeted by Secondary Prevention. These are students who may be considered at-risk of serious

problem behavior and for whom the Primary Prevention level is not enough to redirect behavior. Students at this level may receive individualized supports based on the use of targeted interventions that the school uses for all students referred for this level, or they may be divided into small groups working on similar behavioral issues. A daily behavior contract, a social skills group, or a problem solving group may be organized to teach these students skills that they need to develop in order to promote better behavior. It is at this level that specific behavior goals and interventions might be developed for students with special needs in order to teach them appropriate behaviors to replace their problem behaviors in an effort to reduce the recurrence of those problem behaviors. Secondary Prevention targets approximately 15% of the student population and is comprised of those students who do not consistently respond to Primary Prevention, but for whom more intensive and individualized intervention is not necessary.

Tertiary prevention. Tertiary Prevention is intended to serve the behavioral needs of the approximately 5% of students who do not respond to Primary Prevention or to Secondary Prevention. These are students who exhibit patterns of unsafe or extremely disruptive behaviors which impact their own learning or the learning of others. Although these may be students who are diagnosed with autism, developmental disabilities, or emotional or behavioral disabilities, they may also be students with no diagnosed disability. Tertiary Prevention involves the convening of a team that is familiar with the student including the student's parents and the student when possible. The task charged to the team is to develop a plan which will help to identify problem behaviors, predict the cause of the behaviors, and prevent the behaviors from continuing. The means for executing this plan can involve (and must involve for students with disabilities)

performing a functional behavioral assessment (FBA) to help determine the cause for the problem behavior including where, when, and with whom it occurs, and the consequence of the behavior including what the student gets or avoids due to the behavior. Once these have been determined, the team is to develop a behavior intervention plan (BIP) which targets the causes for and consequences of the behavior in an effort to change the behavior. A BIP often will include instruction for the student on socially acceptable behaviors to replace the problem behaviors (Dragow, Yell, Bradley, and Shriner, 1999). Once the plan has been developed and implemented, data must be collected and analyzed continuously in order to determine the level of effectiveness of the plan and to determine what changes might need to be made to make the plan more effective.

Strength of PBIS implementation. In order to determine the strength of implementation of PBIS, both duration of implementation and fidelity of implementation must be considered. Training and implementation of PBIS are only the first steps. All schools that implement PBIS are not equal. A school that carefully follows the protocols of PBIS, trains staff to consistently apply its tenets, and makes decisions based on data collection is more likely to see the positive effects of PBIS than a school that trains its staff then fails to consistently follow up on the initial training. Likewise, a school that has implemented PBIS faithfully over the course of several years is likely to see better results than a school in its first year of implementation. For these reasons, it is important to consider these factors when evaluating the efficacy of the use of PBIS.

PBIS and zero tolerance. PBIS is an alternative to zero tolerance. PBIS offers a continuum of approaches to behavior so that even those with the most problem behaviors can be helped. It also teaches acceptable behavior as a means to prevent many of the

behaviors targeted by zero tolerance policies. Most importantly it allows for individualization for those who have the most difficulty managing their own behavior, and it allows for the discretion of school administrators to prevail over rigid and often harmful policies.

Implementation history for PBIS. According to Sailor (2005), the practice of positive behavior support for individuals began to fully develop in the early 1980s. Through the 1980s and 1990s more schools throughout the United States began to implement these practices for individual students with considerable success. In a review of more than 100 studies conducted between 1985 and 1996, Carr et al. (1999) found that positive behavioral supports caused a significant reduction in problem behaviors for targeted individuals. Results were higher when paired with a functional assessment of behavior.

In 1996, the Office of Special Education Programs began funding the Tri-State Consortium for Positive Behavior Support. Their task was to measure behavior outcomes for individuals with disabilities based on the implementation of positive behavioral supports. The sample included 78 individuals, most of whom were aged 3 to 8. Behavior support teams implemented positive behavioral supports for each of them. In a four-year study approximately 80% of respondents reported that problem behaviors were occurring less frequently and that occurrences were less severe (Kincaid, Knoster, Harrower, Shannon, & Bustamante, 2002).

Individual studies throughout the 1990s all had similar results with regard to improved behavior or the perception of improved behavior. In 1993, Gottfredson, Gottfredson, and Hybl reported on a three-year study conducted in a series of middle

schools. The purpose was to measure improvement in behavior if rules were explained clearly and enforced consistently, and rewards were given for desirable behavior. These are some of the essential elements of PBIS. In this study, it was found that, in schools which implemented the program faithfully, student behavior improved significantly.

Colvin, Kameenui, and Sugai (1993) implemented a similar program using one middle school as the experimental group and the other as the control group. The middle schools were similar in size and demographics. Each was studied for a time before implementation and after implementation. In the treatment school office referrals decreased by approximately 50% and suspensions and detentions went down. In the control school office referrals increased and suspensions and detentions remained about the same.

Turnbull et al. (2002) studied the implementation of PBIS at a middle school in 1998. They focused not only on the whole school level of implementation, but also implementation at the secondary and tertiary levels for students who were not successful at the primary level. On the primary level, office referrals decreased after PBIS was implemented. Furthermore, teachers reported more positive interactions among students, and a sense of accomplishment due to the decrease in office referrals. At the secondary level, one student who consistently displayed problem behavior was charted. Although this student made progress in some areas with the rest of the student body, there were some behaviors which were still a significant concern. When they moved him into the secondary level he made still further improvement. However, he still exhibited some problem behaviors and he was moved to the tertiary level, in which a functional behavioral assessment was completed.

Curtis, Van Horne, Robertson, and Karvonen (2010) analyzed existing data after the fourth year of implementation of PBIS in an elementary school. Between the first and fourth years of the program, behavioral referrals decreased 47.8%, suspensions decreased 67%, and instructional days lost decreased 56.5%.

PBIS has also been linked with higher teacher self-efficacy (Kelm & McIntosh, 2012) and teachers' improved impressions of their work environment (Bradshaw et al., 2008). These improvements in teacher feelings would presumably translate into improved student outcomes.

According to the U.S. Department of Education as of January 2013 more than 18,000 schools nationwide were using PBIS. The State of Maryland alone lists more than 700 schools as participating in PBIS (PBIS Maryland, n.d.). In 2007, then Senator Barak Obama introduced legislation to both houses of Congress which would expand the use of PBIS and help further fund training in schools (Obama, 2007).

Although positive behavioral supports have been used more and more over the last 30 years, the formalized movement of PBIS is still young. Studies have shown that elements of PBIS have been used effectively to reduce problem behaviors in individuals with disabilities and across some school settings. Several studies in recent years have pointed to the efficacy of PBIS in improving behavior and achievement in schools. Bradshaw, Mitchell, and Leaf (2010) conducted a five-year longitudinal study in 37 elementary schools and found decreases in the percentage of students receiving office discipline referrals (ODR), the number of ODRs per student, and the percentage of students receiving suspensions. Bradshaw, Pas, Goldweber, Rosenberg, and Leaf (2012) implemented tier 2 supports over three years in elementary schools already trained in

universal interventions and found teachers felt more effective at handling behavior problems, teachers reported better student achievement, teachers reported fewer referrals for special education services, and students needed fewer classroom behavioral services and supports. Bradshaw, Waasdorp, and Leaf (2012) implemented PBIS in elementary schools over four years and found a decrease in disruptive and aggressive behavior and in concentration problems, an increase in prosocial behaviors and in emotion regulation, and they found that students in PBIS schools were 33% less likely to receive ODRs than students in control schools. Lassen, Steele, and Sailor (2006) implemented PBIS in a middle school over three years and found decreases in ODRs and suspensions and an increase in standardized test scores. Although Horner, Sugai, and Anderson (2010) argue that enough documentation exists to call PBIS an evidence-based practice, Chitiyo, May, and Chitiyo (2012) counter that the evidence base is methodologically weak.

Maryland began to implement PBIS in the late 1990s. The Maryland State Department of Education (MSDE) collaborated with the Sheppard Pratt Health System (SPHS) to focus on mental health in schools, which led to the first state-wide PBIS meetings (PBIS Maryland, n.d.). Within only a few years Maryland had over 100 schools implementing PBIS, and the Johns Hopkins University (JHU) joined the collaborative effort of MSDE and SPHS. In 2010 MSDE, SPHS, and JHU secured a grant from the United States Department of Education to begin the Maryland Safe and Supportive Schools (MDS3) Initiative, which set out to train schools in the use of PBIS and other evidence-based practices and to evaluate its effectiveness.

PBIS and school climate. The majority of the research conducted examining the efficacy of PBIS has focused on behavioral outcomes. PBIS has been linked with

improvements in behavior in most of the research available. More research has been conducted recently to establish the link between PBIS and school climate, but much only establishes an indirect link by comparing elements of PBIS with school climate. Schools that use positive means of behavior management (Gottfredson et al., 2005; Kitsantas et al., 2004; McNeely et al., 2002), those that clearly teach and fairly enforce rules (Astor et al., 2002; Brand et al., 2003; Cushing et al., 2003; Gottfredson et al., 2005; Kitsantas et al., 2004; McNeely et al., 2002; Welsh, 2001; Wilson, 2004), and those that use a school wide approach to behavior management (Dupper & Meyer-Adams, 2002) are the schools that have a more positive climate. A direct link between PBIS and school climate is addressed in limited research.

Bradshaw et al. (2009) studied the impact of PBIS on school organizational health, a construct that the researchers used as a measure of school climate. The authors used data from a five-year group randomized trial of PBIS in Maryland. Thirty-seven schools participated and twenty-one of those were randomly placed into the treatment group. The remaining sixteen comprised the control group. The treatment schools were trained and implemented PBIS. The total sample included 2596 staff of the 37 schools in the trial. Staff completed surveys that included demographic information and an inventory of school organizational health (institutional integrity, staff affiliation, academic emphasis, collegial leadership, and resource influence). Data were also collected on school characteristics and the quality with which they implemented PBIS. Data were collected during each of the five years of the study. The authors analyzed their data using a multilevel approach to structural equation modeling.

After controlling for demographic variables and school characteristics, the authors found that PBIS had a significant positive effect on overall organizational health. They also found positive effects for individual components of organizational health including resource influence, staff affiliation, and academic emphasis, but not for collegial leadership or institutional integrity. In addition, the authors found that schools that started with the lowest levels of resource influence, collegial leadership, academic emphasis, and overall organizational health made the greatest improvements in those areas.

Caldarella, Shatzer, Gray, Young, and Young (2011) examined the impact of school-wide positive behavior supports (SWPBS) on school climate and student outcomes. The researchers selected two middle schools in the Western United States. In one school the team implemented SWPBS over a period of four years, while using the other demographically similar school as a control with no intervention. In both schools teachers completed two questionnaires (PBS-Supplemental Questionnaire, PBS-SQ, and the Indicators of School Quality, ISQ) as a measure of school climate at the end of each school year. Student data including grade-point average and behavior measures were also collected from each school at the end of each year. Over the course of the four years the researchers collected 345 teacher responses to the PBS-SQ (81.4% response rate) and 315 to the ISQ (74.3% response rate) from the two schools. They also collected outcome data for 10,766 students. They used analysis of variance (ANOVA) to analyze their data.

The researchers conducted a factor analysis to chunk the PBS-SQ questions into manageable constructs. They determined three factors that explained 59.4% of the variance in teacher responses. Student pro-social behavior ($\alpha=.90$) measured appropriate

student behavior and social skills. School communication/collaboration ($\alpha=.82$) measured the school's ability to work with stakeholders. Educational assistance ($\alpha=.76$) measured the school's ability to assist students in the learning process. In the treatment school each of the three factors showed significant improvement over the four years with medium to large effect sizes (student pro-social behavior, $F=46.96$, $p<.001$, $d=1.51$; school communication, $F=19.82$, $p<.001$, $d=0.95$; educational assistance, $F=10.93$, $p<.01$, $d=0.69$). In the control school the only statistically significant change was a decrease in student pro-social behavior ($F=4.56$, $p<.05$, $d=-0.47$). On the ISQ, the treatment school showed significant improvement in six of seven categories, all with medium to large effect sizes (parent support, $F=4.07$, $p<.05$, $d=0.43$; teacher excellence, $F=4.71$, $p<.05$, $d=0.46$; student commitment, $F=11.56$, $p<.01$, $d=0.74$; school leadership, $F=19.69$, $p<.001$, $d=1.13$; instructional quality, $F=8.81$, $p<.01$, $d=0.63$; resource management, $F=11.67$, $p<.05$, $d=0.72$; school safety, $F=0.44$, p not reported, $d=0.15$). The control school showed no statistically significant trends on any of the ISQ measures. Student behavior improvements were statistically significant in both the treatment school and the control school, but the interaction effect showed significantly greater improvement in the treatment school (discipline referrals, $F=14.01$, $p<.001$; tardiness, $F=77.51$, $p<.001$; absences, $F=12.04$, $p<.001$). Both the treatment school and the control school showed significant improvement in grade-point average and there was little interaction effect. Both had small effect sizes.

Horner et al. (2009) studied the impact of PBIS on student perceptions of school safety, levels of problem behavior, and academic achievement. They employed a randomized, wait-list control effectiveness trial with repeated measures. The authors

collected data between 2002 and 2006 from elementary schools in Hawaii and Illinois. Thirty schools from each state were selected and randomly assigned to treatment and control groups. The treatment groups were then trained to use PBIS at the start of the study (T1) and control groups were trained one year later (T2). Due to attrition for various reasons, the researchers added schools to the sample and randomly assigned them, leaving the totals at 33 treatment schools and 30 control schools. The average enrollment in the schools was 471 (range 131-969) with an average of 61% non-white students (range 2%-100%) and an average of 51% of students receiving free or reduced meals (range 0%-99%). Over a four-year period the authors collected data on quality of PBIS implementation using the School-wide Evaluation Tool (SET), student perceptions of school safety based on the School Safety Survey (SSS), office discipline referrals (ODR), state standardized test scores, and student demographic data. Data were collected prior to the training of the treatment groups (T1), after the first year of implementation and before training of the control groups (T2), and after the training of the control groups (T3).

To analyze the school safety data for risk factors the authors used a Time x Condition group analysis. From T1 to T2 they found a statistically significant Time x Condition interaction ($-.064$), $t(35)=-2.55$, $p<.05$. They also found a statistically significant difference between risk factors for the treatment and control groups at T2 ($-.078$), $t(35)=-2.03$, $p<.05$. Prior to implementation of PBIS the schools were not using ODRs, so there is no pre-test post-test data to compare. However, schools that had been trained in PBIS reported relatively low numbers of ODRs. On state standardized tests the authors found no statistically significant Time x Condition interaction, but there were

statistically significant differences in test scores between T1 and T2 for the treatment group (.056), $t(57)=2.75$, $p<.05$ and between treatment and control group at T2 (.111), $t(57)=2.20$, $p<.05$.

With the limited research on PBIS and school climate, more needs to be done to determine the relationship between the two. Based on the research that indirectly and directly links PBIS and school climate, it seems as though it has enough promise to merit further investigation.

Summary of PBIS. Research in the area of school climate points out that positive approaches to discipline lead to better behavior and improved school climate. PBIS addresses student behavior in a positive and proactive way, and meets students at their level of need using a three-tiered approach. It establishes a framework within which students are taught clear expectations then rewarded for meeting those expectations to promote positive behavior. It is still a relatively new approach to behavior management, and research needs to be conducted with more methodological rigor (Chitoyo, May, & Chitoyo, 2012) in order to determine its efficacy both in improving behavior and in improving school climate.

Summary

Violence and disorder in schools is a well-documented problem. Although high-profile acts of violence are not nearly as prevalent as what is depicted in the media, more common forms of violence including bullying and fighting are still a significant problem in schools. Lower levels of misconduct also detract from the classroom and school climate. This violence and disorder can lead to reduced instructional time for all

students. It can also lead to higher rates of absenteeism or a general lack of academic focus in students who feel threatened.

Research has shown that positive school climate is associated with less violence and disorder in schools as well as improved attendance and achievement. School climate consists of many factors that are part of the way that staff and students feel about their school. School climate can be measured as a function of staff perceptions, student and staff perceptions, or only student perceptions. Research shows that staff perceptions of climate tend to be related to staff-perceived outcomes, and student perceptions of climate to student-perceived outcomes. If schools want to improve student outcomes, it makes sense to measure climate and outcomes from the students' perspectives.

PBIS, a three-tiered model for improving student behavior, is a promising practice for improving school climate. It addresses the entire school by teaching clear and fair positive expectations for students and rewarding the students for meeting those expectations. It also addresses small groups of students and individual students who do not respond to the school-wide interventions. PBIS addresses many of the factors considered to be part of the construct of school climate. Although it is promising, little research has been done to prove the efficacy of PBIS. More research needs to be conducted.

Chapter 3

Method

The primary purpose of this study was to expand upon the research linking safety, school climate, and student outcome variables. A secondary purpose was to examine the strength of the relationship between the implementation of PBIS in schools and the same student outcome variables. This study utilized a non-experimental quantitative research design using the preliminary data collected for the Maryland Safe and Supportive Schools (MDS3) Project. Specifically, data were collected from student surveys on demographic variables and student-perceptions of safety, school climate, and student outcome variables, and school-level data from the MSDE including data on school use of PBIS to determine the strength of the relationship between school climate, student outcomes, and the use of PBIS. The study also presents descriptive statistics to seek patterns in variables depicting violence, safety, and achievement. The research questions for this study were:

1. Does the MDS3 data on school climate establish a link between student-perceived school climate and student outcomes;
 - a. Does school climate predict student-reported academic achievement;
 - b. Does school climate predict student-perceived physical safety;
2. What is the relationship between schools implementing PBIS and outcomes for students in those schools;
 - a. Does the use of PBIS in schools predict student-reported academic achievement;

- b. Does the use of PBIS in schools predict student-perceived physical safety?

MDS3 Project and Its Data

The MDS3 Project was established to develop a statewide online tool to measure school safety, school climate, and student engagement and to help improve the safety and climate in high schools that scored low on the measured scales by implementing evidence-based prevention programs. The project, funded by the United States Department of Education, was a joint effort of the Maryland State Department of Education, Johns Hopkins University, and the Sheppard Pratt Health System and was designed as a randomized control trial to test the effectiveness of integrating PBIS with several other evidence-based programs in Maryland high schools. The study was expected to last for three years after the initial training with data being collected at the end of each school year.

The study used 21,824 students from 52 Maryland high schools and randomly divided the schools into two groups. Data were collected including observational reports and survey data from students, staff, and parents. After the initial data collection, 30 schools received training in evidence-based prevention practices while the remaining 22 schools served as the control. Outcome data would then be collected at the ends of each of the following three years for both the experimental and control groups.

The 21,824 students in the data set were obtained from randomly selected classrooms from each of the 52 participating schools. The research team selected 25 classrooms from each school to include 7 ninth grade classrooms and 6 classrooms each for grades ten through twelve. Student participation was voluntary and anonymous, and

researchers obtained passive parental consent for their participation. Students completed online surveys consisting of 154 items.

I employed the preliminary survey data collected from students in the participating schools in the spring of 2011. Students responded online to survey questions on a variety of topics including personal demographics and recent academic performance, perceptions of safety and violence, perceptions of bullying and cyberbullying, perceptions about availability and use of drugs and alcohol, perceptions of school engagement and academic expectations, perceptions of the importance their role in school, family involvement in school, perceptions of the level that they internalize or externalize problems, perceptions of school connectedness, perceptions of order and discipline at school, and perceptions of the school's physical disorder, among others.

Analytic Sample

The data set that I employed contained 21,824 cases with 21 variables measuring demographic data, perceptions of school climate, and self-reported outcomes. Upon closer examination of the data set I determined that only four items were present for all cases: student identifier, school identifier, district identifier, and gender. Of those 21,824 cases, 1996 cases did not have valid responses to grade level or race. Of the 1996 cases all but four were male students, but they were spread among schools and school districts. Although there was a clear pattern of data missing by gender, the missing data appeared to be due to students not participating in the survey. Those cases were eliminated due to the absence of demographic data leaving 19,828 cases. Finally, 1716 cases were missing data on one or more of the key variables being analyzed. The missing data tended to come more from non-white males in upper grades. Those cases were removed leaving

18,112 students from 52 high schools in 10 school districts in Maryland. The average number of students per school is 348 with a standard deviation of 127.9 and a range from 38 to 667. Table 3 provides a description of the deleted data.

Variables

Several of the variables used for this study are constructed from multiple survey questions (Table 1). For those variables, the internal consistency was estimated using Cronbach's alpha and is included in parentheses. Others are based on individual survey questions or on data collected outside of the surveys including school-level data obtained from MSDE. Depending on the questions being asked, a single variable might be considered a response variable in one situation and a predictor variable in another. For convenience, the variables are described below as either response, control, or predictor, but some of them may fall into multiple categories. It is important to note that for the purpose of this study school climate was an independent variable while academic achievement and physical safety were dependent variables. In practice school climate and student outcomes are interwoven, so it is difficult to say which causes the other. In my analysis I chose to view school climate as the cause and student outcomes as the effect.

Dependent variables. *Grades on Report Card (RPRTCARD)* is a student-level variable measuring self-reported academic achievement. It is drawn from a single survey item which asks students about the grades they received on their most recent report card. Students respond that they received mostly As, Bs, Cs, Ds, or E/Fs (A=5, F=1). The original response pattern valued As as 1 and Fs as 5, but it was reverse-coded so as to have better grades equal to higher values. The mean value for this variable was 3.94 with

a standard deviation of 0.959 and a range of 1 to 5. Prior to analysis, the variable was standardized (ZRPTRCRD) for ease of interpretation. The new mean was 0 with a standard deviation of 1 and a range of -3.06 to 1.11.

Physical Safety (SAFETY; $\alpha=.721$) is a student-level variable that included four survey items that inquired about how safe students felt in school. Some survey questions were rescaled to ensure that for each question 4 meant safer and 1 meant less safe. The mean value for this variable was 2.93 with a standard deviation of 0.624 and a range of 1 to 4. Prior to analysis, the variable was standardized (ZSAFETY) for ease of interpretation. The new mean was 0 with a standard deviation of 1 and a range of -3.10 to 1.71

Control variables. Several student-level demographic variables based on single item survey responses are used as controls variables. Among those are Gender (male or female), Grade (grade 9, grade 10, grade 11, or grade 12), and Race (Native American/American Indian, White, Hispanic/Latino, Asian/Pacific Islander, Black/African American, Hawaiian or other Pacific Islander, or Other). For purposes of analysis, each of these variables was made into a dichotomous variable. Gender became MALE (1=male; 0=female), Grade became NINTHGRA (1=9th Grade; 0=not 9th grade), and Race became NONWHITE (1=not white; 0=white).

At the school level *Free and Reduced Meals Rate* and *Student Minority Rate (MNRTYRAT)* were obtained from the MSDE and used as control variables. *Free and Reduced Meals Rate* was made into a dichotomous variable (HIGHFARM; 1=40% or greater free and reduced meal rate; 0=less than 40% free and reduced meal rate).

Twenty-three schools had high FARM rates and 29 did not. *Student Minority Rate* was

standardized (ZMNRTYRT) for ease of interpretation. Its mean was 0 with a standard deviation of 1 and a range of -1.49 to 2.02.

Independent variables. My initial analysis called for several student-level independent variables. However, the variables were very highly correlated, each minimizing the effect of the others when entered into the full model. For this reason I developed a factor utilizing all three variables. The three variables were Relationships and Connectedness, School Participation and Academic Emphasis, and Order and Discipline. The standardized factor developed from those variables was School Climate (ZCLIMATE). Each is described below.

Relationships and Connectedness ($\alpha=.884$; *RELATE*) is a student-level variable that included ten survey items that inquired about the students' sense of belonging in the school, and perceptions of the quality of relationships among students and between students and staff. All items were rescaled so that 4 meant better relationships and connectedness and 1 meant worse. The mean value for this variable was 2.65 with a standard deviation of 0.598 and a range of 1 to 4.

School Participation and Academic Emphasis ($\alpha=.807$; *ACADEMPH*) is a student-level variable that includes eight items about students' views on the importance of school and students' perceptions of how teachers view their potential to succeed academically. Again, all items were rescaled so that 4 meant better school participation and academic emphasis and 1 meant worse. The mean value for this variable was 3.03 with a standard deviation of 0.566 and a range of 1 to 4.

Order and Discipline ($\alpha=.538$; *ORDER*) included seven survey items that inquired about students' perception of rules and how students follow those rules. Again,

some items were rescaled so that 4 meant more order and discipline and 1 meant less. The mean value for this variable was 2.43 with a standard deviation of 0.438 and a range of 1 to 4.

School Climate (ZCLIMATE; $\alpha=.803$) is the factor made from *Relationships and Connectedness*, *School Participation and Academic Emphasis*, and *Order and Discipline*. It was developed using factor analysis. The three component variables loaded onto one factor which explained 71.82% of the variance among the three variables and had an Eigenvalue of 2.155. A reliability analysis was run using the three variables, and it produced a Cronbach's Alpha of .803. The mean of ZCLIMATE was 0 with a standard deviation of 1 and a range of -3.76 to 2.90.

Each of the student-level independent variables was aggregated to a school-level independent variable. Again, the three variables were highly correlated and were loaded onto a single factor. *Average Relationships and Connectedness* had a mean of 2.65, a standard deviation of 0.13, and a range from 2.44 to 3.08. *Average School Participation and Academic Emphasis* had a mean of 3.03, a standard deviation of 0.11, and a range from 2.85 to 3.41. *Average Order and Discipline* had a mean of 2.43, a standard deviation of 0.10, and a range from 2.24 to 2.70. These aggregated variables loaded onto a single factor, *Average School Climate (ZCLIMAT2; $\alpha=.943$)*. This factor explained 90.43% of the variance among the three variables and had an Eigenvalue of 2.713. A reliability analysis was run using the three variables, and it produced a Cronbach's Alpha of .943. The mean of ZCLIMAT2 was 0 with a standard deviation of 1 and a range of -1.48 to 3.41.

Active PBIS is a school-level variable that describes whether the school was already using PBIS during the first year of this study when the preliminary data were collected. It is a dichotomous variable (1=using PBIS; 0=not using PBIS). At the time when preliminary data were collected, 27 schools were using PBIS and 25 were not. The strength of this variable is questionable, as there are no measures of how long the school had implemented PBIS or with what fidelity it had been implemented. These are both critical factors when considering the effective use of PBIS. However, it was the only available measure when the preliminary data were collected.

Variables depicting safety and violence. I used several individual student survey items to explore the degree to which students perceived safety and violence in their schools. In order to separate those who perceived threats to safety or reported violence from those who did not, items were transformed from scaled variables to dichotomous variables. Table 2 outlines the items along with their original scales and transformed dichotomous responses.

Analysis

I employed several means to analyze the data. Descriptive statistics were estimated using IBM SPSS Statistics 21. I also used SPSS in determining bivariate correlations between each set of variables. In order to determine the relationships between predictor and response variables, I conducted a series of regression analyses first using IBM SPSS Statistics 21 for the ordinary least-squares regressions, then using Hierarchical Linear and Nonlinear Modeling (HLM) 7 for the multilevel regression analyses. HLM is the most appropriate means of analysis due to the nested nature of the data. Because the individual students were selected as a part of a school, each student in

that school is potentially more similar to others in their school than they are to students in other schools. This could be due to the geographic location of the school, the culture of the school, the influence of specific teachers or administrators in the school, or any other number of factors that make schools different. If using more typical means of analysis, these similarities would violate the assumption of independence of observations (McCoach & Adelson, 2010). Because these students are nested within their schools, analysis that does not consider this hierarchical structure can lead to underestimating standard errors and increasing the chance of Type-I errors (McCoach & Adelson, 2010; Roberts, 2004). In order to effectively use ordinary least-squares regression (OLS) to analyze nested data, a researcher would need to run a separate regression for every larger unit (e.g. 52 schools in this study), thus requiring numerous regressions to analyze the effects of the predictors (Roberts, 2004). HLM is much more efficient and effective than OLS because it runs all regressions simultaneously and takes into account the effect of individual differences as well as differences caused by group membership (McCoach, 2010). HLM can also mitigate the problems associated with comparing samples of different sizes (Ma, Ma, & Bradley, 2008) as is the case with the differing number of students surveyed from each of the schools in this sample.

In order to answer all questions efficiently, I approached the data from multiple angles using multiple means of analysis. I first examined the bivariate correlations of all student-level and school level predictors, controls, and outcomes. Some variables had very strong correlations leading to concerns about multicollinearity. In order to rule out this possibility, I conducted multicollinearity diagnostic analyses. These analyses determined potential threats of multicollinearity among RELATE, ACADEMPH, and

ORDER both at the student level and the school level, thus causing me to develop the CLIMATE factor for the final analyses. Bivariate correlations were again conducted at the student level and school level using the new variable and the remaining variables, and no concerns of multicollinearity were flagged.

In order to determine the effects of school climate (question 1a) and PBIS (question 2a) on academic achievement, I constructed a multilevel model using HLM 7 software. This model was conducted in four stages. The first model was the unconditional model examining the overall between-schools effects on academic achievement. The second model was the level one model which included the student level predictors and controls. Because school climate (ZCLIMATE) is expected to be different and have different effects in different schools, I entered this variable group-mean centered and with random effects. Gender (MALE), race (NONWHITE), and grade (NINTHGRA) were entered as control variables and were grand-mean centered and given fixed effects. The third model was to determine the full effect of school climate (ZCLIMATE) on academic achievement. I entered the school level variables as cross-level interactions with the intercept and with school climate. Student minority rate (ZMNRTYRT), high free and reduced meals rate (FARMHIGH), and average school climate (ZCLIMAT2) were all grand-mean centered. In the fourth model I analyzed the effect of schools using PBIS on academic achievement. I entered PBIS as a grand-mean centered, cross-level interaction with average achievement.

In order to determine the effects of school climate (question 1b) and PBIS (question 2b) on student safety, I constructed another multilevel model using HLM 7 software. This model was also conducted in four stages in a parallel manner to the first.

The first model was the unconditional model examining the overall between-schools effects on student safety. The second model was the level one model which included the student level predictors and controls. Again I entered school climate (ZCLIMATE) group-mean centered and with random effects. Gender (MALE), race (NONWHITE), and grade (NINTHGRA) were again entered grand-mean centered and given fixed effects. The third model was to determine the full effect of school climate (ZCLIMATE) on student safety, so I again entered the school level variables as grand-mean centered, cross-level interactions with the intercept and with school climate. In the fourth model I analyzed the effect of schools using PBIS on student safety. I entered PBIS as a grand-mean centered, cross-level interaction with average physical safety.

Summary

This study was designed to determine the effect of school climate and PBIS on student safety and academic achievement. The data were collected as part of the MDS3 Project, a collaborative effort of the Maryland State Department of Education, Johns Hopkins University, and the Sheppard Pratt Health System, and was drawn from sample of 21,824 students from 52 Maryland high schools. Variables depicting school climate, student achievement, student safety, student demographics, and school demographics were used in the analysis. Using a multilevel analysis model the goal was to determine if school climate and use of PBIS were predictive of academic achievement and student safety.

Chapter 4

Results

The results of the study are organized into demographic descriptive statistics, examination of the link between student-perceived school climate and self-reported student outcomes, and examination of the link between schools' use of PBIS and student-perceived school climate. In examining the relationship between school climate and student outcomes, this study considered school climate as the independent variable and student outcomes as the dependent variable, even though the direction of the relationship is not clear.

Descriptive statistics

The MDS3 sample consisted of 18,112 cases from 52 high schools in 10 school districts in Maryland. Students were 48.8% male and 51.2% female, and 52.7% white and 47.3% non-white (Black/African American – 29.8%, Hispanic/Latino – 4.7%, Asian/Pacific Islander – 4.4%, Native American/American Indian – 1.6%, other – 6.8%). More students in the sample were in ninth grade (31.0%) than in any other grade (10th grade – 24.6%, 11th grade – 24.9%, 12th grade – 19.5%).

Based on single survey item (I feel safe at this school; strongly agree, agree, disagree, or strongly disagree), 20.4% of students reported that they did not feel safe (disagree or strongly disagree) at school. The percentages of male students (22.2%), non-white students (24.3%), ninth grade students (21.3%), tenth grade students (20.9%), and eleventh grade students (20.7%) exceeded the overall percentage of students who did not feel safe in school. Approximately 10.9% of students missed one or more days of school because they felt unsafe at school or traveling to or from school. Again, male students

(11.4%), non-white students (12.5%), and ninth grade students (11.8%) exceeded the overall percentage of students who missed one or more days of school because they felt unsafe at school or traveling to or from school.

Of the total sample, 12.3% of students had been in more than one physical fight. The percentages of male students (17.4%), non-white students (15.7%), and ninth grade students (14.8%) exceeded the overall percentage of students who had been in more than one physical fight. Sixteen and three-tenths percent (16.3%) of students reported being threatened or injured with a weapon at school one or more times. The percentages of male students (21.1%), non-white students (18.2%), and ninth grade students (19.8%) exceeded the overall percentage of students who had been threatened or injured with a weapon at school one or more times.

According to self-report, 9.1% of students brought a weapon to school one or more times. The percentages of male students (13.6%), non-white students (11.0%), eleventh grade students (9.7%) and twelfth grade students (9.7%) exceeded the overall percentage of students who brought a weapon to school one or more times. Of the total sample, 9.9% of students reported that they had belonged to a gang at some point. Male students (15.1%), non-white students (13.4%), ninth grade students (10.2%) and eleventh grade students (10.4%) exceeded the overall percentage of students who reported that they had belonged to a gang at some point.

According to self-report, 7.5% of students earned mostly Ds or Fs on their last report card. Male students (10.0%), non-white students (9.5%), ninth grade students (10.0%), and tenth grade students (7.7%) exceeded the overall percentage of students who reported that they had earned mostly Ds or Fs on their last report card.

Being male and non-white was significantly associated with feeling unsafe (male, $r=0.032$, $p<.01$; non-white, $r=0.065$, $p<.01$), earning poor grades (male, $r=0.080$, $p<.01$; non-white, $r=0.061$, $p<.01$), belonging to gangs (male, $r=0.141$, $p<.01$; non-white, $r=0.094$, $p<.01$), getting into fights at school (male, $r=0.120$, $p<.01$; non-white, $r=0.078$, $p<.01$), carrying weapons to school (male, $r=0.129$, $p<.01$; non-white, $r=0.055$, $p<.01$), and being threatened or injured with weapons at school (male, $r=0.095$, $p<.01$; non-white, $r=0.038$, $p<.01$). As student grade level increases, feelings of safety increase ($r=0.019$, $p<.05$), grades improve ($r=0.059$, $p<.01$), physical fights at school decrease ($r=-0.040$, $p<.01$), and threats and injuries with weapons at school decrease ($r=-0.049$, $p<.01$).

Does school climate predict student-reported academic achievement?

In order to answer question 1a, I first conducted bivariate correlations among student-reported academic achievement and the student-level predictor and controls (Table 4). I measured achievement with the standardized “Grades on report card” (ZRPRTCRD) variable. Standardized school climate (ZCLIMATE) was the predictor variable, and gender (MALE), race (NONWHITE), and grade (NINTHGRA) were the controls. ZRPRTCRD had statistically significant associations with each of the four variables. ZRPRTCRD had the strongest relationship with ZCLIMATE ($r=.281$, $p<.01$) followed by NONWHITE ($r=-.173$, $p<.01$), MALE ($r=-.163$, $p<.01$), and NINTHGRA ($r=-.047$, $p<.01$).

I then conducted bivariate correlations among average achievement at the school level (ZRPRTCR2), average school climate (ZCLIMAT2), school minority rate (ZMNRTYRT), high FARM rate (FARMHIGH), and use of PBIS (PBIS). ZRPRTCR2

had the strongest relationship with ZMNRTYRT ($r=-.554, p<.01$) followed by ZCLIMAT2 ($r=.544, p<.01$), FARMHIGH ($r=-.465, p<.01$), and PBIS ($r=-.402, p<.01$).

In order to determine the variance in academic achievement that is attributable to differences in schools, and to serve as a comparison for further models, I first ran a null model or unconditional model in which only the outcome variable, ZRPTRCRD, was entered with no predictors or controls.

$$\text{Level-1 Model: } ZRPTRCRD_{ij} = \beta_{0j} + r_{ij}$$

$$\text{Level-2 Model: } \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\text{Mixed Model: } ZRPTRCRD_{ij} = \gamma_{00} + u_{0j} + r_{ij}$$

Using this model I was able to determine the intraclass correlation (ICC) of ZRPTRCRD ($\rho=.049$) which indicated that approximately 5% of the variance in academic achievement was due to differences between schools. The reliability was high ($\lambda=.934$), which means we can discriminate among schools on the basis of their average academic achievement.

I next entered the predictor variable, ZCLIMATE, and the control variables, MALE, NONWHITE, and NINTHGRA, grand-mean centered with fixed effects. Reliability remained high ($\lambda=.895$) for the model.

$$\text{Level-1 Model: } ZRPTRCRD_{ij} = \beta_{0j} + \beta_{1j}*(NONWHITE_{ij}) + \beta_{2j}*(MALE_{ij}) + \beta_{3j}*(NINTHGRA_{ij}) + \beta_{4j}*(ZCLIMATE_{ij}) + r_{ij}$$

$$\text{Level-2 Model: } \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

Mixed Model:
$$ZRPTRCD_{ij} = \gamma_{00} + \gamma_{10} * NONWHITE_{ij} + \gamma_{20} * MALE_{ij} + \gamma_{30} * NINTHGRA_{ij} + \gamma_{40} * ZCLIMATE_{ij} + u_{0j} + r_{ij}$$

With the student-level predictor and controls entered into the model, average academic achievement did not significantly change from the unconditional model (Table 5).

However, there were statistically significant differences in academic achievement based on all student-level predictors and controls. Minority students (NONWHITE) academic achievement was approximately 30% of a standard deviation lower than white students ($\beta = -.296, p < .001$). Male students (MALE) academic achievement was approximately 33% of a standard deviation lower than female students ($\beta = -.326, p < .001$). Academic achievement for students in the ninth grade (NINTHGRA) was approximately 10% of a standard deviation lower than students in other grades ($\beta = -.103, p < .001$). Academic achievement for students increase by approximately 27% of a standard deviation for each standard deviation increase in student-rated school climate (ZCLIMATE; $\beta = .272, p < .001$).

Next I added the school-level predictors to the model to construct the fully conditional model or contextual model. Minority rate (MNRTYRAT), high FARM rate (FARMHIGH), and average school climate (ZCLIMAT2) were entered as cross-level interactions with average academic achievement. Reliability remained high ($\lambda = .881$) for this model.

Level-1 Model:
$$ZRPTRCD_{ij} = \beta_{0j} + \beta_{1j} * (NONWHITE_{ij}) + \beta_{2j} * (MALE_{ij}) + \beta_{3j} * (NINTHGRA_{ij}) + \beta_{4j} * (ZCLIMATE_{ij}) + r_{ij}$$

Level-2 Model:
$$\beta_{0j} = \gamma_{00} + \gamma_{01} * (FARMHIGH_j) + \gamma_{02} * (ZMNRTYRT_j) + \gamma_{03} * (ZCLIMAT2_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

Mixed Model:
$$\begin{aligned} ZRPTRCRD_{ij} = & \gamma_{00} + \gamma_{01} * FARMHIGH_j + \gamma_{02} * ZMNRTYRT_j + \\ & \gamma_{03} * ZCLIMAT2_j + \gamma_{10} * NONWHITE_{ij} + \gamma_{20} * MALE_{ij} + \\ & \gamma_{30} * NINTHGRA_{ij} + \gamma_{40} * ZCLIMATE_{ij} + u_{0j} + r_{ij} \end{aligned}$$

With the student-level and school-level predictors and controls entered into the model, there was still no significant change in average academic achievement (Table 5). There were still statistically significant differences in academic achievement based on the fully conditional model, but the estimates for the student-level variables did not change with the inclusion of the school-level variables. There was a statistically significant cross-level interaction effect. Average academic achievement was approximately 13% of a standard deviation lower in schools with a high FARM rate (FARMHIGH; $\beta = -.129$, $p = .009$). This model explained approximately 13.4% of the between-school variance in average academic achievement.

Does the use of PBIS in schools predict student-reported academic achievement?

In order to answer question 2a, I first analyzed correlations then built on the multilevel model used to examine the association between climate and achievement. Bivariate correlations (Table 4) showed a statistically significant, moderate strength, negative relationship between average student academic achievement (ZRPTRCR2) at the school level and the use of PBIS in schools (PBIS; $r = -.402$, $p < .01$). PBIS also had a

statistically significant, moderately-strong, negative relationship with average school climate (ZCLIMAT2; $r=-.512$, $p<.01$).

Using the fully conditional model with academic achievement as the outcome (ZRPTRCRD), school climate (ZCLIMATE), gender (MALE), race (NONWHITE), and grade (NINTHGRA) as student-level predictors and controls, and average school climate (ZCLIMAT2), minority rate (ZMNRTYRA), and high FARM rate (FARMHIGH) as school-level predictors and controls, I added use of PBIS in schools (PBIS) as a school-level predictor for a second fully conditional model to predict the effect of PBIS over and above school climate on student outcomes. Reliability remained high ($\lambda=.883$) for average academic achievement.

$$\text{Level-1 Model: } ZRPTRCRD_{ij} = \beta_{0j} + \beta_{1j}*(NONWHITE_{ij}) + \beta_{2j}*(MALE_{ij}) + \beta_{3j}*(NINTHGRA_{ij}) + \beta_{4j}*(ZCLIMATE_{ij}) + r_{ij}$$

$$\text{Level-2 Model: } \beta_{0j} = \gamma_{00} + \gamma_{01}*(FARMHIGH_j) + \gamma_{02}*(ZMNRTYRT_j) + \gamma_{03}*(ZCLIMAT2_j) + \gamma_{04}*(PBIS_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\text{Mixed Model: } ZRPTRCRD_{ij} = \gamma_{00} + \gamma_{01}*FARMHIGH_j + \gamma_{02}*ZMNRTYRT_j + \gamma_{03}*ZCLIMAT2_j + \gamma_{04}*(PBIS_j) + \gamma_{10}*NONWHITE_{ij} + \gamma_{20}*MALE_{ij} + \gamma_{30}*NINTHGRA_{ij} + \gamma_{40}*ZCLIMATE_{ij} + u_{0j} + r_{ij}$$

Adding PBIS to the model did little to change the model (Table 5). School climate, gender, race, and grade all remained statistically significant to the model, as did the

cross-level interaction between average academic achievement and high FARM rate. In this model I also tested the interaction between use of PBIS (PBIS) and average school climate (ZCLIMAT2), but the interaction was not significant and caused no change to the other coefficients in the model. This model explained approximately 11.5% of the between-school variance in average academic achievement, which is 2% less than what was explained without PBIS.

Does school climate predict student-perceived physical safety?

In order to answer question 1b, I first conducted bivariate correlations (Table 4) among student-perceived physical safety and the student-level predictor and controls. I standardized physical safety (ZSAFETY) variable for ease of interpretation.

Standardized school climate (ZCLIMATE) was the predictor variable, and gender (MALE), race (NONWHITE), and grade (NINTHGRA) were the controls. ZSAFETY had statistically significant associations with each of the four variables. ZSAFETY had the strongest relationship with ZCLIMATE ($r=.497, p<.01$) followed by NONWHITE ($r=-.077, p<.01$), NINTHGRA ($r=-.029, p<.01$), and MALE ($r=.024, p<.01$).

I then conducted bivariate correlations among average physical safety at the school level (ZSAFETY2), average school climate (ZCLIMAT2), school minority rate (ZMNRTYRT), high FARM rate (FARMHIGH), and use of PBIS (PBIS). ZSAFETY2 had the strongest relationship with ZCLIMAT2 ($r=.870, p<.01$) followed by PBIS ($r=-.544, p<.01$), FARMHIGH ($r=-.432, p<.01$), and ZMNRTYRT ($r=-.362, p<.01$).

In order to determine the variance in physical safety that is attributable to differences in schools, and to serve as a comparison for further models, I first ran a null

model or unconditional model in which only the outcome variable, ZSAFETY, was entered with no predictors or controls.

$$\text{Level-1 Model: } ZSAFETY_{ij} = \beta_{0j} + r_{ij}$$

$$\text{Level-2 Model: } \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\text{Mixed Model: } ZSAFETY_{ij} = \gamma_{00} + u_{0j} + r_{ij}$$

Using this model I was able to determine the intraclass correlation (ICC) of ZSAFETY ($\rho=.112$) which indicated that approximately 11% of the variance in physical safety was due to differences between schools. The reliability was high ($\lambda=.971$), which means we can discriminate among schools on the basis of their average physical safety.

I next entered the predictor variable, ZCLIMATE, and the control variables, MALE, NONWHITE, and NINTHGRA, grand-mean centered with fixed effects.

Reliability remained high ($\lambda=.960$) for the model.

$$\text{Level-1 Model: } ZSAFETY_{ij} = \beta_{0j} + \beta_{1j}*(NONWHITE_{ij}) + \beta_{2j}*(MALE_{ij}) + \beta_{3j}*(NINTHGRA_{ij}) + \beta_{4j}*(ZCLIMATE_{ij}) + r_{ij}$$

$$\text{Level-2 Model: } \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\text{Mixed Model: } ZSAFETY_{ij} = \gamma_{00} + \gamma_{10}*NONWHITE_{ij} + \gamma_{20}*MALE_{ij} + \gamma_{30}*NINTHGRA_{ij} + \gamma_{40}*ZCLIMATE_{ij} + u_{0j} + r_{ij}$$

With the student-level predictor and controls entered into the model, average physical safety was still not significant (Table 6). There were statistically significant differences

in physical safety based on gender, grade, and school climate. Male students (MALE) perceived physical safety was approximately 5% of a standard deviation greater than female students ($\beta=.049, p<.001$). Perceived physical safety for students in the ninth grade (NINTHGRA) was approximately 7% of a standard deviation lower than students in other grades ($\beta=-.073, p<.001$). Perceived physical safety for students increase by approximately 46% of a standard deviation for each standard deviation increase in student-rated school climate (ZCLIMATE; $\beta=.460, p<.001$).

Next I added the school-level predictors to the model to construct the fully conditional model or contextual model. Minority rate (MNRTYRAT), high FARM rate (FARMHIGH), and average school climate (ZCLIMAT2) were entered as cross-level interactions with average physical safety. Reliability remained high ($\lambda=.889$) for this model.

$$\text{Level-1 Model: } ZSAFETY_{ij} = \beta_{0j} + \beta_{1j}*(NONWHITE_{ij}) + \beta_{2j}*(MALE_{ij}) + \beta_{3j}*(NINTHGRA_{ij}) + \beta_{4j}*(ZCLIMATE_{ij}) + r_{ij}$$

$$\text{Level-2 Model: } \beta_{0j} = \gamma_{00} + \gamma_{01}*(FARMHIGH_j) + \gamma_{02}*(ZMNRTYRT_j) + \gamma_{03}*(ZCLIMAT2_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\text{Mixed Model: } ZSAFETY_{ij} = \gamma_{00} + \gamma_{01}*FARMHIGH_j + \gamma_{02}*ZMNRTYRT_j + \gamma_{03}*ZCLIMAT2_j + \gamma_{10}*NONWHITE_{ij} + \gamma_{20}*MALE_{ij} + \gamma_{30}*NINTHGRA_{ij} + \gamma_{40}*ZCLIMATE_{ij} + u_{0j} + r_{ij}$$

With the student-level and school-level predictors and controls entered into the model, average physical safety remained not significant (Table 6). There were still statistically significant differences in physical safety based on gender, grade, and school climate, but the estimates for the student-level variables did not change with the inclusion of the school-level variables. There were statistically significant cross-level interaction effects. Average physical safety was approximately 16% of a standard deviation lower in schools with a high FARM rate (FARMHIGH; $\beta = -.160$, $p = .001$), and it was approximately 17% of a standard deviation higher for each standard deviation increase in average school climate (ZCLIMAT2; $\beta = .171$, $p = .001$). This cross-level interaction with average school climate means that not only do students feel safer when they perceive climate to be better, but they also feel safer above and beyond that in schools where the overall student body perceives climate to be better. This model explained approximately 68.5% of the between-school variance in average physical safety.

Does the use of PBIS in schools predict student-perceived physical safety?

In order to answer question 2b, I first analyzed correlations then built on the multilevel model used to examine the association between climate and safety. Bivariate correlations (Table 4) showed a statistically significant, moderately-strong, negative relationship between average physical safety (ZSAFETY2) at the school level and the use of PBIS in schools (PBIS; $r = -.544$, $p < .01$). PBIS also had a statistically significant, moderately-strong, negative relationship with average school climate (ZCLIMAT2; $r = -.512$, $p < .01$).

Using the fully conditional model with physical safety as the outcome (ZSAFETY), school climate (ZCLIMATE), gender (MALE), race (NONWHITE), and

grade (NINTHGRA) as student-level predictors and controls, and average school climate (ZCLIMAT2), minority rate (ZMNRITYRA), and high FARM rate (FARMHIGH) as school-level predictors and controls, I added use of PBIS in schools (PBIS) as a school-level predictor for a second fully conditional model to predict the effect of PBIS over and above school climate on student outcomes. Reliability remained high ($\lambda=.888$) for average academic achievement.

$$\text{Level-1 Model: } ZSAFETY_{ij} = \beta_{0j} + \beta_{1j}*(NONWHITE_{ij}) + \beta_{2j}*(MALE_{ij}) + \beta_{3j}*(NINTHGRA_{ij}) + \beta_{4j}*(ZCLIMATE_{ij}) + r_{ij}$$

$$\text{Level-2 Model: } \beta_{0j} = \gamma_{00} + \gamma_{01}*(FARMHIGH_j) + \gamma_{02}*(ZMNRITYRT_j) + \gamma_{03}*(ZCLIMAT2_j) + \gamma_{04}*(PBIS_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\text{Mixed Model: } ZSAFETY_{ij} = \gamma_{00} + \gamma_{01}*FARMHIGH_j + \gamma_{02}*ZMNRITYRT_j + \gamma_{03}*ZCLIMAT2_j + \gamma_{04}*(PBIS_j) + \gamma_{10}*NONWHITE_{ij} + \gamma_{20}*MALE_{ij} + \gamma_{30}*NINTHGRA_{ij} + \gamma_{40}*ZCLIMATE_{ij} + u_{0j} + r_{ij}$$

Adding PBIS to the model did little to change the model (Table 6). School climate, gender, and grade all remained statistically significant to the model, as did the cross-level interactions between average physical safety and high FARM rate and average school climate. In this model I also tested the interaction between use of PBIS (PBIS) and average school climate (ZCLIMAT2), but the interaction was not significant and caused no change to the other coefficients in the model. This model explained approximately

69% of the between-school variance in average physical safety, which is 0.5% more than what was explained without PBIS.

Summary

In order to analyze the MDS3 data, I chose to use descriptive statistics to develop a further understanding of the data set, bivariate correlations to understand the relationships between variables, and hierarchical linear modeling (HLM) to answer my research questions. Descriptive statistics showed that male students, non-white students, and ninth grade students were at higher risk for violence, feeling unsafe, and poor achievement. Bivariate correlations showed that significant relationships existed between the outcome variables, student-reported grades on report card and student-perceived physical safety, and a variety of predictors including gender, race, grade level, student-perceived school climate, school minority rate, school FARM rate, average school climate, and school use of PBIS. HLM analyses allowed me examine the relationships between outcomes and predictors while taking into consideration the multi-level nature of the data. As expected, school climate was predictive of student-reported academic achievement (question 1a) and student-perceived physical safety (question 1b). However, school use of PBIS as measured in this dataset did not appear to predict student-reported academic achievement (question 2a) or student-perceived physical safety (question 2b). In the next chapter I will discuss these results and their implications.

Chapter 5

Discussion

The purpose of this study was to expand upon the existing research that examines the relationship between safety, school climate, and student outcomes, and to explore the relationship between the school climate and the use of PBIS in schools. I utilized data collected as part of the Maryland Safe and Supportive Schools (MDS3) Project, a collaborative effort of the Maryland State Department of Education, the Johns Hopkins University, and the Sheppard Pratt Health System. I used descriptive methods to examine variables depicting violence, safety, academic achievement, and school climate. I then conducted bivariate correlations and multilevel analyses to examine the relationships between school climate, student-perceived safety, student-reported grades on report card, and school use of PBIS. I found statistically significant relationships among the selected variables, which I will discuss further in this chapter.

Descriptive Findings

The descriptive statistics relating to student perceptions of safety, violence, and achievement shed light on the students in this sample as compared to the national sample used in the 2011 Youth Risk Behavior Survey (YRBS; CDC, 2012). In the MDS3 sample 10.9% of students reported missing at least one day of school because they felt unsafe, as opposed to 5.9% in the YRBS. Even higher rates of male students (11.4%), non-white students (12.5%), and ninth grade students (11.8%) in this sample reported missing days of school due to feeling unsafe, which was similar to the YRBS in which males and nonwhites missed days at a higher rate. Likewise, 16.3% of the students in the MDS3 sample reported being threatened or injured by a weapon in school as compared to

only 7.4% in the YRBS. Again, even higher rates of male students (21.1%), non-white students (18.2%), and ninth grade students (19.8%) in this sample reported being threatened or injured by a weapon at school, as was the trend in the YRBS. In the MDS3 sample 9.1% of students reported bringing a weapon to school as compared with 5.4% in the YRBS. Male students (13.6%) and non-white students (11.0%) reported higher rates of bringing weapons to school as was the case with the YRBS.

One possible explanation for the higher rates of risk for ninth grade students is dropouts. In some school districts as many as one-third of dropouts leave school before completing the ninth grade (Neild, Stoner-Eby, & Furstenberg, 2008). This would mean that the students who remain in the later grades tend to be the ones who are better able to handle the demands of high school academically and socially. By the twelfth grade where students show the fewest risk factors, the students who were academically and socially unable to handle the demands have often gone, thus limiting the sample of twelfth grade students to those who view school more positively.

Overall, in the MDS3 data, a higher rate of male students, non-white students, and ninth grade students reported risk factors including feeling unsafe, involvement in violence, and lower academic achievement. These data are similar to those found in the literature. Chen and Weikart (2008) noted that disorder detracts from student attention to academics and student attendance, clearly indicating that these groups of students should be the focus of attention for programs that reduce risk factors.

Being non-white had statistically significant negative associations with self-reported grades on report card, perceived physical safety, and reported school climate. Being in ninth grade had a statistically significant negative association with perceived

physical safety. At the school level, minority rate and high FARM rate had statistically significant negative associations with average grades and average physical safety.

Minority rate also had a statistically significant negative association with average school climate. Although high FARM rate did not reach statistical significance in its relationship with average school climate, it did have a negative association. These results should again be considered when planning for schools with these characteristics.

Academic Achievement

At the student level, achievement had statistically significant negative bivariate correlations with being male, non-white, and in ninth grade, and a statistically significant positive association with school climate. At the school level, achievement had statistically significant negative bivariate correlations with minority rate and high FARM rate, and a statistically significant positive association with average school climate. The direction of these relationships is consistent with the literature on academic achievement. When examining these variables in a multilevel model and considering only student-level effects, the disparity in achievement based on race and gender appears to be much greater than the disparity based on grade. When school-level predictors are added to the model, only high FARM rate has a statistically significant interaction with average achievement. In this case, students in schools with a high FARM rate start on average with an eighth of a standard deviation lower achievement than students in schools with lower FARM rate. This is also consistent with the literature, as FARM rate is a measure of the average socioeconomic status of students in the school. If more students in the school are of lower socioeconomic status and socioeconomic status is linked with achievement, then the average achievement for the school will likely be lower than a school with fewer

students of lower socioeconomic status. Glasser's framework explains this, as students of lower socioeconomic status are more likely to have competing needs that impact their academic behavior. In some cases students may be more focused on survival needs for their families, thus causing positive academic behaviors to become secondary. And, if achievement satisfies the student's need for power, that need may be better satisfied by providing for the family in some way, thus making achievement less important.

With only student-level effects in the model, each standard deviation of school climate increase accounts for more than a quarter of a standard deviation increase in academic achievement. This relationship between school climate and academic achievement has been found in previous studies linking the two variables (Hopson & Lee, 2011; Ripski & Gregory, 2009). This is not surprising. It stands to reason that if a student finds his school to be a welcoming and positive place, he will make more of an effort to be successful. In a school with a more positive climate a student's survival needs are generally being met by the safe and orderly environment, and his love and belonging needs are being met by more positive relationships with peers and staff. That would allow a student to focus more on his need for power by improving his achievement.

Somewhat surprisingly, a school's use of PBIS did not have a statistically significant cross-level interaction with average academic achievement. It would seem logical that a program designed to improve student behavior by implementing positive and proactive strategies would have the effect of improving student attendance and increasing time at-task in the classroom, thereby causing improvement in achievement. However, the MDS3 data did not show this. These results should be tempered by the

weakness of the variable used to depict the use of PBIS. Because there was no measure of fidelity and no measure of the duration for which PBIS had been implemented, it is impossible to know if the schools were implementing PBIS as it was intended, or simply using it in name only. Use of PBIS in schools had moderate to moderately strong, negative bivariate correlations with average grades ($r=-.402, p<.01$) and average school climate ($r=-.512, p<.01$) and weak positive bivariate correlations with minority rate and high FARM rate. This also implies that schools that did not use PBIS would have had the inverse correlations. Because the use of PBIS was associated with schools with high FARM rate and higher minority rate, both of which are associated with lower climate and academic achievement, it is possible that the effect was influenced by those variables. Furthermore, in schools that used PBIS there was a higher percentage of male students and non-white students who were in the sample (Table 7). Since those populations are associated with greater risk factors, it is possible that the negative correlation between achievement and use of PBIS is related to those variables. Because data were only collected at one point in time, it is also possible that PBIS had been implemented in those schools as a means to counteract low school climate. If that were the case, the use of PBIS could possibly have already improved the schools' climate, but not quite to the point that it matched the climate of the other schools that were not using PBIS. Additionally, the use of PBIS by schools was only captured as using or not using PBIS. In order for PBIS to have the desired effects, schools must implement it with fidelity, and they must continue to use it over time (Barrett, Bradshaw, & Lewis-Palmer, 2008). There was no measure of how long the schools had been using PBIS nor was there a measure of

the fidelity with which they implemented PBIS. Both could be factors in explaining the negative association.

Physical Safety

At the student level, safety had statistically significant negative bivariate correlations with being non-white and in ninth grade, and statistically significant positive associations with being male and school climate. School climate explained approximately 25% of the variance in safety ($r^2=.247$). At the school level, average safety had statistically significant negative bivariate correlations with minority rate and high FARM rate, and a statistically significant positive association with average school climate. Average school climate explained approximately 76% of the variance in average safety ($r^2=.757$). The direction of these relationships is consistent with the literature on school safety. When examining these variables in a multilevel model and considering only student-level effects, the disparity in safety based on race was not statistically significant, while the disparity in safety based on gender and grade remained. When school-level predictors are added to the model, high FARM rate has a statistically significant interaction with average safety. Students in schools with a high FARM rate start on average with 16% of a standard deviation lower safety rating than students in schools with lower FARM rate. This is also consistent with the literature.

With only student-level effects in the model, each standard deviation of school climate increase accounts for 46% of a standard deviation increase in physical safety. When school-level predictors are added to the model, average school climate has a cross-level interaction with average physical safety. For each standard deviation increase in average school climate, students' average physical safety rating begins 17% of a standard

deviation higher. Thus, school climate not only has a direct effect on student-perceived physical safety, but attending school where climate is perceived to be higher by the overall student body has an additional positive effect on student-perceived physical safety. This contextual effect means that in order for students to feel safer in school, it is not only important that they have positive perceptions of their school's climate, but also that their peers share their positive perceptions of their school's climate. This is not a surprising finding, as it makes sense that students are more likely to feel safe in an environment that is welcoming and friendly and where more people around them have the same perceptions of the environment. This finding agrees with the literature on school climate. When students feel welcomed by and included in school, they are more likely to feel connected to the school and less likely to commit acts that undermine safety (Battistich et al., 1995; Payne, et al., 2003; Stewart, 2003; Wilson, 2004). If their needs for survival, love and belonging, and power are being met, they are more likely to choose behaviors that would maintain their needs rather than make choices that would be destructive to those needs.

As was the case with average academic achievement, a school's use of PBIS did not have a statistically significant cross-level interaction with average physical safety. Use of PBIS in schools had moderately strong, negative bivariate correlations with average grades ($r=-.544, p<.01$) and average school climate ($r=-.512, p<.01$) and weak positive bivariate correlations with minority rate and high FARM rate. This unexpected outcome could possibly be explained by the weakness of the PBIS variable, the cross-sectional design of the study, and the significant demographic differences between the schools using and not using PBIS.

Implications for Policy and Practice

This study described the relationships between school climate, student perceptions of safety, student-reported academic achievement, and school use of PBIS. This study when added to the literature reviewed in chapter two provides implications for policy and practice.

A positive school climate has been determined to be associated with increased student safety, decreased violence in schools, and improved student achievement. With this in mind, schools and school districts should make a consistent effort to measure climate with some regularity. Because violence in schools is often not the best predictor of safety (Furlong et al., 2004) and because students and staff often do not have the same perceptions of school climate or violence (Hurford et al., 2010), schools should make sure to consider both staff and students' perspectives when measuring climate.

Male students, non-white students, and ninth grade students were found to have the most risk factors in this study. The literature agreed that these groups were at higher risk than others. In particular, in some urban areas one-third of students who drop out of high school do so before completing the ninth grade, and dropout rates at all grades are strongly associated with ninth grade achievement and attendance (Neild, Stoner-Eby, & Furstenberg, 2008). With that in mind, schools should focus on these groups when targeting climate improvement in schools. This is particularly true when considering the contextual effect of school climate that students feel safer when their peers have positive perceptions of school climate. Schools should consider violence prevention programs and programs that support achievement for all students, but particularly for these groups. And in order to decrease dropout rates, schools need to change the way that they address

ninth graders (Neild, Stoner-Eby, & Furstenberg, 2008). Additionally, schools with a high minority rate or a high FARM rate have also been associated with lower levels of school climate, safety, and achievement. Schools with those demographics should be targeted by school districts for improving school climate as well as school facilities.

The literature pointed to elements of school climate that have specific relationships with student behavior, safety, and achievement including having clear and fair conduct policies that are equitably enforced and that students know and understand, having high academic expectations for all students, and having supportive relationships between staff and students and among students. These were the same elements considered in this study as part of school climate (i.e. order and discipline, school participation and academic emphasis, and relationships and connectedness). Glasser's theory also supports these same ideas. Behavior is a choice that students make in order to meet their needs. If their needs for survival, love and belonging, power, freedom, and fun are met, students will choose behaviors that are more accepted in school. Schools should consider these areas when developing policies or when considering new programs.

Although the data in this study did not show a statistically significant difference between the groups using and not using PBIS, the literature does point to its efficacy, and the data in this sample have limitations that may have affected those results. The results presented here should be tempered by the weakness of the PBIS variable, the cross-sectional nature of the study, and the significant demographic differences between schools using and not using PBIS. With that in mind, PBIS should still be considered as an option for schools looking to improve academic achievement, narrow gaps in achievement, decrease violence, and increase safety. PBIS targets some of the specific

areas that have been found to improve safety and achievement including disciplinary policy, relationships, and student expectations. Furthermore, the multi-tiered nature of PBIS can also effectively meet the requirements of the IDEA to address the behavior of children with disabilities whose behavior impedes their own learning or the learning of others. If students behavioral needs are addressed using this multi-tiered approach from an early age, it is conceivable that fewer students will be categorized with special needs, as their needs will be addressed as a part of the general school program.

Limitations and Future Research

Although the findings of this study were significant, caution should be taken when interpreting them. There are many limitations to consider with the data set, methodology, and theory behind the findings. Due to these limitations further research should be considered to mitigate those limitations.

The foremost limitation of this study is in its design. This was a cross-sectional study that took data from one point in time and had no comparison data. According to Stanovich and Cunningham (2004), this leads to two major problems. The first is the “third-variable problem.” When looking at correlations between variables, one must take into account potentially confounding variables that may correlate with the predictor and outcome variables. Only a limited number of variables were analyzed in this study, so it is possible that a variable not considered here would mitigate the effects of the ones considered. In particular, does school climate as it is constructed for this study have the same effect on safety and achievement when other variables are considered? This is only answered to a small degree as I did include a few potentially confounding variables. However, infinitely more variables exist, so this will never be fully answered. The

second is the “directionality problem,” also known as ambiguous temporal precedence, and it calls into question whether the first variable caused the second or if the second caused the first. In correlational studies direction cannot be proven, so this will always be a problem. In this case, does better school climate lead to improved achievement and increased safety, or do the latter lead to better school climate? This question cannot be answered with certainty based on this study. In order to help control for these problems, future research should include implementation of methods intended to improve school climate with data collection at multiple points and with a variety of potentially confounding variables included. Not all variables can be considered, but the more that are ruled out, the greater the likelihood that the researcher’s theory is correct (Stanovich & Cunningham, 2004).

The sample in this study is also a limitation. In order to be included in the study, schools had to meet certain requirements and the administrators had to be willing allow their students to be used as participants. These problems do not invalidate the results, but they do limit the external validity of the results. Furthermore, the differences between the original sample and the analytic sample serve as a limitation. Almost all of the students who failed to complete the survey were male. Because males had significantly different experiences with school climate, safety, and achievement than females, the results may have been quite different with their inclusion. In order to support the results of this study, more research should be conducted using the same methods but with different samples to see if the results are similar.

The variables used had some limitations. Student academic achievement was measured by self-reported grades on report card and consisted of options such as “Mostly

As” or “Mostly Cs.” Since not all students fit into one of the included categories perfectly and since not all students may be willing to self-report low achievement, it is possible that this is not the best measure of achievement. Student socioeconomic status (SES) is an accepted control measure for studies on student achievement and safety. In this study there was no measure of individual student SES. Future studies should consider the use of these variables if at all possible.

The construct of school climate also has its limitations. Many different studies have constructed climate differently. In this study I chose to construct it with measures that had been used frequently in the literature. However, many elements that had been considered in the literature were also left out. More research should be done to develop a consensus model of school climate in order to better compare climate in different settings.

Although the results to my analyses reached statistical significance, in some cases the practical significance may not have been great. When analyzing the effects of school climate on physical safety, approximately 11% of the variance was explained by differences at the school level. Of that, the fully conditional model explained almost 70% of the variance between schools. However, the results for academic achievement were not as strong. Only about 5% of the variance was explained by differences at the school level, and of that only about 13% of the variance between schools was explained by the fully conditional model. Both of these were found to be statistically significant, but the results for physical safety seem to have significantly greater practical significance.

The use of PBIS in schools was significant neither to physical safety nor to academic achievement in this study. That result differs from the literature examined in

chapter two. One possible cause for this is that the measurement of PBIS in this study was relatively weak. At the time of the initial data collection a school was either using or not using PBIS. There was no measure of implementation fidelity or of the duration for which PBIS had been used in the school. Both of these are important factors in the efficacy of PBIS. Future research should include measures of the duration and fidelity of PBIS implementation in order to develop a better picture of conditions under which PBIS works.

In addition to future research implications based on the limitations in this study, other areas of school climate research should be considered. Qualitative studies should be considered to examine the practices and policies in schools that consistently have high measures of school climate. This could help to inform school leaders about further ways to improve their own school's climate. Further studies should also be conducted on other programs designed to improve school climate (e.g. Project ACHIEVE, Comer Schools, etc.). Lastly, the results of the MDS3 Project should continue to be explored. It should help to answer some of the questions about the implementation fidelity and duration of use of PBIS, as the study progresses over time.

Summary

The purpose of this study was to examine the relationships between school climate, academic achievement, physical safety, and the use of PBIS in schools. The findings supported the literature on the topic, specifically that positive school climate was associated with improved academic achievement and increased physical safety. The findings also pointed to males, non-whites, and ninth-graders as students at greater risk for negative outcomes including lower safety and achievement and increased violence.

These findings also supported the literature. Surprisingly, the use of PBIS in schools did not have a significant positive association with school climate, physical safety, or academic achievement. This departure from the literature is possibly due to the way in which use of PBIS in schools was measured in this study as compared to how it was measured in the literature.

Further research should be conducted on the effects of school climate and on the effects of PBIS. Those studies should take into consideration the weaknesses of this and other studies in order to produce optimal results.

Table 1

Constructed Variable Elements

Variable	Survey Items	Measure
<i>Order & Discipline</i> ($\alpha=.538$)	“Students disobey the rules”	4=Strongly disagree, 1=strongly agree
	“Students listen to the teachers”	4=Strongly agree, 1=strongly disagree
	“Disruptions by other students can get in the way of my learning”	4=Strongly disagree, 1=strongly agree
	“There are clear rules about student behavior”	4=Strongly agree, 1=strongly disagree
	“Misbehaving students get away with it”	4=Strongly disagree, 1=strongly agree
	“Students are rewarded for positive behavior”	4=Strongly agree, 1=strongly disagree
	“Everyone knows what the school rules are”	4=Strongly agree, 1=strongly disagree
<i>Physical Safety</i> ($\alpha=.721$)	“I feel safe at this school”	4=Strongly agree, 1=strongly disagree
	“I feel safe going to and from this school”	4=Strongly agree, 1=strongly disagree
	“Physical fighting between students”	4=Not a problem, 1=large problem
	“Students carrying guns or knives”	4=Not a problem, 1=large problem
<i>Relationships & Connectedness</i> ($\alpha=.884$)	“I feel like I belong”	4=Strongly agree, 1=strongly disagree
	“I feel like I am part of this school”	4=Strongly agree, 1=strongly disagree
	“My teachers listen to me when I have something to say”	4=Strongly agree, 1=strongly disagree
	“Students help one another”	4=Strongly agree, 1=strongly disagree
	“My teachers care about me”	4=Strongly agree, 1=strongly disagree
	“Students respect one another”	4=Strongly agree, 1=strongly disagree
	“Teachers respect the students”	4=Strongly agree, 1=strongly disagree
	“Students and staff feel pride in this school”	4=Strongly agree, 1=strongly disagree
	“My teachers make me feel good about myself”	4=Strongly agree, 1=strongly disagree
	“My teachers tell me when I do a good job”	4=Strongly agree, 1=strongly disagree
<i>School Participation & Academic Emphasis</i> ($\alpha=.887$)	“I enjoy learning at this school”	4=Strongly agree, 1=strongly disagree
	“I like this school”	4=Strongly agree, 1=strongly disagree
	“My teachers believe that I can do well in school”	4=Strongly agree, 1=strongly disagree
	“I believe I can do well in school”	4=Strongly agree, 1=strongly disagree
	“My teachers encourage me to work hard in my classes”	4=Strongly agree, 1=strongly disagree
	“It is important to finish high school”	4=Strongly agree, 1=strongly disagree
	“At school I do interesting activities”	4=Strongly agree, 1=strongly disagree
	“During the last month, how many days of school have you missed because you skipped or “cut”?”	4=Zero days, 1=four or more days

Note: Cronbach’s alpha is in parentheses for each constructed variable, and estimates that variable’s internal consistency.

Table 2

Survey Items Exploring Safety, Violence, and Achievement

Survey Item	Original Measure	Dichotomous Measure
"I feel safe at this school"	4=Strongly agree, 3=agree 2=disagree, 1=strongly disagree	0=Feel safe 1=Do not feel safe
"During the past 30 days, how many days did you not go to school because you felt you would be unsafe at school or going to and from school?"	1=0 days 2=1 day, 3=2 or 3 days, 4=4 or 5 days, 5=6 or more days	0=0 days 1=1 or more days
"During the past 12 months, how many times were you in a physical fight on school property?"	1=0 times, 2=1 time 3=2 or 3 times, 4=4 or 5 times, 5=6 or 7 times 6=8 or 9 times, 7=10 or 11 times, 8=12 or more times	0=0 or 1 time 1=more than 1 time
"During the past 12 months, how many times were you threatened or injured with a weapon on school property?"	1=0 times 2=1 time, 3=2 or 3 times, 4=4 or 5 times 5=6 or 7 times, 6=8 or 9 times, 7=10 or 11 times 8=12 or more times	0=0 times 1=1 or more times
"During the past 30 days, how often did you carry a weapon, such as a knife or gun, on school property?"	1=0 days 2=1 day, 3=2 or 3 days, 4=4 or 5 days, 5=6 or more days	0=0 days 1=1 or more days
"Have you ever belonged to a gang?"	1=yes 2=no	0=no 1=yes
"On your last report card, you earned:"	1=mostly As, 2=mostly Bs, 3=monstly Cs 4=mostly Ds, 5=mostly Fs	0=As, Bs, or Cs 1=Ds or Fs

Table 3

Missing Data Description

	Original Sample		First cut				Second cut			
	N	%	<i>Deleted</i>		<i>Remaining</i>		<i>Deleted</i>		<i>Remaining</i>	
			N	%	N	%	N	%	N	%
Gender										
Male	11859	54.3	1992	99.8	9867	49.8	1026	59.8	8841	48.8
Female	9965	45.7	4	0.2	9961	50.2	690	40.2	9271	51.2
Grade Level										
Missing	1989	9.1	1989	99.6	0	0	0	0	0	0
9 th grade	6115	28.0	1	0.1	6114	30.8	497	29.0	5617	31.0
10 th grade	4851	22.2	3	0.2	4848	24.5	397	23.1	4451	24.6
11 th grade	4946	22.7	1	0.1	4945	24.9	428	24.9	4517	24.9
12 th grade	3923	18.0	2	0.1	3921	19.8	394	23.0	3527	19.5
Race										
Native Am.	318	1.5	1	0.1	317	1.6	27	1.6	290	1.6
White	10146	46.5	3	0.2	10143	51.2	590	34.4	9553	52.7
Hispanic	940	4.3	0	0.0	940	4.7	92	5.4	848	4.7
Asian	869	4.0	0	0.0	869	4.4	79	4.6	790	4.4
Black	6156	28.2	1	0.1	6155	31.0	759	44.2	5396	29.8
Hawaiian	133	0.6	0	0.0	133	.7	21	1.2	112	.6
Other	1271	5.8	0	0.0	1271	6.4	148	8.6	1123	6.2
Missing	1991	9.1	1991	99.7	0	0.0	0	0.0	0	0.0
School District										
Anne Arundel	3465	15.9	88	4.4	3377	17.0	296	17.2	3081	17.0
Baltimore County	9247	42.4	846	42.4	8401	42.4	827	48.2	7574	41.8
Caroline	1062	4.9	233	11.7	829	4.2	31	1.8	798	4.4
Charles	3064	14.0	370	18.5	2694	13.6	191	11.1	2503	13.8
Dorchester	619	2.8	6	0.3	613	3.1	65	3.8	548	3.0
Queen Anne's	1220	5.6	200	10.0	1020	5.1	59	3.4	961	5.3
Somerset	372	1.7	17	0.9	355	1.8	42	2.4	313	1.7
Washington	998	4.6	187	9.4	811	4.1	44	2.6	767	4.2
Wicomico	1176	5.4	28	1.4	1148	5.8	123	7.2	1025	5.7
Worcester	601	2.8	21	1.1	580	2.9	38	2.2	542	3.0
Total	21824	100	1996		19828	100	1716		18112	100

Table 4

Bivariate Correlation Coefficients among Variables

<i>Student-Level Variables</i>	1.	2.	3.	4.	5.
1. Not White	--				
2. Male	.005	--			
3. 9th Grade	.009	-.004	--		
4. Zscore: Re-scale: On your last report card, you earned	-.173**	-.163**	-.047**	--	
5. Zscore: physical safety	-.077**	.024**	-.029**	.153**	--
6. Zscore: Climate Factor: RELATE, ACADEMPH, ORDER	-.046**	.005	-.005	.281**	.497**
** $p < .01$					
<i>School-Level Variables</i>	1.	2.	3.	4.	5.
1. Active PBIS	--				
2. Zscore: Minority Rate	.287*	--			
3. High FARM Rate	.237	.349*	--		
4. Zscore: Average Grades on Report Card	-.402**	-.554**	-.465**	--	
5. Zscore: Average Physical Safety	-.544**	-.362**	-.432**	.533**	--
6. Zscore: Climate factor: RELATE2, ACDEMPH2, ORDER2	-.512**	-.298*	-.233	.544**	.870**
** $p < .01$. * $p < .05$					

Table 5
Multilevel Results for Student-reported Grades on Report Card (ZRPTRCRD)

	Unconditional Model		Student-level Model		School-level Model		School-level Model w/ PBIS	
	β	SE	β	SE	β	SE	β	SE
<i>Fixed Effects</i>								
For INTRCPT1, β_0								
INTRCPT2, γ_{00}	-0.012	0.032	-0.004	0.023	-0.006	0.022	-0.006	0.022
FARMHIGH, γ_{01}					-0.129**	0.047	-0.127*	0.048
ZMNRTYRT, γ_{02}					-0.006	0.025	-0.005	0.025
ZCLIMAT2, γ_{03}					0.017	0.024	0.011	0.027
PBIS, γ_{04}							-0.024	0.052
For NONWHITE slope, β_1								
INTRCPT2, γ_{10}			-0.296***	0.016	-0.293***	0.016	-0.293***	0.016
For MALE slope, β_2								
INTRCPT2, γ_{20}			-0.326***	0.014	-0.325***	0.014	-0.325***	0.014
For NINTHGRA slope, β_3								
INTRCPT2, γ_{30}			-0.103***	0.015	-0.102***	0.015	-0.102***	0.015
For ZCLIMATE slope, β_4								
INTRCPT2, γ_{40}			0.272***	0.007	0.272***	0.007	0.272***	0.007
	<i>SD</i>	<i>Variance</i>	<i>SD</i>	<i>Variance</i>	<i>SD</i>	<i>Variance</i>	<i>SD</i>	<i>Variance</i>
<i>Random Effects</i>								
INTRCPT1, u_0	0.2222	0.0493	0.1591	0.0253	0.1480	0.0219	0.1495	0.0224
level-1, r	0.9795	0.9594	0.9185	0.8437	0.9185	0.8436	0.9185	0.8436
ICC	0.049							
Reliability	0.934		0.895		0.881		0.883	
Between-Schools								
Vari. Explained					13.4%		11.5%	
*p<.05	**p<.01	***p<.001						

Table 6
Multilevel Results for Student-perceived Physical Safety (ZSAFETY)

	Unconditional Model		Student-level Model		School-level Model		School-level Model w/ PBIS	
	β	SE	β	SE	β	SE	β	SE
<i>Fixed Effects</i>								
For INTRCPT1, β_0								
INTRCPT2, γ_{00}	-0.004	0.047	-0.000	0.035	-0.005	0.021	-0.005	0.020
FARMHIGH, γ_{01}					-0.160***	0.045	-0.155**	0.045
ZMNRTYRT, γ_{02}					-0.015	0.023	-0.011	0.023
ZCLIMAT2, γ_{03}					0.171***	0.022	0.157***	0.025
PBIS, γ_{04}							-0.062	0.048
For NONWHITE slope, β_1								
INTRCPT2, γ_{10}			-0.013	0.014	-0.009	0.014	-0.009	0.014
For MALE slope, β_2								
INTRCPT2, γ_{20}			0.049***	0.012	0.050***	0.012	0.050***	0.012
For NINTHGRA slope, β_3								
INTRCPT2, γ_{30}			-0.073***	0.014	-0.072***	0.014	-0.072***	0.014
For ZCLIMATE slope, β_4								
INTRCPT2, γ_{40}			0.460***	0.006	0.458***	0.006	0.458***	0.006
	<i>SD</i>	<i>Variance</i>	<i>SD</i>	<i>Variance</i>	<i>SD</i>	<i>Variance</i>	<i>SD</i>	<i>Variance</i>
<i>Random Effects</i>								
INTRCPT1, u_0	0.3371	0.1136	0.2493	0.0622	0.1401	0.0196	0.1390	0.0193
level-1, r	0.9469	0.8965	0.8327	0.6933	0.8327	0.6934	0.8327	0.6934
ICC	0.112							
Reliability	0.971		0.960		0.889		0.888	
Between-Schools								
Vari. Explained					68.5%		69.0%	
*p<.05	**p<.01	***p<.001						

Table 7

Descriptive Data of PBIS Schools

	PBIS	Not PBIS
Students in Sample (n=18,112)	49.2%	50.8%
Gender		
Male	50.6%	49.4%
Female	47.9%	52.1%
Race		
White	42.0%	58.0%
Not White	57.3%	42.7%
Schools in Sample (n=52)	27	25
Overall Minority Rate		
<50%	13	18
>50%	14	7
Overall FARM Rate		
<40%	12	17
>40%	15	8
Average Grades on Report Card (range 1 to 5)	3.83	4.02
Average Physical Safety (range 1 to 4)	2.82	3.05
Average School Climate (range 1 to 4)	2.65	2.76

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