THE RELATIONSHIP BETWEEN STUDENT PERCEPTIONS OF SCHOOL CLIMATE DOMAINS AND ACADEMIC ACHIEVEMENT IN RURAL SCHOOLS

by

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Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

The purpose of this study was to determine how accurately student achievement in reading could be predicted by student perceptions of certain school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of teasing and bullying). Research demonstrated a predictive relationship between school climate domains and student academic achievement. This study applied a quantitative, correlational design to determine the predictive ability of school climate domains on student achievement in reading in rural schools. Rural school outcomes were measured by student responses for each climate domain on the 2018 Virginia School Climate Survey while academic achievement in reading was measured by school pass rates on the 2018 Virginia reading end-of-course standards-of-learning assessment. All 102 rural Virginia high schools were included in this study. Results indicated that while a weak association existed between student perceptions of school climate domains and student achievement in rural schools, a linear combination of student perceptions of school climate domains was not significantly predictive of student achievement in rural schools.

Keywords: school climate, student engagement, academic expectations, bullying, and rural schools

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List of Abbreviations

Standards of Learning (SOL)

National Center for Educational Statistics (NCES)

Virginia School Climate Survey (VSCS)

School and Staffing Survey (SASS)

Ratio of Instructional to Transportation Expenditures (RITE)

Educational Demographics and Geographic Estimates (EDGE)

Virginia Department of Criminal Justice Services (VDCJS)

Technology-Enhanced Items (TEI)

Division Director of Testing (DDOT)

School Testing Coordinator (STC)

Institutional Review Board (IRB)

Variance Inflation Factor (VIF)

CHAPTER ONE: INTRODUCTION

Overview

The purpose of this quantitative correlational study is to determine how accurately student achievement in reading can be predicted by a linear combination of student perceptions of school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of teasing and bullying) in rural schools. Understanding this relationship will assist school leaders in directing school improvement efforts in a more prescriptive manner and more efficiently allocating resources to maximize student achievement gains. Chapter One will provide a background for the topics of school climate, student achievement, and rural schools. The theoretical framework for this study will be included in the background of the study. Chapter One will introduce the problem statement, the purpose statement, and the significance of the study. This chapter will also identify the research questions to be addressed. The chapter will conclude with the definition of key terms that will guide this study.

Background

While a strong curriculum and effective teaching are critical to student academic success, student perceptions of the school climate may be, as well. School climate is comprised of many factors such as the interactions between subgroups within a school, the school and its community, and the rules and regulations guiding school operations (Daily et al., 2020). Berkowitz (2020) found that student perceptions of positive school climate factors such as meaningful student-teacher relationships were associated with higher student achievement (r = 0.85), while student perceptions of negative school climate factors such as the prevalence of

risky peer behavior (r = 0.51) and high levels of school violence (r = 0.63) were associated with lower student achievement.

How students view their school's performance on specific climate factors can potentially provide school leaders with an indication of problems that may exist (Daily et al., 2019). Leaders of schools that are not performing well academically may become better equipped to positively influence the academic outcomes of their students by forming a clearer understanding of student perspectives regarding their school. Analysis of data resulting from studies of specific climate domains may allow school leaders to become more prescriptive in deciding which areas of school climate should receive the most priority in funding and staffing.

While many school climate studies have included examinations of urban schools, very few studies have investigated the role of school climate in rural schools. Teacher quality, access to programs, smaller schools and class sizes, poverty, and a lack of enrichment opportunities are issues facing rural schools that necessitate further study. "Education research and reforms are often designed around large urban populations; hence, these reforms may fare poorly in rural areas" (Shakeel & Maranto, 2019, p. 463). Leaders of rural schools may not have access to valuable data that may facilitate cultural and academic improvements in their schools (Sulak, 2016).

Historical Context

School climate was first identified as a concept in 1908 when Principal Arthur Perry asked fellow school leaders to consider their schools as more than simply housing for their students during the day (Perry, 1908). School climate became an empirical construct with Halpin and Croft's (1963) creation of the first instrument for measuring school climate, the Organizational Climate Descriptive Questionnaire. As the role of schools began to evolve from

simply disseminators of information to a more holistic approach, researchers began to understand that school environments were affecting students' ability to learn and develop emotionally.

While school climate increased in relevance, defining school climate became a challenge for researchers. Early definitions of school climate focused on the harmony of relationships within the school, especially interactions between students, staff, and school administration (Halpin & Croft, 1963). While these interactions are still included in school climate definitions and research, there have been significant additions to the definition in the past 20 years. School shootings and other acts of school violence warrant school safety to be considered as a key component of the overall school climate (Lucio et al., 2012). The National School Climate Council (2007) indicated the importance of relationships within a school by stating that "a safe and supportive school environment, in which students have positive social relationships and are respected, engaged in their work and feel competent, matters" (p. 1).

School climate has been studied from multiple perspectives. The earliest works examined school climate from the perspectives of teachers, specifically their perceptions of the effects of school climate on their ability to teach and their students' ability to learn (Berkowitz et al., 2017). As teacher measurement instruments designed for school climate were created, the focus soon shifted to developing surveys measuring how students perceived their school climate. (Wang & Degol, 2016). Using student perceptions as a measure of school climate has become the most utilized method of data collection in school climate research (Berkowitz, et al., 2017). Student perceptions are valuable data points in measuring the effects of climate on student achievement because the common factor in both instances is the student (Sanders, et al., 2018).

In addition to the variety of perspectives from which school climate has been studied, there is variation in the specific climate domains measured to test the association with student

achievement. The disciplinary structure of schools, such as the way students perceive the fairness and enforcement of school rules, has been implemented as a school climate domain in many studies investigating the association between climate and achievement measures such as grade point average and standardized testing results (Cornell et al., 2016; Maxwell et al., 2017; University of Virginia, 2018). Relationships between teachers and students have also been employed as a climate indicator in multiple studies (Maxwell et al., 2017; Shukla et al., 2016; Sulak, 2016). School safety has been included more frequently as a school climate domain since 2005 because of increased occurrences of school-related violence (Wang & Degol, 2016). Other areas that have been commonly utilized as measures of school climate include student perceptions of staff as projecting high learning expectations and the prevalence of bullying (Berkowitz et al., 2017; Daily et al., 2019; Sulak, 2016).

Research findings have been inconsistent in determining which school climate domains are most predictive of student achievement. For instance, McCoy et al. (2013) found that the disciplinary climate of a school had a more significant association ($r = 0.16$) with academic achievement than other climate variables. Glew et al. (2008) indicated that the prevalence of school bullying was the climate domain most significantly related ($r = 0.38$) to student achievement in their study. Despite disagreement about which specific domains are more significantly related to student achievement, there has been much agreement from researchers that schools with positive school climates, meaning students feel safe, supported, and academically engaged, provide environments that are most predictive of high academic achievement (Benbenishty et al., 2016). Negative school climates, including those in which students indicate perceptions of unsafety, negativity from teachers, and little emphasis on academics, are related to less academic success (Benbenishty et al., 2016).

Social Context

Student perceptions of teacher-student relationships, fairness and enforcement of school rules, emphasis on learning, engagement levels, and bullying frequency affect more than students' likelihood to earn satisfactory grades and passing scores on assessments. These relationships may be more effectual in rural schools because of the poverty and seclusion that many rural students experience (Greenough & Nelson, 2015). Because many rural parents work multiple jobs or travel a great distance to work, rural children often do not experience the necessary supportive relationships at home, which is why these relationships must be substantial at school.

How students perceive the climate of their schools affects their social and emotional health, as well as their behavior inside and outside of school (Shukla et al., 2016). Students who attend schools where they indicate feeling safe and supported tend to view school as a place where they can express their feelings to a mentor or other adults (Cohen & Geier, 2010). The support that students perceive as being available in schools with a positive climate creates opportunities for personal connections that often improve mental health and support systems for students (Newland et al., 2019). When students perceive school as safe and have teachers with whom they have fostered positive relationships, they become more motivated to learn (National School Climate Council, 2007). Furthermore, when students view their school as unsafe, they often feel the need to misbehave in class, bring weapons to school, or participate in other conduct that may be detrimental to their physical or mental health (Shukla et al., 2016). There is also evidence that students who attend schools with a poor disciplinary structure as demonstrated by aggression towards staff, classroom disruptions, and student fights, are more likely to be

involved with drugs, weapons, or gangs outside of school both during their tenure as students and after they have completed their high school education (Benbenishty et al., 2016).

Dropping out of school before earning a diploma can result in community issues such as increased unemployment and crime. High school dropouts are 70% more likely to be unemployed than those who have earned a diploma and 5 times more likely to be incarcerated during their lifetimes (Backman, 2017). School connectedness is an important aspect of reducing dropout rates in high schools because the desire to please teachers with whom they have formed a relationship is important to many students at risk of dropping out of school (Shukla et al., 2016). Such teacher-student relationships are critical components of school climate.

Theoretical Framework

Bronfenbrenner's (1977) ecological systems theory described the role of a child's environment in his or her academic, behavioral, and social development through the examination of microsystems and macrosystems. Macrosystems, such as schools and neighborhoods, influence children by providing structure and demonstrating social, academic, and behavioral norms (Bronfenbrenner & Ceci, 1994). Schools and neighborhoods each project unique identities that influence the thoughts and behaviors of the entire macrosystem. Bronfenbrenner identified microsystems as the relationships between children and their parents, friends, teachers, and individual classroom environments. He posited that microsystems significantly affect the ability of students to achieve academically and to grow emotionally (Ashiabi & O'Neal, 2015).

The ecological systems theory was expanded in 1994 to include arguments of heredity versus environment. Heredity refers to the uncontrollable genetic human composition that exists throughout a person's life. The person's environment refers to the external factors with which that person interacts during his or her life. The heredity versus environment argument questions

which of the two factors most influence human development. Bronfenbrenner and Ceci (1994) authored the bioecological model of development recognizing that heredity and environment are both important to the development of children, and more specifically, their ability to achieve their genetic potential. Bronfenbrenner posited that hereditary factors innate from birth, such as a child's intelligence level and disability status, affect his or her ability to learn. He also posited that the environment in which a child is raised and educated can significantly influence a student's academic achievement. The bioecological model introduced the concept of proximal processes as the specific interactions between children and their macro- or microsystems that allow them to overcome hereditary and environmental factors such as learning or emotional disabilities (Bronfenbrenner & Ceci, 1994). Examples of proximal processes include specific interactions, both positive and negative, between children and their parents, teachers, neighbors, community members, and school environments (Bronfenbrenner & Ceci, 1994).

Bronfenbrenner explained that proximal processes allow students the opportunity to overcome hereditary issues such as learning disabilities that impact their ability to learn. These connections can help explain the importance of school climate. For example, if a child is learning-challenged, or suffers from a learning disability, these issues are often hereditary. By applying the bioecological model, if children with learning disabilities experience positive relationships with their teachers, feel safe, and are presented with engaging lessons, they may academically outperform the expectations of a student with such a disability. Conversely, if these students attend schools in which teachers exhibit low expectations, teacher-student relationships are negative, and students feel unsafe, then their disability may be more of a limiting factor. These deductions are supported by the premise that environment can assist in overcoming hereditary factors associated with poor academic performance, especially if strong proximal

processes exist such as positive parent-teacher interactions, student-teacher interactions, student-student interactions, or parent-student interactions (Bronfenbrenner & Ceci, 1994). Positive parent-teacher interactions are more difficult to achieve in rural areas due to the potentially excessive distance from home to school and a lack of parental transportation which precludes many parents from visiting schools (Rosenberg, et al., 2015). Student-to-student relationships are often measured by the prevalence of bullying in schools. Student perceptions of the support level present in their schools are often formed as a result of the student-teacher interactions that they experience. When such interactions are beneficial for students when they are positive, the bioecological model suggests that academic issues could be exacerbated by poor relationships within a school.

Bronfenbrenner's bioecological model of development provides theoretical support between student perceptions of school climate and student achievement central to this study. School climate research has progressed from its origins examining the relationships among students, staff, and administration to considering school safety and the mental health of students in conjunction with these relationships. The manner in which students perceive the climate of their school is important because these perceptions may be the impetus for students developing meaningful relationships with adults such as teachers, counselors, or administrators that could positively influence their ability to cope with social or academic issues, as well as aid in improving their mental health. Rural schools provide specific macrosystems that could result in students employing a different perception of their school's climate than in urban and suburban schools. Attracting and retaining qualified and experienced staff is an issue for rural schools because of low salaries and geographical seclusion (Rosenberg et al., 2015). The shortage of quality teachers may result in poor teacher-student relationships, unruly classrooms, low

academic expectations, and a lack of engaging lessons. The bioecological model of development posits that deficiencies in these climate areas may lead to students being less likely to reach their academic potential.

Problem Statement

A lack of research regarding the relationship between school climate and student achievement in rural schools has prevented rural school leaders from fully understanding how school climate could affect students' academic achievement. Academic achievement is closely correlated with student perceptions of school climate in many studies (Berkowitz et al., 2017; Ruiz et al., 2018). While a positive relationship between school climate and academic achievement is evident in the literature, results from school climate studies are inconsistent concerning which school climate domains are most closely related to academic performance (Daily, et al., 2019).

Achievement comparisons are necessary for demonstrating how schools with positive student perceptions of school climate compare academically with schools whose student climate perceptions are more negative (Lacks & Watson, 2018). Davis and Warner (2018) noted that studies of school climate and achievement focus on urban areas resulting in a need for geographically expanded school climate studies. Rural schools are specific macrosystems that may present characteristics resulting in a more significant influence on student academic achievement as influenced by their perceptions of school climate. The problem is that insufficient research exists to determine how accurately high school reading achievement can be predicted from a linear combination of student perceptions of specific school climate domains in rural Virginia schools (Sulak, 2016; The Rural School and Community Trust, 2019; Thier et al., 2021).

Purpose Statement

The purpose of this correlational study is to determine how accurately student achievement in reading can be predicted by a linear combination of student perceptions of school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of teasing and bullying) in rural schools. The predictor variable for this quantitative study will be student perceptions of school climate as measured by a linear combination of student perception scores on the five school climate domain indicators on the 2018 Virginia School Climate Survey (VSCS) for rural high schools in Virginia. Rural high schools in Virginia will be defined as all high schools in the state that are located in school districts that met the criteria to be 100% remote in 2019 according to the National Center for Educational Statistics (NCES). The locale codes defined by the NCES are the measures most commonly found in research to describe school divisions are rural or urban (Greenough & Nelson, 2015). Wang and Degol (2016) defined school climate as the set of norms and interactions between groups of people in a school that established parameters for acceptable behaviors and relationships. Climate surveys have been employed as the instrument of choice for measuring student perceptions of school climate for most quantitative school climate research (Berkowitz, 2017).

The criterion variable for this study will be student academic achievement in rural Virginia high schools as measured by performance on the 2018 administration of the Virginia end-of-course reading SOL test. The reading SOL test was selected for this study because a passing score is required of all Virginia high school students in order to graduate. By choosing a required test to measure achievement, it is ensured that students on a variety of academic performance levels will be included in the study. Davis and Warner (2018) described academic

achievement as the measure of student learning and mastery. State or national standardized testing is commonly implemented to measure academic achievement in studies for which the relationship between school climate and student achievement is being examined (Ruiz et al., 2018).

This study will employ the student-generated results depicting their perceptions of each of the five school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of teasing and bullying) from rural schools that completed the VSCS. School pass rates for rural Virginia schools on the 2018 end-of-course reading SOL test will represent the academic achievement of each school. The two variables will be compared to determine the direction and strength of the relationship. This study will also attempt to determine which categories of student climate perceptions can most accurately predict achievement in rural Virginia schools.

Significance of the Study

This study is intended to provide insight into how accurately high school reading achievement can be predicted by a linear combination of student perceptions of specific school climate domains in rural schools. From a theoretical perspective, this study will add to the literature regarding bioecological theory by explaining the relationship between rural high school students' perceptions of their school's climate and the academic achievement of their schools. The manner in which students feel about the relationships and disciplinary structure of their schools is an important indicator of the proximal processes within those schools. If it is determined that positive relationships exist between specific climate domains and academic achievement, then Bronfenbrenner's position that proximal processes are integral to student learning would be strengthened.

The empirical significance of this study is the need for inter-school research in unique settings, especially in rural schools where little research exists (Sulak, 2016). There is a gap in the literature, addressed by this study, regarding how accurately student perceptions of school climate domains can predict achievement in rural schools. Information regarding how accurately student perceptions of specific school climate domains can predict student achievement could be practically useful to rural school leaders as a tool for choosing which climate domains to address in order to improve student achievement. School climate is malleable which makes the information garnered from this study valuable to school leaders who wish to improve academic performance via a focus on a specific climate domain (Wang & Degol, 2016). Financial and human resources for schools and school divisions are often limited; therefore, the specificity that can be garnered from a study providing predictive information about specific school climate domains and academic achievement would allow for interventions to be prescriptive and targeted (Maxwell et al., 2017). If data indicate that student perspectives regarding their school's performance in achieving specific climate domains are predictive of academic achievement, then an increased focus on climate domains that are the most predictive of student achievement may lead to better academic performance by many students. If data indicates that school climate perceptions are not predictive of student achievement, school leaders may find it more beneficial to direct achievement efforts to areas other than school climate.

Research Questions

RQ1: How accurately can high school reading achievement be predicted from a linear combination of student perceptions of specific school climate domains (disciplinary structure, academic expectations, student support, student engagement, and prevalence of bullying) for students in rural Virginia schools?

Definitions

1. *Disciplinary structure* - The disciplinary structure of a school consists of the rules and consequences created to address behavioral issues within the school (Glew et al., 2008).
2. *Student achievement* - Student achievement is the measure of student learning and mastery (Davis & Warner, 2018).
3. *School climate* - The set of norms and interactions between groups of people in a school that set parameters for acceptable behaviors and relationships in that school (Wang & Degol, 2016).
4. *Student engagement* - Student engagement is the degree to which students are involved with their classrooms, learning, and school community (Fatou & Kubiszewski, 2018).
5. *Student support* - Student support is the measures implemented by schools to assist in meeting the unique needs of students (Dailey et al., 2019).

CHAPTER TWO: LITERATURE REVIEW

Overview

The purpose of this correlational study is to determine how accurately student achievement in reading as measured by the 2018 Virginia end-of-course standards of learning (SOL) test results can be predicted by a linear combination of student perceptions of school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of teasing and bullying) as measured by the 2018 Virginia School Climate Survey in rural schools. This chapter will begin with a description of the theoretical framework and how it helps to explain the relationship between student perceptions of school climate and student achievement. Literature regarding the definition and perceptions of school climate, the interaction between climate and achievement, measuring academic achievement, and rural schools will be examined. There is a gap in school climate literature regarding how accurately school climate domains can predict academic achievement in rural schools.

Theoretical Framework

Most school climate research indicates that there is a positive relationship between the climate of a school and the academic achievement of its students; however, school climate is a difficult construct to define because of the many individual domains that contribute to the entire concept (Shukla et al., 2016). Due to the difficulty of defining school climate, researchers have applied a variety of categorical measures as contributors to defining school climate. Relationships, disciplinary structure, academic expectations, level of student engagement, and school safety are among the most common measures of school climate inherent to the literature (Berkowitz et al., 2017; Maxwell et al., 2017). When considering the relationship between

student perceptions of school climate domains and student academic achievement, Bronfenbrenner's ecological systems theory and bioecological model of development, as well as Vygotsky's theory of cognitive development, offer a connection between the two concepts.

Ecological Systems Theory

Urie Bronfenbrenner was a Russian-born American psychologist who studied behavioral and cognitive child development. Bronfenbrenner was critical of previous child development research because important research such as Mary Ainsworth's study of child attachment (1971) was derived from experiments that occurred in laboratory settings that were unfamiliar to the participating children. He argued that to generate accurate results, child development research should occur in a setting that is natural for the children participating.

Bronfenbrenner's ecological systems theory (1977) focused on the role of a child's environment in his or her academic, behavioral, and social development. The environment Bronfenbrenner described consists of five levels: the microsystem, the mesosystem, the exosystem, the macrosystem, and the chronosystem (Bronfenbrenner, 1977). The microsystem produces the greatest influence on a child's behavioral and cognitive development. Inherent to this system are the individuals who facilitate the most immediate interactions with the child including parents, peers, and teachers. According to ecological systems theory, behavioral effects of a microsystem are bi-directional, meaning the child can be influenced by others in his or her microsystem and he or she can influence others within the microsystem. As a microsystem, ecological systems theory explains that schools influence children's emotional growth and learning abilities by providing structure and demonstrating social, academic, and behavioral norms (Bronfenbrenner & Ceci, 1994). Interactions between members of a microsystem were referred to as a mesosystem. Bronfenbrenner found that positive interactions within the

mesosystem were beneficial for children (Ashiabi & O'Neal, 2015). For instance, if teachers and parents interact well, students would be positively affected by those interactions because positive interactions are being modeled for the students. The same effects would be created by positive mesosystems within schools and communities, for students and teachers, and for peer groups. Exosystems were described as the child's neighborhood, friends of the parents, and other indirect factors. Socioeconomic and other demographic information comprised the system Bronfenbrenner referred to as the macrosystem. The chronosystem includes the developmental changes that occur in the child's life. The exosystem, macrosystem, and chronosystem produce the least effect on children's development and learning because those systems are more indirect. Bronfenbrenner posited that members of a child's microsystem and the interactions that occurred with the mesosystem provide the most significant effect on a child's ability to learn (Bronfenbrenner, 1977). Figure 1 illustrates the five levels of the ecological system and their proximity to the developing child.

Figure 1

Bronfenbrenner's Ecological Systems Theory Levels

Note. https://pryde.bctr.cornell.edu/news/2018/4/19/pryde-organizes-youth-purpose-symposium

Ecological systems theory posits that mesosystems significantly influence the ability of children to achieve academically and exhibit emotional health because of the importance of microsystem members, such as peers and teachers, to a child's development. (Ashiabi & O'Neal,

2015). Ecological systems theory explains that schools, as a microsystem, affect the ability of children to develop emotionally and to learn by providing structure and demonstrating social, academic, and behavioral norms (Bronfenbrenner & Ceci, 1994). Determining which of Bronfenbrenner's structures most significantly influences student achievement has been the basis for many studies on school climate and student achievement (Fatou & Kubiszewski, 2018; Ruiz, et al., 2018; Shukla, et al., 2016). Single microsystem elements, such as school safety and peer group relationships, have been employed to assess various associations with student achievement in climate studies. In their review of school climate research, Deemer (2004) indicated that the learning process is influenced by teacher expectations and their established goals. Newland et al., (2019) reported that several students in their sample indicated that engaging lessons and assignments motivated and increased learning more than any other climate factor. Most climate research has demonstrated that the interactions inherent to mesosystems, specifically the relationships between teachers and their students, profoundly influence student perceptions of their schools and affect their grades, grade point averages, and standardized test scores (Maxwell et al., 2017; Shukla et al., 2016; Sulak, 2016).

Climate studies have applied the ecological systems' theoretical concept of microsystems and the member interactions through mesosystems to provide a basis for a potentially strong relationship between school climate and student achievement. Newland et al. (2019) employed Bronfenbrenner's theories as a basis for explaining why children indicated that school-based relationships with adults influenced their self-image, mental health, and desire to learn. Student-reported feelings of support, care, and safety within schools have been associated with higher academic achievement across school climate literature (Daily et al., 2020; Ruiz et al., 2018). Most climate research has supported the ecological systems premise that there exists a potential

positive association between student perspectives regarding their school-based microsystem members and their academic achievement levels (Davis & Warner, 2018; Fatou & Kubiszewski, 2018). Daily et al. (2019) found that student perceptions of teacher-student relationships (R^2 = 0.12), order and safety (R^2 = 0.11), and school connectedness (R^2 = 0.11) were predictive of student grades. These school climate domains are the type of mesosystem-level interactions that Bronfenbrenner posited would influence students' ability to learn.

Bioecological Model of Development

Bronfenbrenner's ecological systems theory was expanded in 1994 to include considerations of heredity versus environment. The bioecological model of development (1994) acknowledged that children's traits and abilities inherent at birth affect their development and academic potential; however, the model explains that a positive home and school environment can provide the catalyst for overcoming hereditary deficiencies. While hereditary factors can create challenges for students, school relationships, student perceptions of physical and emotional safety, and high academic expectations can catalyze their academic achievement. The bioecological model introduced the concept of proximal processes described by Bronfenbrenner and Ceci (1994) as the specific interactions between children and their immediate environment intrinsic to their microsystems that allowed them to overcome hereditary and environmental factors. Examples of proximal processes included specific positive and negative interactions between children and their parents, teachers, neighbors, and school environment (Bronfenbrenner & Ceci, 1994). Bronfenbrenner and Ceci (1994) indicated that development occurs through the process of complex reciprocal interactions between a person and his or her immediate environment. The teacher-student interaction is critical to a child's academic development because students are more likely to participate in class, be engaged in their lessons,

and earn higher grades in classes where they perceive a positive relationship with the teacher (Fatou & Kubiszewsi, 2018). Since teachers often interact most frequently with students, their potential to influence students' academic desire and performance is greater (Lacks & Watson, 2018).

Besides describing how children's ability to socialize and learn is affected by their proximal processes, Bronfenbrenner also explained that proximal processes are important in overcoming potentially detrimental environmental factors often inherent to the exosystem and macrosystem. For example, if a child presents a learning deficiency or is negatively affected by complications associated with low socioeconomic status, the bioecological model suggests that should the child attend a school with a supportive academic and social climate with frequent positive proximal processes, his or her likelihood of realizing his or her academic potential is greatly enhanced despite those challenges. If a child experiences negative influences in the home, inclusion in a positive peer group or having a mentor at school may assist that child in making healthy and positive choices. Conversely, a negative school climate may impede a child from fully realizing his or her academic potential and may exacerbate his or her challenges. These deductions are supported by the theoretical premise that relationships within microsystems, such as a school, can assist in overcoming hereditary or societal factors if the child experiences positive proximal processes (Bronfenbrenner & Ceci, 1994).

Christensen (2016) expressed concerns about the ecological theories developed by Bronfenbrenner. He explained that the focus of Bronfenbrenner's work centered on individuals and how they were affected by group interactions. Christensen argued that by focusing so heavily on the individual, insufficient consideration was extended to strengthening the group dynamic. He also argued that if mesosystems and proximal processes were as critical to the

development of children as Bronfenbrenner indicated, then there is a question regarding how it is possible for some children to experience success when they had experienced few positive interactions. Christensen maintained that the resiliency of some children, that others lacked, was a primary component missing from the ecological models. This resiliency allows many children to overcome negative and abusive home situations to perform appropriately both behaviorally and academically as well as be productive citizens despite their life challenges (Christensen, 2016).

Vygotsky's Theory of Cognitive Development

Lev Vygotsky was a Russian psychologist who specialized in the study of childhood cognition in the early 20th Century. Vygotsky's most significant contribution to psychology was his study of the connection between social interactions and cognitive skill development in children. He posited that children were born with attention, sensation, perception, and memory. These abilities are enhanced and developed as a result of their interactions with people whom he referred to as more knowledgeable others (Vygotsky, 1978). More knowledgeable others are people who are more skilled than a child on a particular task. Teachers are examples of more knowledgeable others because they possess more knowledge on specific topics than that of their students. For instance, a child may enter into a fourth-grade classroom with the ability to multiply numbers, but not possess the ability to multiply fractions. The more knowledgeable other, the teacher in this instance, possesses the ability to multiply fractions. The teacher interacts with the student through direct instruction and teaches the student how to progress from multiplying whole numbers to multiplying fractions. The difference between that which the student can achieve prior to receiving the teacher's help and that which the student can achieve after receiving the teacher's help is referred to by Vygotsky as the zone of proximal

development. The relationships that occur between teachers and students are determinants of what is learned and how quickly it is learned. For Vygotsky, the ultimate goal of learning is the internalization of processes learned from more knowledgeable others to be replicated and applied by the student without assistance.

Relationships between teachers and students are critical to Vygotsky's theory. He applied language as the vehicle for teachers to convey knowledge to students and referred to that language between students and more knowledgeable others as the accelerator to thinking which results in information and processes the student later internalizes (Vygotsky, 1978). As a result, positive interactions between teachers and students are catalysts to learning while negative interaction or poor communication between students and teachers may inhibit growth and learning. The importance this theory places upon student-teacher interactions demonstrate the critical nature of these relationships in schools.

While Vygotsky's theory of cognitive development is accepted by many as a link between social interaction and cognitive development, there are criticisms of his work, as well. Vygotsky does not account for a child's motivation or learning needs in explaining his or her zone of proximal development for a task. Vygotsky does not explain how some children are able to rise above a lack of social interactions to learn more quickly than would be expected. Finally, there is no indication as to whether societal influences are more or less influential for different groups based on race, gender, or socioeconomic status. While there are limitations to Vygotsky's work, it provides a basis upon which the relationship between children's social interactions and their learning may be better understood.

Connections to School Climate

School climate focuses on the nature of relationships between individuals and groups within the school. Bronfenbrenner's theories on child development explain that proximal processes affect children's ability to learn and maximize their academic potential. Complex proximal processes in the educational setting require children to be regularly engaged in activities with other individuals in the school, such as teachers and peers, over an extended period (Mercon-Vargas et al., 2020). Research has indicated that the proximal processes students experience at school, such as relationships with their peers, exposure to bullying, teacher expectations, positive student-teacher interactions, and student supports are all associated with student achievement (Davis & Warner, 2018; Shukla et al., 2016). In a study of suburban school climate domains and academic achievement, Sulak (2016) indicated that academic achievement could be predicted ($R^2 = 0.12$) by student perceptions of daily disorder within the school. If students perceive their school as being disorderly, then that is likely a result of negative interactions between students. This study supports Bronfenbrenner's assertion that a negative school environment may impeded learning and children's ability to realize their academic potential.

Vygotsky's theory of cognitive development supports the argument that school climate is positively associated with student achievement by underscoring the importance of positive student-teacher interactions and student engagement as related to student achievement. Magen-Nagar and Azuly (2016) found that there was a significant positive correlation ($r = 0.35$) between school climate and student achievement. The researchers indicated that their results strengthened Vyogotsky's position supporting the value of positive teacher-student interactions by noting that the schools in the study performed well academically while emphasizing student-teacher

relationships to overcome learning obstacles such as household poverty and learning disabilities. The schools included in the study ensured that quality teachers were targeting instruction via the application of methods such as differentiated instruction. Sulak (2016) and Maxwell et al. (2017) examined the relationship between school climate and student achievement and their findings supported Vygotsky's theory of cognitive development as a theoretical basis specifically citing his claim that the classroom's social climate is one of the most influential factors in a child's cognitive development.

The proposed study seeks to determine the relationship between school climate domains including student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying and academic achievement of students in rural schools. Each of the domains examined is an example of Bronfenbrenner's classification of mesosystems and proximal processes, both of which he found influenced students' ability to learn. Student-teacher relationships and student engagement are essential elements to teachers effectively serving as students more knowledgeable others which Vygotsky posited as a critical component in student learning. This study will extend Bronfenbrenner's and Vygotsky's developmental theories and provide additional evidence regarding the predictive potential of climate domains influencing student achievement. By focusing specifically on rural schools, this study will demonstrate the applicability of these theories in diverse settings.

Related Literature

School climate is a concept studied since the early 1900s (Sulak, 2018). School climate is a compilation of the relationships that exist within schools (Shukla et al., 2016). Physical safety and emotional security have become more recognized components of school climate in the past 15 years (Wang & Degol, 2016). Schools have climates that are unique to their students, staff,

and community. A positive school climate has been shown to counteract the effects of poverty and improve equity in schools (Davis & Warner, 2018).

Defining School Climate

Defining school climate has proven to be challenging for researchers. Researchers have presented many definitions of school climate. School climate has been defined as the quality of school life, the quality of relationships in a school, the social characteristics of a school, and the culmination of students' experiences, among other definitions (Davis & Warner, 2018, Maxwell et al., 2017; Ruiz et al., 2018). The multi-dimensional nature of school climate has also resulted in difficulty for researchers when comparing studies that have measured correlation and effect sizes for school climate and student outcomes (Ruiz, et al., 2018). Individual school climate domains included in studies have facilitated the creation of more specific definitions and measurable indicators of school climate. For this study, the climate domains comprising the 2018 Virginia School Climate Survey (VSCS) will be applied as indicators of school climate perceptions. These climate domains include student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying and teasing (Virginia Department of Criminal Justice Services, 2020). The VSCS was implemented to measure student perceptions of school climate in two recent studies about the benefits of an authoritative school climate (Cornell et al., 2016; University of Virginia, 2018). Both of these studies employed the five individual climate domains that comprise the VSCS to measure student climate perceptions. A version of the VSCS is also administered to teachers measuring the same domains as measured in the student survey. Teacher surveys are administered every two years corresponding to student survey administration.

Student Support

For the student survey, the VSCS defined student support as the student perception that school staff is helpful, supportive, and respectful of students. Relationships, especially between teachers and their students, is a domain common to many school climate studies because these relationships are demonstrative of the most significant association with student achievement (Daily et al., 2020; Fatou & Kubiszewski, 2018; Reynolds et al., 2017). Teacher-student relationships are important because they provide students who may feel alone with an adult who will listen and take an active interest in their academics and lives. These relationships, and subsequent conversations, are examples of positive proximal processes as described by Bronfenbrenner (1994) which help students realize their potential. In a study of the predictive relationship between school climate measures and cognitive engagement, Fatou and Kubiszeski (2018) found that student-teacher relationships, such as those measured by the student support section of the VSCS, were predictive ($\beta = 0.22$, $p < .001$) of student achievement as measured by grades. Students spend more time with their teachers than any other adults in the school. Because effective proximal processes require relationships to occur over a specified period, teachers possess the greatest opportunity to influence students.

Disciplinary Structure

The VSCS applies the disciplinary structure domain to measure students' perceptions of the consistency and fairness of school rules and their implementation. One of the climate domains most commonly utilized in the literature is the disciplinary structure of the school (Daily et al., 2019; Maxwell et al., 2017; Reynolds et al., 2017). Authoritative schools, defined as schools in which students report that teachers and administrators have clear behavioral expectations and enforce those rules in a strict, but fair, method, have received more favorable

climate reviews from their students and are composed of students that have achieved higher academic performance than their less authoritative counterparts (University of Virginia, 2018). Cornell et al. (2016) examined the relationship between an authoritative school climate and student grades. They found that an authoritative climate was predictive of high achievement in mathematics ($\beta = 0.26$, $p < .05$) but was not as predictive ($\beta = 0.12$, $p < .05$) of English grades. This study indicates that student achievement in reading and writing may not be as malleable based on school climate as mathematics achievement.

Academic Expectations

The VSCS defined academic expectations as the degree to which teachers project high expectations for student learning. Other domains measuring the concept of academic expectations include teaching and learning, academic rigor, and the academic climate of the school (Davis & Warner, 2018; Shukla et al., 2016; Sulak, 2016). The variety of terms used to describe academic achievement indicates the complexity of the construct. Factors demonstrating influence over academic expectations include quality of instruction, willingness and motivation of the teacher, and the use of best practices (Wang & Degol, 2016). In the Cornell et al. (2016) study on authoritative climates, the researchers found that high academic expectations of teachers explained 8% of the variation in student grades in math and English. Interactions between teachers and students resulting in high academic expectations are considered mesosystemic per the ecological systems theory and proximal processes per the bioecological model of development. Bronfenbrenner (1977) indicated that such interactions between members of a microsystem are reciprocal, meaning both students and teachers affect the academic expectations of classrooms and schools. Teachers create rigorous assignments, expect students to demonstrate exceptional content knowledge, and encourage students, while it is the

responsibility of the student to complete assignments and engage with his or her classmates in the application of class material.

Student Engagement

The VSCS defined student engagement as student perceptions of school, a sense of belonging at school, and a desire to learn. While student engagement was applied most frequently in school climate literature, Benbenishty et al. (2016) employed the term "school belongingness" to describe student engagement when examining the causal connections between school climate and academic achievement. Shukla et al. (2016) described student engagement as fundamental to student motivation and learning. Students who are engaged in the learning process have increased attention and focus, are motivated to attempt more challenging assignments, and have more meaningful learning experiences. Student engagement is developed from student relationships with adults, peers, instruction, and curriculum within their schools. Engagement tends to be higher for elementary school students with studies indicating that 40% to 60% of high school students are disengaged (Martin & Torres, 2016). From an ecological standpoint, significant student engagement would suggest strong proximal processes for students within their schools.

School Safety and the Prevalence of Bullying

The VSCS defines the prevalence of bullying as the student-reported frequency of bullying incidents at their school. The survey did not require respondents to have personally experienced bullying but they could have witnessed incidents of bullying within the school. In several studies, bullying was incorporated into the concept of school safety, often identified in the literature as a predominant school climate component (Lee & Stankov, 2018; Ruiz et al., 2018; Sulak, 2018). School safety generally refers to the prevalence of dangerous or disorderly

behavior in a school (Davis & Warner, 2018). The presence of bullying is a specific disciplinary issue for which clear rules and consequences are necessary due to the significant influence on the collective school climate (Cavrini et al., 2015; Daily et al., 2020; Maxwell et al., 2017). Sulak (2015) found that student perceptions of extreme school bullying were predictive ($\beta = 0.28$, $p = 0.001$) of the number of students performing below the 20^{th} percentile on a standardized assessment. The definition of school safety has expanded to include emotional safety which is based on student perceptions that they are accepted and safe to express themselves (Sanders, et al., 2018). The perception of prevalent bullying is a contributing factor to how students perceive the overall climate of their schools.

Student Perceptions of School Climate

The subjective nature of school climate has made the construct difficult to measure. Most studies pertaining to school climate measure student perceptions of school climate, as collected via questionnaires, school surveys, or state and national school climate surveys as school climate instruments (Cavrini et al., 2015; Fatou & Kubiszewski, 2018; Gase et al., 2017). These surveys measure perceptions of students on a variety of climate issues including the degree of school safety students perceive existing, the effectiveness of school rules, the presence of dangerous activities such as weapon possession and gang affiliations, the prevalence of bullying, and the existence of positive relationships between adults and students (Gase et al., 2017; Shukla et al., 2016).

Student perceptions are valuable data in measuring the effects of climate on student achievement because the common factor in both instances is the student (Sanders, et al., 2018). Several studies utilize within-school comparisons of students including climate perceptions from specific students matched with their academic achievement often measured by grades or

standardized test scores (Davis & Warner, 2018; Sulak, 2016). Davis and Warner (2018) utilized data from the New York City Department of Education's annual climate survey to examine the relationship between student perceptions of school climate and achievement on an academic index that included student grades and results from the Regent's exam which is New York State's standardized assessment of student learning. They found that student perceptions of climate were predictive ($R^2 = 0.26$) of student index scores. Many climate studies utilize student perception data extracted from major state or national climate survey results and conduct between-school studies comparing climate and achievement data for entire schools. Sanders et al. (2018) conducted a between-school study to determine how well student perceptions of school climate, as measured by the Conditions for Learning Survey (CLS), could predict the difference between the academic achievement of English language learners at the elementary, middle, and high school levels. The researchers found that the associations between student climate perceptions and mathematics achievement were slightly different at each level. The association was significant at the elementary level ($\beta = 2.68$), the middle school level ($\beta = 2.61$), and the high school level ($\beta = 2.07$).

The bioecological model of development explains that mesosystem relationships between microsystem members, known as proximal processes, are important for a child's behavioral and cognitive development (Bronfenbrenner & Ceci, 1994). Surveys that utilize students' perceptions of school climate provide insight into the strength of these proximal processes. Students are better able to express perceptions about interactions they have experienced because of their direct involvement.

Perspectives of teachers and administrators have also been measured in studies designed to assess the relationship between school climate and student achievement. Lacks and Watson

(2018) conducted a correlational study investigating the relationship between teacher perceptions of school climate and teacher efficacy which they hypothesized might affect student achievement. The results indicated that there was not a significant correlation ($r = 0.19$) between the teachers' perceptions of school climate and their self-efficacy. Sulak (2016) conducted a correlational study examining the relationship between school administrators' perceptions of school climate and academic achievement. She found that school climate variables accounted for "only 14.5% of the variance in the percentage of students scoring below the 15th percentile on standardized tests" (p. 679). The absence of significant relationships between teacher and administrator perceptions of school climate and student achievement may indicate that staff members are not as sufficiently aware of student interactions as the students.

School Climate and Academic Achievement

School climate research has proposed positive associations between school climate and student achievement (Berkowitz, 2017). In terms of the correlation between school climate and student achievement, Cornell et al. (2016) found a significant positive correlation between student support and grades ($r = 0.75$) and disciplinary structure and grades ($r = 0.78$) in their study concerning the relationship between an authoritative climate and achievement. Gase et al. (2017) found that the school climate domain of student engagement was positively correlated ($r = 0.23$) with student grade point average. Weak correlations such as those found in the Gase et al. (2017) study, may indicate the need for additional climate research especially in rural schools where minimal school climate research exists. Daily et al. (2019) noted that "understanding nonacademic factors like school climate, and its relationship to academic performance across specific domains, can provide schools with the information needed to implement innovative/alternative pedagogical strategies that potentially reduce learning disparities,

especially among disadvantaged students" (p. 177). Sanders et al. (2018) determined that a positive school climate was related ($\beta = 2.94$, $p < 0.05$) to improved student achievement for students with disabilities, especially in reading and math.

A small number of climate studies have resulted in a weak relationship between school climate and student achievement. Maxwell et al. (2017) found a weak relationship between the school climate domain of student relations and numeracy ($r = 0.11$), reading ($r = 0.04$), and writing ($r = 0.07$). Benbinishty et al. (2016) applied an autoregressive model to determine that while climate did influence achievement ($R^2 = 0.3$), significant student achievement produced a greater effect ($R^2 = 0.7$) on school climate. This relationship supports Bronfenbrenner's claim that proximal processes are reciprocal; a positive climate is associated with high achievement and, conversely, high achievement is associated with a positive climate.

Measuring Academic Achievement

School climate research has primarily utilized student grades, standardized test results, and indices comprised of grades and test results to measure student achievement (Berkowitz, 2017). Daily et al. (2019) utilized self-reported grades to represent student achievement in a correlational study with school climate. They found that between 10% and 17% of the variance in student achievement was explained by school climate measures. Student perceptions of academic support explained the greatest amount of variance ($R^2 = 0.17$) while perceived privilege within the school accounted for the least variance ($R^2 = 0.10$). Davis & Warner (2018) implemented a progress composite variable that combined credits earned and state testing scores to form the composite score. The researchers found a significant predictive relationship ($R^2 = 0.262$) between student perceptions of school climate and student achievement in New York City

schools. Despite the different measures of student achievement utilized in these studies, the results demonstrate that school climate measures are predictive of student achievement.

Reading Achievement

Schools, localities, and state agencies frequently employ data resulting from the administration of standardized reading tests as measures of student achievement (International Literacy Association, 2017). Reading assessments are often utilized as a measure of overall academic achievement due to the importance of reading comprehension for students in acquiring and demonstrating knowledge across content areas. Reading is a cumulative skill that is developed throughout a child's life and his or her academic career; therefore, states, such as Virginia, require high school students to successfully complete a standardized reading assessment in order to graduate (Virginia Department of Education, 2021a). The importance of reading for students in the workplace and society after high school adds to the importance of adequately assessing this skill prior to graduation.

Results from standardized reading assessments have been employed as the student achievement measure in numerous studies designed to test the association between school climate and student achievement. Maxwell et al. (2017) conducted a study measuring the relationship between school identification and academic achievement. The researchers measured academic achievement by school performance on a state standardized reading assessment and found that there was only a small correlation ($r = 0.15$) between climate and reading achievement. In another climate study utilizing reading achievement as a measure of overall student achievement, Cornell et al. (2016) found that the authoritative nature of school climate was correlated with reading achievement ($r = 0.26$).

Rural Schools

The National Center for Educational Statistics (2021) defines rural schools as those located at least five miles from an urbanized area. Nationally, approximately 7.5 million students, or one in every seven students, attended rural schools during the 2016-2017 school year (Rural School and Community Trust, 2019). Rural schools in Virginia served 269,906 students in the 2019-20 school year (The Commonwealth Institute, 2019). Several states, including Virginia, are partially comprised of large urban and suburban school divisions that impact the policy influence of rural divisions at the state level because of the drastic differences in student enrollment. Rural schools experience unique challenges such as difficulties in recruiting and retaining quality teachers, inadequate funding, high rates of poverty, and geographic spread. A 2019 report from *The Rural School and Community Trust* found that "nearly one in six rural students live below the poverty line, one in seven qualifies for special education, and one in nine has changed residence in the previous 12 months" (Rural School and Community Trust, 2019).

Teacher Recruitment and Retention

Hiring quality teachers, and retaining teachers once they are hired, is challenging for many rural schools and school divisions. Data from the School and Staffing Survey (SASS) encompassing the previous 15 years have indicated that rural schools are 60% more likely to experience difficulties in hiring teachers for English language learners than urban schools and project more math and science vacancies than urban or suburban schools (Tran et al., 2020). Difficulties in hiring and retaining teachers have resulted in a climate where some rural school leaders act as though they must hire anyone who applies, regardless of qualification, or not offer certain programs or courses (Tran et al., 2020). During the 2017-2018 school year, there were 1,906 fewer teachers, 887 fewer support staff, 115 fewer school counselors and librarians, and 43

fewer principals employed by rural schools in Virginia as compared to 2008-2009 (The Commonwealth Institute, 2019). Several factors contribute to the difficulty that many rural schools experience in attracting and retaining quality teachers. Salaries are a major factor in attracting and retaining staff, as rural schools in Virginia offer average teacher salaries that are 11% lower than their suburban and urban counterparts (The Commonwealth Institute, 2019). Non-competitive salaries render some rural divisions unable to attract quality teaching and administrative candidates who maintain offers from other school divisions that include higher salaries.

The remote location of many rural school divisions presents difficulties for these divisions to attract and retain quality teaching candidates. Many of these school divisions are hundreds of miles from the nearest universities which train teaching candidates. This presents difficulties for rural school divisions to recruit potential new hires in person. Over 50% of rural teachers report commutes of at least 45 minutes to work every day (Rural School and Community Trust, 2019). Rosenberg et al. (2015) found that the length of teacher commutes was the most commonly reported factor affecting staffing efforts of schools. Due to limited employment opportunities in rural areas, many potential new educational hires are unable to acquire local employment for their spouses (Rosenberg et al., 2015). It is more practical for quality teachers to accept jobs in localities in which both they and their spouses can work without lengthy commutes.

Non-competitive salaries and remote settings have projected difficulty for rural schools to attract the most qualified teaching and administrative candidates. As a result, remote rural schools employ teachers receiving below-average evaluation scores that are similar to those in the most challenging urban school districts (Schafft, 2015). It is also challenging for rural

schools to provide low-performing teachers the professional development they need due to the schools being located a significant distance from colleges and universities that typically offer professional development opportunities. The ecological model of development posits that the relationships between microsystem members, such as students and teachers, are critical to the ability of students to learn and develop. When schools are forced to retain low-performing teachers and hire those who are weaker candidates, students will likely suffer academically from poor instruction, but also from being enrolled in classrooms where fewer positive relationships exist between teachers and students (Greenough & Nelson, 2015).

Funding

Rural school divisions are often located in small communities and enroll fewer students than urban school divisions. Due to reduced populations in many rural areas, the tax base is often limited, resulting in these localities collecting fewer tax revenues and maintaining fewer funds available for government operations, such as schools. As a result, rural schools are often minimally funded by their local governments. Despite receiving fewer local funds, reduced student enrollment results in rural schools needing to hire more teachers, on a per-pupil basis, to teach the required standards (Rosenberg et al., 2015). With more teachers per pupil being required and less local funding, rural schools are often restricted, resulting in fewer student services, such as mental health services (Rosenberg et al., 2015).

While smaller tax bases in rural areas result in fewer available funds, rural school funding is also negatively affected by low student enrollment which is a primary component in many state funding formulas. In Virginia, school division budget allocations from the state to local school divisions are based on the locality's student enrollment. School divisions with larger enrollments receive more state allocations than divisions with smaller student enrollments, such

as rural schools. Rural school division enrollment in Virginia decreased by 8% from 2008 to 2019 (The Commonwealth Institute, 2019). In 2019, rural schools comprised 31.3% of all schools in Virginia, but only received 23.5% of state education funds because student enrollment in rural schools was lower when compared to other types of schools (The Rural School and Community Trust, 2019).

The lack of adequate funding in rural schools is an issue that could exacerbate school climate issues. Staff development related to important climate measures, such as developing and nurturing positive student-teacher relationships and creating engaging classrooms, may not be available to teachers because funds are being expended primarily on salaries, transportation, and materials. As a result, teachers may not be adequately trained on methods integral to improving the climate of their schools. Inadequate funding also results in rural students missing opportunities that may influence their sense of belonging in their schools. For instance, afterschool programs designed to enrich the student experience may not be available to rural students because their school divisions cannot afford these programs. Opportunities to improve school climate are limited in rural school divisions because of inadequate funding.

Poverty

Student poverty is an issue that affects rural schools at a higher rate than the overall school population. In 2017, 13% of all Virginia students experienced poverty as compared to 16% of rural students (The Commonwealth Institute, 2019). In Virginia, 48% of all rural students were eligible for free or reduced-price lunch in 2017 compared to 41% of students who were eligible statewide (The Commonwealth Institute, 2019). Children who originate from homes affected by poverty are more likely to experience issues with hunger, healthcare, and housing, all of which affect a student's ability to learn. These students are also less likely to access necessary

educational resources at home and do not possess the same enrichment opportunities as their more affluent peers (The Rural School and Community Trust, 2019). Students who originate from homes affected by poverty often matriculate with a readiness gap that broadens as they progress through school. For rural schools, student poverty is an issue that must be considered when developing plans to improve student achievement.

Geographic Spread

Rural schools primarily expend limited funds on personnel and transportation costs. Transportation costs are more significant in rural areas because population densities are extremely low, meaning that there are fewer citizens, but more land per square mile. Due to the geographic spread in many rural areas, bus routes are generally longer in duration requiring more significant mileage accumulation (Rosenberg et al., 2015). The ratio of instructional to transportation expenditures (RITE) is calculated to determine the funds expended by school divisions transporting students as compared to those expended on instruction (The Rural School and Community Trust, 2019). In 2019, the average RITE for all school divisions in the United States was $14.55, while the average RITE for rural schools was $10.81 (The Rural School and Community Trust, 2019). The 2019 RITE for rural school divisions in Virginia was $9.11, which was lower than the national average for all schools and rural schools. This difference indicates that rural Virginia schools are spending more of their limited funds on transportation than their urban counterparts.

Rural families often do not possess adequate personal transportation and access to public transportation is infrequent at best. As a result, parents are less likely to visit their child's school and interact with his or her teachers (Greenough & Nelson, 2015). This lack of parent-teacher interactions impedes one of the proximal processes Bronfenbrenner identified as important to a

child's development. Besides affecting parent and teacher interactions, geographic spread also restricts after-school enrichment and extra-curricular activities available to students who live in homes without adequate transportation or whose parents work late hours. The inability of some rural students to participate in these activities impedes their ability to connect with other students and foster a sense of belonging.

Class Size

Rural schools typically enroll fewer students than other types of schools because they serve less populous communities. Small schools with low student enrollments often facilitate classes with fewer students than larger schools. Several positive factors result from schools and classrooms enrolling fewer students. Strong relationships between teachers and students can be more easily formed in smaller classes. When teachers teach fewer students, there is more opportunity for individualized instruction increasing the potential for students to progress from their current knowledge levels into their zones of proximal development (Vygotsky, 1978). Classroom disruptions are typically less frequent in smaller classes and schools, as are instances of bullying (Rosenberg et al., 2015). Opportunities for individualized learning, greater student engagement, and fewer disruptions all positively contribute to a school's climate. For these reasons, low student enrollment for rural schools serves as a distinct climate advantage as compared to their larger urban counterparts.

While having fewer students enrolled in a school may contribute to a more positive school climate, it may also negatively influence the climate of rural schools. Many states allocate funding for local school divisions based on enrollment. As a result, schools with smaller enrollments are allocated fewer state funds but with more responsibility due to the insufficient tax base. Due to less funding allocations, programs that are designed to improve school climate

are often not available in some smaller schools (Rosenberg et al., 2015). Small rural schools also provide fewer extra- and co-curricular activities for students as compared to larger schools, especially non-athletic activities. (Greenough & Nelson, 2015). The lack of variety in extra- and co-curricular activities results in some students in small rural schools unable to find peer groups with which to identify.

Climate and Achievement in Rural Schools

School climate is as diverse in rural schools as it is in their urban and suburban counterparts (Beach, 2019). Several studies revealed that students in rural schools reported less gang affiliation and other dangerous behaviors than was reported by students in more urban schools (Roberts & Green, 2013). Students attending schools in areas defined as rural remote were five times less likely to indicate a gang presence in their school than students attending schools in rural fringe areas closer to urbanized areas (Rosenberg et al., 2015). Results from school climate surveys in multiple states explained that rural students perceived their schools to be physically safer than urban students (Lee & Stankov, 2018). In the same school climate surveys, a majority of rural students indicated that their schools were governed by rules that were both fair and enforced by the school administration (Lee & Stankov, 2018). Compared to urban schools, rural students identified a higher prevalence of positive relationships between students and teachers within their schools (Shakeel & Maranto, 2019).

School climate appears to be as influential on student achievement in rural schools as in their urban counterparts; however, the literature suggests that teacher-student relationships are more closely related to student achievement in rural schools than school safety or adherence to rules (Schafft, 2016; Sulak, 2016). This may be explained by the prevalence of parents in rural areas often enduring extended work commutes because of the lack of employment opportunities

in many rural areas, especially those in remote areas, which makes the teacher-student relationship even more critical to student success (Schafft, 2016). On average, students in rural schools academically outperformed students in urban schools when measured by various standardized assessments (Rural School and Community Trust, 2019). The average rural high school graduation rate in 2019 was 89%, roughly the same as suburban schools but 10% higher than urban schools Rural School and Community Trust, 2019). Despite graduation rates being higher, on-time college attendance rates were lower for rural high school graduates than their counterparts from urban areas (Rural School and Community Trust, 2019). Rural schools also reported less violent behavior nationwide than urban schools (Rural School and Community Trust, 2019). As a result of experiencing fewer incidents of violent behavior in their schools and neighborhoods, school safety may be less of a consideration for rural school students (Sulak, 2016).

Studies have been conducted to determine how relationships affect student achievement in rural schools (Beach et al., 2019; Biddle & Azano, 2016). Beach et al. (2019) found that students in rural schools who performed better academically experienced a mentor-mentee relationship with at least one adult in their school. They also noted that “rural intermediary and small industrial communities do not express the same kind of relationships through school context as in the national and global context, nor the same relations to their local environments” (p. 28). Rural schools are typically smaller in size, as are the communities they serve, which affords students and teachers a more practical opportunity to form stronger relationships (Rural School and Community Trust, 2019). These relationships are essential to the proximal processes described in the bioecological model of development. Rural students who define themselves as

connected to the school via relationships academically outperformed their peers who indicated a disconnection to the school by a larger margin than those indicated in urban areas (Sulak, 2016).

Many studies have been conducted to determine how school climate affects urban and suburban students. Researchers have approached this topic primarily from a school safety perspective because of the significant crime rates in some urban neighborhoods (Davis & Warner, 2018). Beach et al. (2019) explained that "research on rural youth is scarce and it tends to be conducted from rather urban-centered perspectives and theories" (p. 20). Studies have been conducted examining the relationship between school climate and student achievement; however, a gap exists in the literature as to whether student perceptions of specific school climate domains are predictive of student achievement in rural schools. School climates in rural settings are different from those in urban or suburban settings. Three out of five rural students qualify for free or reduced lunch indicating the prevalence and potential effects of poverty in rural schools (Greenough & Nelson, 2015). Students who indicate that they have not formed positive relationships in rural schools typically underperform academically when compared to more connected students (Rural School and Community Trust, 2019). By examining rural schools, administrators in these areas can become better informed about the significance of different school climate factors for their schools.

Summary

Bronfenbrenner (1977) explained that children should be studied in their natural settings for researchers to acquire an accurate understanding of the influence of the environment on their social and cognitive development. Through his ecological systems theory, he explained that the interaction of children with members of their microsystems including their parents, teachers, peers, and schools affected the children's development and learning. Bronfenbrenner (1994) later

introduced his bioecological model of development which expanded his earlier work to include environmental and heredity considerations. The concept of proximal processes explained that mesosystem interactions sufficiently influenced the development of children to allow them to overcome some environmental or hereditary issues such as poverty, learning disabilities, and lack of parental support.

Vygotsky (1934) posited that the cognitive ability of children was greatly influenced by social interactions between those children and their more knowledgeable others. In the case of schools, the more knowledgeable others are primarily teachers. Students learn by teachers instructing them on subject matter to fill their zones of proximal development, or the difference between the knowledge that children possess and the knowledge that they can possess with the assistance of a teacher or other adult with superior knowledge. Positive teacher-student interactions serve as catalysts for students filling their zones of proximal development which results in student learning.

School climate is a construct most researchers agree is important to understand in order to maximize the academic outcomes of students. The difficulty in measuring school climate lies in determining the domains that should be measured in order to gain the most accurate assessment of the overall climate construct. The level of student support, disciplinary structure, academic environment, level of student engagement, and the prevalence of bullying in a school are among the climate domains that the literature suggests are components of school climate.

While much research exists concerning school climate and its relationship with student achievement, there is a need to expand that research to determine how rural schools are affected (Sulak, 2016). There is limited research concerning the relationship between specific school climate domains and student achievement in rural schools. It is important for leaders in rural

schools to access data regarding student perceptions of the school environment and their potential association with academic performance. The proximal processes that are most consequential for rural students may be equal to those for urban students, but they may be different. Regardless, the information gleaned from the study will be critical for rural school leaders.

CHAPTER THREE: METHODS

Overview

This quantitative predictive correlational study will investigate the relationship between school climate and student academic achievement to determine the accuracy of student perceptions of specific school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in predicting high school student academic achievement in reading in rural Virginia high schools. Chapter Three of this study will begin by discussing the type of research design to be applied. The research questions and hypotheses to be explored will also be included in this chapter. Chapter Three will continue with a description of the participants and settings from which the sample was chosen, as well as an examination of the instruments to be utilized for data collection. Chapter Three will conclude with a description of the procedures and data analysis to be employed in this study.

Design

This study will implement a quantitative, correlational design to determine how accurately student achievement in rural schools, as measured by rural high school pass rates on the 2018 Virginia standards of learning (SOL) end-of-course test, can be predicted by student perceptions of specific school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying), as measured by rural high school results from the 2018 Virginia Secondary School Climate Survey (VSCS). Archived VSCS and SOL data from 2018 will be used in this study. Correlational research is designed to determine the direction and magnitude of the relationship between variables (Gall et al., 2007). A correlational design will be utilized in this study because the purpose is to determine the predictive relationship between predictor variables and a criterion variable (Warner, 2013).

Results from predictive correlational studies employing school climate as a predictor variable and student achievement have been frequently applied in school climate research. Sulak (2016) employed a predictive correlational study to determine how student achievement on standardized tests could be predicted by administrator perspectives of student discipline in suburban schools. Daily et al. (2020) conducted a predictive study to determine the relationship between student perceptions of school climate and self-reported grades.

The predictor variables in the proposed study will be comprised of student perceptions of school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in rural Virginia high schools. Student support perceptions indicate how supportive, helpful, and respectful students perceive the school staff (Virginia Department of Criminal Justice Services, 2018). Wang and Degol (2015) referred to student-teacher relationships as an important factor in maximizing student learning because they encourage the sharing of ideas between students and teachers.

Student perceptions of school disciplinary structure explain how students feel about the fairness of school rules and how consistently they are enforced. Daily et al. (2019) found that disciplinary structure explained more variance in high school academic achievement ($R^2 = 0.09$) than any other predictor variable in their study except for student support ($R^2 = 0.12$). Schools considered to have an authoritative disciplinary structures have been shown to have higher student achievement as measured by standardized testing results (University of Virginia, 2018).

Perceptions of academic expectations refer to whether students believe that teachers have ambitious learning goals for their students. Maxwell et al. (2017) referred to academic expectations as “academic emphasis” in their study of school climate and academic achievement.

The teacher's academic expectations are a major component of what students identify as a positive student-teacher relationship in a classroom

Student engagement perceptions indicate whether students like school and have a sense of belonging at school. In a qualitative study, Newland et al. (2019) reported that when asked what they liked most about school, the most common student response was "participating and having fun" coded as student engagement. A lack of student engagement has also been identified as a factor contributing to high dropout rates in some schools (Berkowitz, et al, 2017).

The prevalence of bullying measures student perceptions of bullying frequency experienced by students themselves or bullying incidents that they have witnessed others experience within their school. Sulak (2015) studied the effects of student perceptions of bullying as a predictor variable and concluded that larger schools produced a greater prevalence of negative bullying perceptions which was associated with lower levels of student achievement. Bullying has been associated with trauma not only for the student being bullied but also for students who witness frequent bullying in their schools (Cavrini, 2015).

The criterion variable in this proposed study is student achievement as measured by school-level 2018 Virginia end-of-course reading SOL pass rates for rural Virginia high schools. Standardized test results have frequently been applied as measures of student achievement in school climate research (Benbenishty et al., 2016; Berkowitz et al., 2017; Sulak, 2016). Cornell et al. (2016) conducted a study to determine the relationship between an authoritative school climate and school-level student achievement. They utilized the 2013-14 Virginia end-of-course reading SOL school-level pass rates as a measure of student achievement. The researchers cited the use of school-level SOL pass rates instead of individual student test scores as a limitation in their study. SOL testing did not occur in spring of 2020 due to school closures in Virginia related

to COVID-19. VSCS for secondary schools are only administered in even-numbered years; therefore, the most recent year that SOL testing and the VSCS were administered in the same year was 2018. In order to have SOL and VSCS data from the same year, 2018 data will be collected from both instruments.

Research Questions

RQ1: How accurately can high school reading achievement be predicted from a linear combination of student perceptions of specific school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) for students in rural Virginia schools?

Hypothesis

$H_0$1: There will be no statistically significant predictive relationship between high school reading achievement and the linear combination of perceived school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in rural Virginia schools.

Participants and Setting

This study will be designed to examine the relationship between school climate domains and student achievement in rural schools. Rural schools have unique characteristics such as smaller class sizes, difficulties in recruiting and retaining teachers, lesser funding because of student population size, and poverty that may contribute to climate issues that are different from other types of schools (Rosenberg et al., 2015). School climate and student achievement will be examined for all rural schools in Virginia that participated in the 2018 Virginia School Climate Survey and the 2018 Virginia end-of-course reading Standards of Learning (SOL) test.

Population

According to the 2018 Education Demographics and Geographic Estimates (EDGE) Report, there were 65 school divisions in Virginia with at least 50% of their schools being classified as rural (NCES, 2018). The EDGE report defines rural schools as those located at least five miles from an urbanized area. Of these 102 rural high schools, 18.6% enrolled fewer than 400 students, 29.4% between 400 and 600 students, 17.6% between 600 and 800 students, and 34.4% more than 800 students. Rural students comprise 48% of the total K-12 public school population in Virginia. Students in rural schools had an average pass rate of 86% on the 2018 reading end-of-course standards of learning test as compared to students in urban or suburban schools who had a pass rate of 82%.

Sample

The sample for this study will be the 2018 Virginia School Climate Survey (VSCS) respondents selected through random sampling from each rural Virginia high school. Schools selected for this study will be located in school divisions that were classified as rural fringe, rural distant, or rural remote on the 2018 Education Demographics and Geographic Estimates (EDGE) Report that is published annually by the National Center for Educational Statistics (NCES, 2018). The 2018 EDGE Report defined rural fringe schools as being located five miles or less from an urbanized area, rural distant schools as being located between five and 25 miles from an urbanized area, and rural remote school districts as being more than 25 miles from an urbanized area (Geverdt, 2018). EDGE defined an urbanized area as a “densely settled core with densely settled surrounding areas” (Gevert, 2018, p. D-1).

The EDGE report contains a link to its public school district file that provides the percentage of schools in each district that is included in various locale codes. Locale percentages

are not provided for individual schools, only school divisions. For instance, if a school division consists of five schools with three of them classified as rural fringe and two classified as rural remote, the public school district file would display 60 in the rural fringe percentage column and 40 in the rural remote percentage column to indicate the percentage of schools in that division for each locale code. Locale codes used to describe school divisions in the 2018 EDGE Report included large city, midsize city, small city, large suburb, midsize suburb, small suburb, fringe town, distant town, remote town, rural fringe, rural distant, and rural remote. High schools to be included in this study will be located in school divisions with at least 75% of their schools classified as either rural fringe, rural distant, or rural remote. While rural schools are heterogeneous based on their proximity to urban areas, overall demographic characteristics exist for the population. The average high school size for a rural school in the nation is 470 students, while urban high schools average 900 students (Greenough & Nelson, 2015). Nationally, white students outnumber black students in rural schools by a two-to-one ratio (Schafft, 2016).

The number of schools to be included in this study will be 102 which exceeds the required number of participants for medium effect size. Gall et al. (2007) indicated that at least 66 participants must be included in a study for a medium effect size with a statistical power of .7 and an alpha level of $\alpha = 0.05$. Students participating in the VSCS at each school ranged from grades nine through twelve. Schools with differing proportions of students from various genders, races, and socio-economic levels participating in the VSCS will be included in this study.

There were two options from which schools could choose samples of students to participate in the VSCS. Schools could utilize a whole grade option in which all students in each grade level were invited to participate in the survey. The other option was for schools to use a random number list provided to the schools by the Department of Criminal Justice Services to

select 35 students from an alphabetized roster for each grade level. The first 25 students selected would be the survey participants for that grade level, while the other ten students would be alternates. If any of the 25 chosen participants were absent from survey administration, the first student on the alternate list would be brought to the survey administration site to participate (Cornell et al., 2018). All students were eligible to participate unless language barriers, physical disability, or intellectual disability prevented them from doing so (Cornell et al., 2018). Informational letters for parents were sent home by the students selected for participation and alternates at least two weeks prior to survey administration to describe the study and to offer parents the opportunity to decline participation.

This study will consist of 10356 students from 102 schools with 55% of respondents being White students, 34% Black students, 1% Asian students, 6% Hispanic students, and 4% of respondents being of two or more races. 56% of the survey respondents for all schools were male and 44% were female. 28% of the respondents were economically disadvantaged as indicated by eligibility for free or reduced school meals.

Setting

Schools participating in the VSCS were mailed specific instructions as to the administration of the survey. Schools chose a two-week window for completion of the student surveys (Virginia Department of Criminal Justice, 2018). Schools were directed to have students complete the VSCS online in a secure, quiet area in each school. Answers submitted online were received immediately by the Virginia Department of Criminal Justice Services (VDCJS). School staff administered the surveys and were provided standardized administration instructions to use when administering the survey. Standards of Learning tests are administered in a secure

environment meaning that the testing site is free of posted educational materials, electronic devices are not permitted, and there are no distractions present in the site.

Instrumentation

This study will seek to measure the effect of student perceptions of specific school climate domains on student achievement in rural Virginia high schools. To measure student perceptions of school climate domains, results from the 2018 Virginia School Climate Survey (VSCS) will be used. To measure student achievement, the 2018 Virginia end-of-course reading standards of learning (SOL) test pass rates for rural Virginia high schools will be used. Data from the 2018 SOL test will be used because spring SOL testing in Virginia was canceled in 2020 due to COVID-19 causing Virginia schools to be closed on March 23, 2020. The VSCS is only administered to high schools in even-numbered years; therefore no VSCS was administered to high schools in 2019. As a result, 2018 was the most recent year that both the VSCS and the Virginia end-of-course reading SOL test were administered in the same year.

Virginia School Climate Survey

Archived data from the 2018 VSCS will be used to measure student perceptions of school climate (Virginia Department of Criminal Justice Services, 2019). The VSCS is a survey administered to students from each public middle and high school in Virginia biannually. The purpose of the VSCS is to measure student and staff perceptions about the climate of their schools. The VSCS is the primary analytical component of the Virginia School Safety Audit program that was established in 1997 to measure both physical safety and safety concerns of students (Cornell et al., 2018). The VSCS was first administered in 2005 using information obtained from principals. Ninth-grade students were administered the first student version of the VSCS online in 2007. After further development, the VSCS was administered biannually to

middle and high schools throughout the state in 2013. The 2018 VSCS consisted of 53 questions measuring students' perceptions of each of its five school climate domains: student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying.

Validity and Reliability

The VSCS has been used in multiple studies concerning school climate in Virginia (Cornell et al., 2016; Sanders et al., 2018; University of Virginia, 2018). The 2018 VSCS was comprised of two validity screening items to identify students who were not responding to the survey honestly. The first item that stated, "*I am telling the truth on this survey.*" offered four responses to students including *strongly disagree, disagree, agree, and strongly agree*. Students who answered *strongly disagree* or *disagree* to this item were removed from the sample. The second item asking, "*How many of the questions on this survey did you answer truthfully?*" offered answer choices of *all of them, all but one or two of them, most of them, some of them, and only a few or none of them*. Students who answered *some of them* or *only a few or none of them* were omitted from the sample (Cornell et al., 2018). 7.6% of the total respondents in Virginia were removed from the sample because of their answers to either or both of the validity questions (Cornell et al., 2018). Samples were also screened for the time taken to complete the survey. Of the respondents state-wide, 0.4% were removed from the sample because they completed the survey in less than six minutes, which the researchers deemed insufficient time for respondents to have accurately read the questions (Cornell et al., 2018). Cronbach's alpha is a measure of how closely related a set of terms are as a group (Warner, 2013). Cronbach's alpha for the VSCS climate domains are provided (see Table 1).

Table 1

Reliability of VSCS Climate Domains

Climate domain	Cronbach's alpha (α)
Student support	0.85
Disciplinary structure	0.77
Student engagement	0.77
Academic expectations	0.72
Prevalence of bullying	0.79

Note. Cornell, 2016

Student Support Subscale

The 2018 VSCS required respondents to indicate their level of agreement with statements regarding relationships within their school. Student agreement on statements such as, "*Teachers and other adults at this school want students to do well.*" was measured on a four-point Likert scale with answer choices of *strongly disagree*, *disagree*, *agree*, and *strongly agree*. There were 12 items included on the student support subscale and none of these items were reverse-scored (Virginia Department of Criminal Justice Services, 2018). The standardized score for the student support category was based on the average score for student responses on the 12 student support survey items for each individual high school. The standardization of scores allowed for the mean state score for this reporting category to be ten with a standard deviation of one. Scores for this category that are above eleven or below nine are one or more standard deviations away from the state average for comparison purposes.

Disciplinary Structure Subscale

The 2018 VSCS included items measuring perceptions of the fairness of rules and consistency in the enforcement of those rules. There were ten items in the disciplinary structure section such as, "*Students are treated fairly regardless of their race or ethnicity.*" requiring responses on a four-point Likert scale including *strongly disagree, disagree, agree, and strongly agree.* Two items in this section were reverse-scored, "*Students are suspended without a good reason.*" and "*The adults at this school are too strict.*" (Virginia Department of Criminal Justice Services, 2018). The standardized score for the disciplinary structure subscale was based on the average score for student responses on the ten disciplinary structure survey items for each individual high school. The standardization of scores allowed for the mean state score for this reporting category to be ten with a standard deviation of one. Scores for this category that are above eleven or below nine are one or more standard deviations away from the state average for comparison purposes.

Academic Expectations Subscale

Five statements regarding academic expectations within the school such as, "*My teachers expect me to work hard.*" were included in the 2018 VSCS. Responses to these items appeared on a four-point Likert scale including *strongly disagree, disagree, agree, and strongly agree*. One of the items, "*My teachers do not really care how much I learn.*" was reverse scored (Virginia Department of Criminal Justice Services, 2018). The standardized score for the academic expectations category was based on the average score for student responses on the five survey items designed to measure student perceptions of academic expectations for each individual high school. The standardization of scores allowed for the mean state score for this reporting category to be ten with a standard deviation of one. Scores for this category that are

above eleven or below nine are one or more standard deviations away from the state average for comparison purposes.

Student Engagement Subscale

Six items such as, "*I like this school.*" and "*I feel like I belong at this school.*" comprised the student engagement subscale of the VSCS. This section also utilized a four-point Likert scale for responses ranging from *strongly disagree* to *strongly agree*. No items in this section were reverse-scored (Virginia Department of Criminal Justice Services, 2018). The standardized score for the student engagement category was based on the average score for student responses on the six student engagement survey items for each individual high school. The standardization of scores allowed for the mean state score for this reporting category to be ten with a standard deviation of one. Scores for this category that are above eleven or below nine are one or more standard deviations away from the state average for comparison purposes.

Prevalence of teasing and bullying subscale

Twenty items measuring students' agreement with statements concerning bullying in their schools were included on the 2018 VSCS. Eight of the items such as, "*Bullying is a problem at this school.*" were measured using a four-point Likert scale with responses ranging from strongly disagree to strongly agree. The other twelve items in this section asked respondents about the frequency of bullying within their schools. These items included response choices on a four-point scale including *never, one time, more than one time,* and *many times*. None of the questions in the bullying section were reverse-scored (Virginia Department of Criminal Justice Services, 2018). The standardized score for the prevalence of teasing and bullying category was based on the average score for student responses on the 20 bullying prevalence survey items for each individual high school. The standardization of scores allowed

for the mean state score for this reporting category to be ten with a standard deviation of one. Scores for this category that are above eleven or below nine are one or more standard deviations away from the state average for comparison purposes.

Scoring Procedures

Means for each of the five climate subscales were computed for individual schools by the Virginia Department of Criminal Justice Services staff. To make the domain scores easily comparable to state means, standardized scores were calculated from each school's mean on the five scales. Raw scale scores were converted to standard z-scores with a mean of zero and a standard deviation of one using the formula $Zi = (Xi\text{-}M)/SD$, where M equals the mean of a given domain for all the schools in Virginia, SD equals the standard deviation of the school means for a given scale, and *i* denotes different schools (Cornell et al., 2018). Z-scores were then converted to standardized scores with a mean of ten and a standard deviation of one by adding ten to each z-score (Cornell et al., 2018). As a result, scores between 9 and 11 were within 1 standard deviation of the mean.

Administration

Schools were required to administer the VSCS during a two-week period between January 29, 2018 and April 1, 2018 that was chosen by the school (Cornell et al., 2018). Schools were then required to choose either the whole grade sampling option or the random sample option of 25 students per grade level plus 10 alternates. Schools were then required to send informational letters home to parents of the participants by the students who had been chosen for the survey using the template provided by the Virginia Department of Criminal Justice Services. School staff provided students with the password for completing the survey after arriving at the administration site. Students who had been chosen to participate, but were absent on the day of

testing, were replaced with alternates. Once surveys have been completed, the principal was required to complete an electronic summary of student participation form (Virginia Department of Criminal Justice Services, 2018).

The median completion time for the 2018 VSCS was 14.5 minutes (Cornell et al., 2018). Nearly 80% of the 85,750 surveys accepted were completed between 9.5 and 26.4 minutes. 92% of the surveys were completed in 30 minutes or less (Cornell et al., 2018). Surveys completed in less than six minutes were not included in the sample. Incomplete surveys or online surveys opened by school officials were also discarded (Cornell et al., 2018).

Virginia End-of-Course Standards of Learning Test

Academic achievement will be measured by school pass rates on the 2018 Virginia end-of-course reading standards of learning (SOL) test. This test is administered at the end of grade 11 English courses throughout the state. High schools on a block schedule administer the test after fall English 11 courses and again after spring English 11 courses. High schools with year-long English 11 courses administer the SOL test at the completion of the course in May or June (VDOE, 2021d). The purpose of SOL testing in Virginia is to measure student learning and achievement (Cornell et al., 2016).

History of SOL Testing

The first SOL tests in Virginia were administered in mathematics, reading, writing, history, and science in 1998. These tests were developed using test blueprints, review committees, and field testing (Cornell et al., 2016). The 1998 results allowed the Virginia Department of Education (VDOE) to set benchmark scores for proficiency on subsequent tests. School SOL testing results became a component of school accreditation in Virginia in 1999. High school students in Virginia were required to pass the end-of-course reading SOL, the end-

of-course writing SOL, one end-of-course high school math SOL, one end-of-course science SOL, one end-of-course history SOL, and an additional high school SOL of the student's choosing to meet graduation requirements. In spring of 2003, SOL testing in Virginia moved from a paper format to a completely online testing administration. Curriculum teams for mathematics, English, history, and science meet annually to review and edit state standards. If standards were edited, then the assessment teams at the VDOE make SOL testing changes to reflect the changes in standards. In 2009, technology-enhanced items (TEI) were added to SOL tests to make them more rigorous. TEI questions required students to choose from a list of possible answers with multiple components to each correct answer chosen for each question. Students had to choose all correct components of the answer for that question to be scored as correct. In 2018, schools in Virginia were allowed to substitute state-approved performance assessments for SOL tests in writing and history. These assessments were project-based and designed to support the state's initiative to develop students' 21st-century skills.

Validity and Reliability

Virginia SOL testing results have been used as a measure of academic achievement in several studies (Cornell et al., 2016; University of Virginia, 2018). The validity of results from SOL testing was based on evidence from test content, response processes, and internal structure (VDOE, 2021d). Test content validity is achieved through matching test items with SOL blueprints, soliciting and receiving continuous educator input on questions, and conducting alignment studies between the standards and the SOL tests annually (VDOE, 2021d). Response processes of students are measured through an annual item development review to ensure that responses are being measured properly. Student TEI responses assist the committee in understanding whether answer choices were appropriate for students' level of understanding

(VDOE, 2021d). Validity is assessed for internal structure through the use of differential item functioning which employs field testing to ensure that questions are not demographically biased (VDOE, 2021d). Reliability for the end-of-course reading SOL was measured using Chronbach's alpha (see Table 2).

Table 2

Reliability for End-of Course Reading Standards of Learning Test

Test form	Chronbach's alpha (α)
1	0.87
2	0.87
3	0.89

Note. Virginia Department of Education (2021d)

Implementation

There were 55 questions on each of the three possible student forms included in the 2018 end-of-course reading SOL assessment. There was an average pass rate of 87% for high schools in Virginia on the 2018 end-of-course reading SOL test (VDOE, 2021d). The 2018 reading SOL test comprised 15 TEI questions and 40 multiple choice questions with each multiple-choice question consisting of 4 possible answers (VDOE, 2021d).

School division directors of testing (DDOT) provide standardized training materials annually to school testing coordinators (STC) at each school. STCs conduct training annually for all potential SOL test administrators in their schools. During this training, the testing presentation provided by the VDOE is discussed in its entirety. Staff sign a form indicating that they have received this training which makes them eligible to administer SOL tests. Test administrators are provided an examiner's manual that is specific to the test that they are

administering one week before the testing data. These manuals include a specific script that is required to be used when administering SOL tests. Examiners receive student test tickets and ancillary test materials such as formula sheets within an hour of testing. These items are considered secure and must be collected as students complete their tests. The test administrator from the STC acquires these secure materials before the testing session and returns them after the test session is complete. Students are provided their test tickets and ancillary materials once they have been seated and the testing site is secure. The testing group is directed to enter their ticket information into the state test management system (TestNAV) website.

Once students begin testing, any disruption or irregularity must be reported by the examiner to the STC who reports the irregularity to the DDOT. The DDOT is required to submit an irregularity report to the VDOE for further investigation. Upon completion of their test, students are directed to raise their hand and the examiner will ask them to submit their answers electronically by pressing the submit key on their screen with the computer mouse (VDOE, 2021c).

Scoring

Raw scores on the Virginia end-of-course reading SOL test are converted to scaled scores ranging from 0 to 600. Scaled scores below 400 are considered failing while students scoring between 400 and 499 are reported as proficient in reading. Students earning a score of 500 or higher are reported as advanced in reading. A score of 600 indicates that the student answered all questions correctly. Reading SOL test pass rates for individual high schools are reported annually through the VDOE school quality profiles (VDOE, 2021e).

Procedures

This study will begin by obtaining Liberty University Institutional Review Board (IRB) approval before collecting data (see Appendix A). Archived, public data will be collected in this study; therefore, it will not be necessary to secure permission from participants. Since their instruments will be sourced in the study, a letter will be sent to the Virginia Department of Education (VDOE) and the Virginia Department of Criminal Justice Services (VDCJS) via email to inform them that this study will occur and that their instruments will be implemented for data collection (see Appendix B). The study will begin by locating the 2018 Education Demographics and Geographic Estimates (EDGE) Report that was created by the National Center for Educational Statistics (NCES). This Microsoft Excel report contains a public school district file that provides the percentage of schools in each school division that is located within each locale code. This spreadsheet will be narrowed to only school divisions in Virginia. After the list has been sorted to include only Virginia school districts, the list will be further sorted to include only school divisions with at least 50% of their schools being classified as rural fringe, rural distant, or rural remote. By sampling school divisions with at least 50% of their schools being rural, all rural schools will be included in the study. Schools within the same division will likely possess similar characteristics even though they may be closer to urban areas. Once this listing of remote school divisions in Virginia has been created, each rural division will be searched on the VDOE Public School Listing by Region website (VDOE, 2021b). By opening the links for each of the rural school divisions, a list of high schools in each rural division will be generated. All high schools located in rural school divisions will be included in the study.

Once the list of rural high schools in Virginia has been created, a determination will be made as to whether each of those schools participated in the 2018 VSCS. The Virginia

Department of Criminal Justice's Secondary (VDCJS) School Climate Survey Results webpage (Virginia Department of Criminal Justice Services, 2021) will determine whether individual rural high schools participated in the 2018 VSCS. Only schools that participated will be available on the school menu under the 2018 tab. If a school is not listed, then its students did not participate in the survey and will not be included in the study. Once the school's name appears in the text box showing participation, page two of the results for that school entitled "scale results" will be printed from the same screen and maintained in a binder. This page will provide a listing of standardized scores on each climate measure for the school. All rural schools in Virginia that participated in the survey will be compiled for use in the study.

VDOE school quality profiles provide information regarding school performance for each academic year, including SOL test pass rates for reading, writing, mathematics, history, and science (VDOE, 2021e). The school name will be entered into the text box on the school quality profiles website and "full report" will be selected. Once the full report has been opened, the "assessments" tab will be selected. The school pass rate for the reading SOL test will be listed for 2018 along with the school division pass rate and the state pass rate for the 2018 reading SOL. The school quality profile assessment page for each school in the study, which includes the reading SOL pass rate, will be printed and placed in a binder so that the information can be easily accessed by the researcher. Data will be organized into a spreadsheet with a number representing the school, the score for each climate measure from the VSCS, and the reading SOL pass rate for 2018.

Data Analysis

The null hypothesis reads that there will be no statistically significant predictive relationship between high school reading achievement and the linear combination of perceived

school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in rural Virginia schools. To test this hypothesis, the researcher will perform a multiple regression to determine the predictive potentiality of individual school climate measures on school pass rates on the 2018 reading SOL test. In conducting this predictive, correlational research, each of the school climate domains will serve as a predictor variable while SOL reading test pass rates will serve as the criterion variable. The multiple correlational coefficients (R^2) will allow the researcher to determine the percentage of variation in the criterion variable explained by each of the predictor variables in the equation (Gall et al., 2007). The R^2 statistic will allow the researcher to determine whether a linear combination of the school climate domains are predictive of student achievement.

Multiple regression is the best fit for this study because it will provide data that explain the predictive power of each school climate domain (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying). The implementation of multiple regression will provide school leaders with data that may allow them to address the climate measures that are most predictive of student achievement. Climate studies that have implemented multiple regression to determine the power of specific school climate measures in predicting student achievement include studies by Cornell et al. (2016) and the University of Virginia (2018). Both of these studies examined the predictive relationship school climate domains and student achievement in schools with authoritative climates. Cornell et al. (2016) found that student perceptions of a school's authoritative disciplinary structure only explained 4.5% of the variance in student achievement while the University of Virginia (2018) study found that 38% of the variance in student achievement was explained by a school's authoritative climate. It is important to note that the Cornell study employed student grades as

the measure of student achievement while the University of Virginia study utilized standardized test scores as the student achievement measure.

Data screening will include boxplots to identify extreme outliers. A boxplot organizes numerically-arranged data into quartiles to demonstrate the variability of different points in relation to the median. Boxplots will be created based on data generated from the study. Data points outside the whiskers of the boxplots will not be included in the data analysis. Outliers in the data will not be suppressed in this study because they could provide valuable insight into the the predictive relationship between school climate measures and student achievement.

Multiple regression analyses require three assumptions: an inspection for bivariate outliers, multivariate normality, and the assumption of non-multicollinearity. Bivariate outliers will be found by visually examining scatterplots between all pairs of independent variables (x, x) and also the predictor variables (x) and the criterion variable (y) using the Statistical Package for the Social Sciences (SPSS) program (version 28). The assumption of multivariate normality will be measured by investigating the potential presence of a linear relationship between each pair of variables. If the variables are not linearly related, the power of the test is reduced. This assumption will be tested by plotting a scatterplot for each pair of predictor variables (x, x), between the predictor variables (x) and the criterion variable (y). A “cigar shape” will be present for scatterplots that exhibit normality. Non-multicollinearity will be measured through the analysis of a variance inflation factor (VIF). If the VIF is greater than 10, then this assumption will have been violated meaning that some predictor variables in the study are too highly correlated. The multiple correlation coefficient, R, or the adjusted correlation coefficient R^2, are both appropriate measures of effect size in correlational studies (Warner, 2013). In determining whether to reject or fail to reject the null hypothesis, an alpha level of $\alpha = .05$ will be sufficient.

CHAPTER FOUR: FINDINGS

Overview

This chapter contains the research question, hypothesis, and the results of the data analysis related to this study. The purpose of this correlational study was to determine how accurately student achievement in reading could be predicted by a linear combination of student perceptions of school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of teasing and bullying) in rural schools. This chapter begins with an analysis of the predictor and criterion variables' descriptive statistics followed by the results of the statistical analysis including assumption testing. The researcher also examines the correlations among school climate domains and between school climate domains and student achievement.

Research Question

RQ1: How accurately can high school reading achievement be predicted from a linear combination of student perceptions of specific school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) for students in rural Virginia schools?

Null Hypothesis

$H_0$1: There is no statistically significant predictive relationship between high school reading achievement and the linear combination of perceived school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in rural Virginia schools.

Descriptive Statistics

The sample for this study consisted of 102 rural high schools located in Virginia during the 2018-2019 school year. The sample size for this study exceeded the 66 participants that Gall et al. (2007) indicated is necessary for a medium effect size with a statistical power of .7 at an alpha level of $\alpha = 0.05$. All high schools located in school districts with at least 50% of their schools being classified as rural fringe, rural distant, or rural remote according to the 2018 Educational Demographics and Geographic (EDGE) report were included in this study (National Center for Education Statistics, 2021). The descriptive statistics provided in the section are school-level data for both student perceptions of school climate measures and pass rates on the 2018 Virginia standards of learning (SOL) reading test.

Descriptive statistics for the predictor variable of SOL pass rates and criterion variables of student support, disciplinary structure, academic expectations, student engagement, and bullying for the sample ($n = 102$) are included in Table 3. The values for the five school climate measures were based on averages that were standardized into z-scores by the organization administering the survey such that the state means for each category was ten and the standard deviation was one. For each climate measure and school SOL pass rate, a minimum and maximum value, mean and standard deviation were calculated.

Each of the predictor variables in this study deviated minimally from the mean. Each of the climate domains projected standard deviations that were less than one except for disciplinary structure with a standard deviation of 1.04. Small standard deviations indicate that the schools in the survey included student respondents who reported similar perceptions about their school's climate as the other schools in the survey. Also, the means for the school climate domains were very similar. The climate category with the highest average student score was student support

with a mean of 9.8809 while the lowest average was for the prevalence of bullying with a mean of 9.5583. This similarity in means may be attributed to similar responses for each climate domain because students experienced an overall positive or negative view of their school, most schools maintaining similar climates, or closely-worded survey questions.

Table 3

Descriptive Statistics for the Predictor and Criterion Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Student Support	102	7.96	13.01	9.8809	.98012
Disc Structure	102	6.83	11.80	9.6945	1.04171
Academic Exp	102	7.63	12.51	9.7337	.95711
Student Engage	102	6.37	12.00	9.7661	.96884
Bullying	102	7.72	11.45	9.5883	.72786
SOL Pass Rate	102	72	97	84.27	5.742
Valid N (listwise)	102				

Note. Predictor variables: Student support, disciplinary structure, academic expectations, student engagement, and prevalence of bullying; Criterion Variable: SOL pass rate

Assumptions Testing

Multiple regression analysis requires three assumptions. Bivariate outliers were identified and the researcher determined whether to include those outliers in the data analysis. Scatterplots for each pair of variables were examined to determine normality. Normality is an indicator of whether the relationship between pairs of variables is linear. Finally, significant levels of multicollinearity between the predictor variables must not exist. Multicollinearity occurs when predictor variables are highly intercorrelated presenting difficulty determining the degree to which their individual introduction produces a change in the criterion variable (Gall et al., 2007).

Inspection for Bivariate Outliers

Multiple regression analysis requires an inspection for potential bivariate outliers inherent to the data. The identification of extreme outliers is important because their inclusion in the data

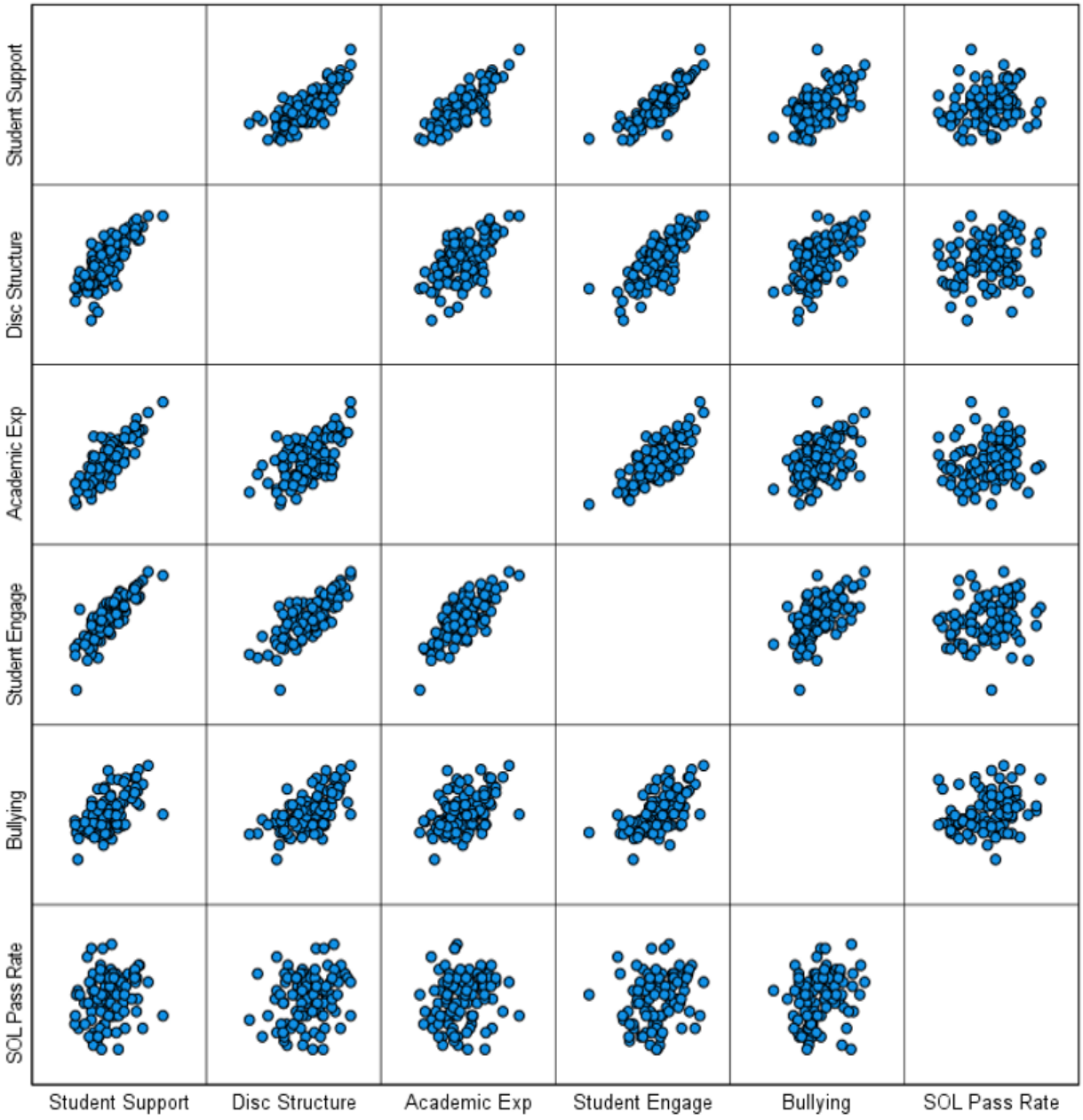
may distort results. Researchers must decide whether to suppress outliers based upon the statistical results obtained with and without their presence (Gall et al., 2007). Figure 2 depicts a scatterplot matrix that illustrates the relationship among the predictor variables and between predictor variables and the criterion variable. Each of the data points represents one of 102 high schools from rural school divisions in Virginia. A visual inspection of the scatterplots indicates that no significant bivariate outliers are present.

Assumption of Multivariate Normality

The assumption of multivariate normality was met through the investigation of each pair of variables to determine whether a linear relationship was present. A strong linear relationship between a predictor variable and a criterion variable is important because predictor variables should, theoretically, be correlated as highly as possible with the criterion variable (Gall et al., 2007). The scatterplots included in Figure 2 were examined to determine if linear relationships could be detected between each pair of predictor variables (x, x) and between the predictor variables (x) and the criterion variable (y). The presence of “cigar shapes” in each of the scatterplots indicated that the assumption of multivariate normality was met.

Figure 2

Scatterplot Matrix



Assumption of Non-Multicollinearity

The potential presence of multicollinearity was measured by the Variance Inflation Factor (VIF) test. This test is designed to determine whether predictor variables are highly correlated which indicates that they are providing the same information about the criterion variable. If predictor variables that are highly collinear are included in a multiple regression model, the reliability of the regression coefficients is diminished because they could have been affected by highly-correlated variables (Warner, 2013). While non-multicollinearity requirements for a multiple regression were met for this study as evidenced by the variance inflation factor (VIF) values presenting as less than ten, varying degrees of multicollinearity between the predictor variables existed. Student support and student engagement perceptions were moderately multicollinear, perceptions of academic support and disciplinary structure reflected weak multicollinearity, and the VIF for bullying was considered insignificant. Collinearity statistics are included in Table 4.

Table 4

Collinearity Statistics

		Collinearity Statistics	
Model		Tolerance	VIF
1	Student Support	.178	5.605
	Disc Structure	.303	3.297
	Academic Exp	.290	3.453
	Student Engage	.211	4.736
	Bullying	.560	1.786

Note. Criterion Variable: SOL Pass Rate

Results

The null hypothesis states that there is no statistically significant predictive relationship between high school reading achievement and the linear combination of perceived school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in rural Virginia schools. Multiple regression was employed to determine if a predictive relationship existed between predictor and criterion variables. The researcher failed to reject the null hypothesis at the 95% confidence level where $F(5, 96) = 1.35$, $p = .251$. There was no statistically predictive relationship between any climate domains employed in the study and student achievement. See Table 5 for regression model results.

Table 5

Regression Model Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	218.526	5	43.705	1.348	.251
	Residual	3111.787	96	32.414		
	Total	3330.314	101			

Note. Criterion Variable: SOL Pass Rate; Predictor Variables: (Constant), Bullying, Academic Exp, Disc Structure, Student Engage, Student Support

This model generated an $R^2 = 0.066$ which indicates that the effect size of student perceptions of school climate on student achievement was small. Only 6.6% of the variance in student achievement as measured by 2018 SOL test pass rates was explained by a linear combination of student perceptions of school climate. According to Cohen (1988), an R^2 less than .09 is considered a small effect size. There was no significant prediction found in this model. The adjusted R^2 value accounts for the number of predictor variables in the model

whereas R^2 reflects the predictive ability of the criterion variables as a whole. The adjusted R^2 for this model was .017 which indicates that the predictor variables had no significant predictive ability of the criterion variable. Table 6 provides a model summary that includes R^2 and adjusted R^2.

The standard error of the estimate (SE) measures the variability of observed criterion values around predicted criterion values. The SE provides the researcher information regarding the accuracy of a sample. Approximately 95% of the observed values should lie within two standard deviations of the regression line. The SE for this model was 5.7 meaning that 95% of the values should have occurred between 10% to 12% of the regression line further indicating that this was not a significant predictive model. The standard error for this model is included in table 6.

Table 6

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.256	.066	.017	5.693

Note. Predictors: (Constant), Bullying, Academic Exp, Disc Structure, Student Engage, Student Support

The coefficients of the linear regression model for this study provide additional information about whether student perceptions of school climate domains are predictive of student achievement in rural schools. For a predictor variable to be statistically predictive of a criterion variable, the *p*-value for that predictor variable must be less than $\alpha = .05$. As Table 7 indicates, none of the predictor variables have a *p*-value that is less than .05; therefore, none of the school climate domain perceptions are predictive of student achievement.

Table 7

Multiple Linear Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	65.387	7.970		8.204	<.001
	Student Support	-.148	1.368	-.025	-.108	.914
	Disc Structure	.674	.987	.122	.682	.497
	Academic Exp	.153	1.100	.026	.139	.890
	Student Engage	.159	1.273	.027	.125	.901
	Bullying	1.125	1.040	.143	1.081	.282

Note. Criterion Variable: SOL Pass Rate

While no significant predictive relationship between student perceptions of school climate domains and student achievement was found, correlation does exist among the predictor variables and between the predictor and criterion variables. Table 8 provides the correlations between the variables in this study. Pearson product-moment correlations are significant at the $\alpha = .01$ level between the pairs of predictor variables including student support and student engagement ($r = 0.85$), academic expectations and student support ($r = .81$), disciplinary structure and student engagement ($r = .78$), academic expectations and student engagement ($r = .77$), and disciplinary structure and student support ($r = .77$). The prevalence of bullying and disciplinary structure are the predictor variables most highly correlated with SOL pass rate with both variables measuring a weak correlation of $r = .23$ with the academic achievement measure.

Table 8

Correlation Matrix

		Student Support	SOL Pass Rate	Disc Structure	Academic Exp	Student Engage
SOL Pass Rate	Pearson Correlation	.198*				
	Sig. (2-tailed)	.046				
Disc Structure	Pearson Correlation	.767**	.229*			
	Sig. (2-tailed)	<.001	.021			
Academic Exp	Pearson Correlation	.814**	.161	.571**		
	Sig. (2-tailed)	<.001	.107	<.001		
Student Engage	Pearson Correlation	.847**	.205*	.779**	.771**	
	Sig. (2-tailed)	<.001	.039	<.001	<.001	
Bullying	Pearson Correlation	.604**	.232*	.634**	.458**	.592**
	Sig. (2-tailed)	<.001	.019	<.001	<.001	<.001

Note. * Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Cohen's f^2 is a commonly implemented measure in multiple regression analysis. The formula for Cohen's f^2 is $R^2 / (1 - R^2)$ and in this model is .066 / .934 = .071. Cohen (1988) indicated that small effect size is .02, medium effect size is .15, and large effect size is .35. An effect size of .071 indicates that student perceptions of school climate measures are not predictive of student achievement in this study.

In summary, this study employed multiple regression analysis to determine how well student achievement could be predicted by a linear combination of student perceptions of school climate domains. The null hypothesis presumed that there would be no statistically significant predictive relationship between high school reading achievement and the linear combination of perceived school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in rural Virginia schools. Based on the data analysis, the null hypothesis failed to be rejected at the 95% confidence level. While some weak correlation exists in this model, assessment of the R^2, adjusted R^2, standard error of the estimate, and *p*-values all support the conclusion that student perceptions of school climate measures are not predictive of student achievement in rural schools.

The results of this study align with Barile et al. (2012) and Buyse et al. (2009) in that small correlations existed between school climate measures and student achievement, but those climate measures were not significantly predictive of student achievement. The results of this study do not align with the results of climate studies conducted by Berkowitz et al. (2017) and McCoy et al. (2013). Both of these studies found that student perceptions of certain climate domains were predictive of student achievement.

CHAPTER FIVE: CONCLUSIONS

Overview

This chapter analyzes the results of this quantitative, correlational study of the relationship between student perceptions of school climate domains and student achievement in rural Virginia schools. Student data from rural high schools in Virginia collected from the 2018 Virginia Secondary School Climate Survey (VSCS) were employed to measure student perceptions of the school climate domains of student support, disciplinary structure, student engagement, academic expectations, and the prevalence of bullying. Student achievement for rural Virginia high schools was measured by school pass rates on the 2018 Virginia Standards of Learning (SOL) reading test. Included in this chapter is a discussion of the results of the research, implications of the study results, limitations of this study, and recommendations for future research.

Discussion

The purpose of this quantitative, correlational study was to determine how accurately student achievement in reading could be predicted by a linear combination of student perceptions of school climate domains in rural Virginia high schools. The study employed average school pass rates on the 2018 Virginia standards of learning reading test to measure student achievement in rural high schools. School standardized scores for five climate measures (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of teasing and bullying) as collected by the 2018 Virginia School Climate Survey were employed to measure school climate in rural schools. School climate and achievement data from this study may assist school leaders in determining which climate measures are most highly correlated with student achievement. Ecological systems theory, the bioecological model of development, and

Vygotsky's theory of cognitive development provided the theoretical basis for the study of the relationship between school climate domains and achievement.

Research Question

RQ1: How accurately can high school reading achievement be predicted from a linear combination of student perceptions of specific school climate domains (disciplinary structure, academic expectations, student support, student engagement, and prevalence of bullying) for students in rural Virginia schools?

Hypothesis

The null hypothesis stated that there would be no statistically significant predictive relationship between high school reading achievement and the linear combination of perceived school climate domains (student support, disciplinary structure, academic expectations, student engagement, and the prevalence of bullying) in rural Virginia schools. The researcher failed to reject the null hypothesis after conducting a multiple regression analysis. This study concluded that the linear combination of school climate domains included in this study, the predictor variables, only accounted for 6.6% of the variance in student achievement as measured by 2018 SOL test pass rates. The coefficient of determination ($R^2 = 0.066$) indicated a small effect size. A statistically small correlation existed between individual climate domains and student achievement in this study with the most significant correlation ($r = .23$) existing between reading SOL scores and student perceptions of bullying and disciplinary structure.

The lack of statistically significant predictive power of school climate domains in terms of student achievement in this study aligns with several previous research studies. These studies also found that only a statistically weak correlation existed between school climate domains and student achievement. Gase et al. (2017) conducted a study in Los Angeles County to determine

whether student perceptions of school climate were predictive of several measures including student achievement. The results of the study indicated that climate perceptions were only able to predict a statistically insignificant amount ($R^2 = .051$) of the variance in student achievement. The researchers found that the correlations between climate measures and student achievement were weak with student engagement being the most strongly correlated ($r = 0.23$) with student achievement.

Maxwell et al. (2017) conducted a study to determine how well student perceptions of school climate could predict student grades in reading and math courses. The researchers found that the linear combination of climate measures applied in their model was not statistically predictive ($R^2 = .086$) of student achievement. Despite the lack of predictive ability, a weak correlation was found between specific climate domains and student grades, the most significant of which was student identification with the school ($r = 0.15$).

The majority of previous research does not support the findings of this study that school climate domains are not predictive of student achievement. Many studies indicated that there is a significant predictive relationship between school climate domains and student achievement. Davis and Warner (2018) conducted a study to determine if student results on the Regent's exam could be predicted from a linear combination of student climate data from the domains on the New York City School Climate Survey. The researchers found that student perceptions of climate were significantly predictive ($R^2 = 0.26$) of student assessment scores.

Benbenishty et al. (2016) applied a multiple regression analysis to determine whether school climate was predictive of student achievement or whether achievement was predictive of climate. Results of the study indicated that school climate and student achievement were

predictive of each other. While student achievement was more predictive of school climate (R^2 = 0.7), school climate was also a significant predictor of student achievement (R^2 = 0.3).

As evidenced by the findings of several studies, there have been discrepancies in the results of studies examining the predictive relationship between school climate domains and student achievement. Some studies found student perceptions of school climate to be significantly predictive of student achievement while findings from other studies comport with the current study that discovered only a small amount of predictive ability in the model. The discrepancies in results may be attributed to the large number of climate measures available for application as predictor variables in studies, the variety of available student achievement measures, and the innate volatility of employing student responses to measure school climate.

Implications

In this study, student perceptions of school climate domains in rural schools were not significantly related to student achievement as measured by reading SOL test results. However, a positive climate is an important characteristic for high-performing schools. Positive school climates that exist over time result in higher graduation rates, improved teacher retention rates, enables positive child development, and decreased mental health issues (Thapa et al., 2013). Daily et al. (2019) noted that, “understanding nonacademic factors like school climate, can provide schools with the information needed to implement innovative and alternative pedagogical strategies that potentially reduce learning disparities, especially among disadvantaged students” (p. 177).

While the results of this study indicate a weak correlation between school climate domains and student achievement in rural schools, it is possible that the unique characteristics of rural schools influence their climates. High poverty rates, difficulties in recruiting and retaining

quality teachers, inadequate funding, and geographic spread affect the climate of rural schools. Poverty affects rural schools more significantly than the overall school population resulting in students who experience issues with hunger, healthcare, and housing, all of which affect their ability to learn, interact with others, and contribute positively to the overall climate of their schools (The Commonwealth Institute, 2019).

Teacher retention and recruitment is also a significant climate issue for rural schools. Non-competitive salaries, lack of adequate housing for teachers, and remote settings contribute to the difficulty rural schools experience in retaining and recruiting teachers (Rural Schools and Community Trust, 2019). When schools are forced to retain underperforming teachers and hire candidates with inadequate training and experience, students suffer academically from poor instruction, but also from being enrolled in classrooms with fewer potential positive teacher-student relationships (Greenhough & Nelson, 2015).

Results generated from this study indicated that climate domains measuring students' sense of school safety were more highly correlated with student achievement than other climate domains. Student perceptions of disciplinary structure and the prevalence of bullying are both measures of students' perceptions of school safety. In this study, the domains of disciplinary structure and the prevalence of bullying were more significantly correlated (r = .23) with student achievement than climate measures such as academic expectations (r = .16) which emphasize relationships over safety. As school leaders attempt to improve student academic achievement, they may consider prioritizing improvements that result in students feeling safer in school such as improved enforcement of school rules.

While the majority of school climate research has been conducted in urban schools, there are significant differences between schools and students in the two areas that limit the

generalizability of results from urban schools to rural schools. Students in urban schools are more likely to engage in high-risk behaviors. As a result, safety concerns are more prevalent in student perceptions of school climate in urban school districts (Sulak, 2016). Climate issues with rural schools tend to be related to poverty (Rural School and Community Trust, 2019). High poverty rates result in rural students often not possessing adequate learning materials. Rural areas consist of fewer parents with post-secondary education resulting in households in which parents are less likely to maintain significant educational aspirations for their students (Rosenberg et al., 2015). Insufficient educational aspirations negatively affect student engagement and the investment students are willing to make in their academic success (Rosenberg et al., 2015).

Rural students also experience fewer opportunities for school engagement as a result of their school districts being inadequately funded. Course offerings in rural schools are frequently limited due to teacher shortages which results in students often not accessing courses of interest or that facilitate developing career paths (Education Commission of the States, 2017). Urban students experience greater access to internships, community mentoring, and cultural activities. Urban schools typically possess more robust extra- and co-curricular options for students which improve opportunities for school connectedness when compared to their rural counterparts (Beach et al., 2019). The significant differences between the school climate characteristics of urban and rural schools are evident and warrant additional research.

The standardized nature of the SOL testing employed as the measure of student achievement in this study may have also repressed the effects of school climate. Standardized testing is inherently designed to mitigate the effects of confounding variables such as race, gender, and socioeconomic status on their results. Achievement measures other than

standardized test results may have resulted in a more accurate assessment of the relationship between climate and achievement.

Limitations

Limitations exist in all research resulting in threats to internal and external validity. The first limitation to this study is that students may have misunderstood the wording of questions leading to answers that do not accurately reflect how they perceived their school climate. This is a threat to the internal validity of the results. The likelihood of this issue could be limited by providing an opportunity for survey administrators to review survey questions and their meanings with participants prior to the administration of the assessment by reading a standard script created by the survey designers.

Examining only student perceptions of school climate may lead to results that are not a true reflection of a school's climate. Students maintain a variety of unique experiences that may result in a significant variance in perceptions of a school's climate. Since random sampling is implemented for most schools participating in the VSCS, there is a possibility that school climate is overstated, positively or negatively, depending on selected students. This could create an issue with internal validity because perceptions of students may not accurately reflect the actual climate of the school. To rectify this issue, results from the staff version of the VSCS could be implemented as a control variable in order to ascertain accurate effects of school climate.

The inclusion of reading SOL test results as the sole academic achievement variable could have influenced the internal and external validity of this study. 48% of the high schools included in the study enrolled less than 600 students. As a result of lower-than-average student enrollments, these schools may have employed only one instructor for the English 11 course that was assessed via the reading SOL test. If the teacher was effective, the students would have been

more likely to perform well on the assessment while ineffective teachers traditionally experience less-than-average student academic performance (Daily et al., 2019). The reading SOL pass rates for these schools could likely be attributed more to the quality of the teacher than the climate of the school; hence, the internal validity of the results could have been affected. Since reading assessment results may not be generalizable to other achievement measures, external validity was affected by the inclusion of only one measure of student achievement as the sole criterion. The validity threats resulting from a single measure of student achievement could be reduced by employing additional measures of student achievement such as math SOL scores, student grades in various courses, grade point averages, and graduation rates.

This study is limited in that it did not account for the effects of confounding variables such as race and gender on SOL test results. Such confounding variables have demonstrated an effect on standardized testing results in previous studies. Standardized testing results have been closely connected to a student's demographics and circumstances. Tienken et al. (2016) indicated that 70% to 78% of the variance in student performance on the New Jersey Assessment of Skills and Knowledge from 2010 through 2012 could have been attributed to socioeconomic status and race. In terms of gender, girls generally outperformed boys on standardized tests with more open-ended questions while boys score higher on multiple-choice tests (Reardon et al., 2018). This study may have better explained the relationship between climate and achievement had confounding variables such as race, gender, and socioeconomic status been controlled.

The absence of between- and within-group comparisons limited this study. This study employed all high schools from rural school divisions in Virginia. The external validity of the study is weakened by excluding urban areas for comparison purposes. This limits the generalizability of this study to areas other than rural areas. Because all rural schools in Virginia

were combined in this study, it is not possible to determine if students from schools that are more or less rural than other rural schools maintained perceptions of school climate that were significantly different. This issue could be addressed by including urban schools in the study for comparison purposes or organizing rural schools into rural fringe, rural distant, and rural remote as is the case in the Education Demographics and Geographic Estimates (EDGE) report. Rural fringe areas are defined as those within five miles of an urbanized area, rural distant areas are those between 5 and 25 miles from an urban area, and rural remote areas are more than 25 miles from an urbanized area (NCES, 2021).

Recommendations for Future Research

A lack of research exists concerning school climate in rural schools. Due to the unique characteristics and the large number of these rural schools in the nation, future researchers must gain a more in-depth understanding of the characteristics of rural schools and how those characteristics influence rural students. Building upon the current study, there are several recommendations for future research regarding school climate and student achievement in rural schools.

Future researchers need to investigate the differences between rural schools' climates based on their proximity to urban areas. A rural school with 800 students near a major city may have a significantly different climate than a school located hundreds of miles from an urban area with 150 students. These differences may impact the climate of the school, student perceptions of their school's climate, or student achievement.

Future research should include multiple measures of student achievement when assessing the predictive ability of school climate domains. Multiple measures of student achievement will allow future researchers more confidence that school-level achievement is being accurately

represented. Multiple achievement measures will allow researchers to determine whether specific academic outcomes are more related to positive or negative perceptions of school climate.

Longitudinal research may more accurately measure the relationship between school climate and student achievement in rural schools than does cross-sectional research. Longitudinal studies allow researchers to examine groups of students as they progress from one level of school to the next. Longitudinal research may determine whether climate affects achievement more or less as students age.

Finally, to enhance the understanding of connections between students' perceptions of their school and academic performance, qualitative studies may be beneficial. Researchers interviewing students about how specific aspects of their schools' climates advance or impede their learning may offer insight into the connection between climate and achievement. Qualitative studies may facilitate a more complete understanding of the complex dynamics of school climate in rural schools.

Summary

The purpose of this study was to determine how well student achievement could be predicted by a linear combination of student perceptions of school climate domains in rural schools. The theoretical link between school climate and student achievement was based on the ecological systems theory which posited that relationships between children and other individuals such as peers, teachers, and parents influenced the social and academic development of children. The theory of cognitive development posited that the relationship between student and teacher (more knowledgable other) affected the degree to which learning occurred.

Previous research acknowledged that a relationship existed between school climate and student achievement. The literature also indicated that defining climate was challenging due to

the many potential measures of the concept. The existence of multiple achievement constructs made student achievement a difficult concept to measure. Many climate studies identified a strong association between the quality of teacher-student relationships and student achievement. The literature also identified rural school climate as an area of study lacking sufficient research. Poverty rates, low teacher retention, and inadequate funding are issues unique to rural areas that warrant additional climate research in rural schools.

This study employed data from the 2018 Virginia Secondary School Climate Survey and the 2018 Virginia Reading Standards of Learning Test to determine how accurately achievement could be predicted by student perceptions of school climate in rural schools. The study was limited to rural high schools in Virginia. The results of the study included no statistically significant ability of school climate perceptions to predict student achievement. Weak correlations were identified between each of the school climate domains and student achievement with perceptions of school safety being most closely correlated with student achievement (r = .23).

This study did not find student climate perceptions to be predictive of student achievement in rural schools; however, the unique characteristics of rural schools may influenced how well students perform academically. Future research should consider how school climate is affected by the characteristics of rural schools and how rural students are influenced by their school climate. This relationship may be best measured via a variety of school climate and achievement measures over time.

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APPENDIX A: IRB Approval

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

October 8, 2021

Robbie Mason
Nathan Street

Re: IRB Application - IRB-FY21-22-125 THE RELATIONSHIP BETWEEN STUDENT PERCEPTIONS OF SCHOOL CLIMATE DOMAINS AND ACADEMIC ACHIEVEMENT IN RURAL SCHOOLS

Dear Robbie Mason and Nathan Street,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your project with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study is not considered human subjects research for the following reason:

(1) It will not involve the collection of identifiable, private information from or about living individuals (45 CFR 46.102).

Please note that this decision only applies to your current application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

Also, although you are welcome to use our recruitment and consent templates, you are not required to do so. If you choose to use our documents, please replace the word ***research*** with the word ***project*** throughout both documents.

If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

Appendix B: Notice of Instrument Usage

Robbie W. Mason

August 23, 2021

Mrs. Nicole Wilcox
Virginia School Climate Survey Director
Virginia Department of Criminal Justice Services
1100 Bank St.
Richmond VA, 23219

Re: 2018 Virginia Secondary School Climate Survey Results

Dear Mrs. Wilcox,

I am a currently a doctoral candidate at Liberty University and I am completing my dissertation entitled, *The Relationship Between Student Perceptions of School Climate Domains and Academic Acheivement in Rural Schools.* The purpose of my study is to determine whether academic achievement in rural Virginia high schools as measured by standardized test results can be predicted by a linear combination of the five school climate domains included in the 2018 version of your agency's Virginia Secondary School Climate Survey.

While both the Virginia Secondary School Climate Survey and the results of the survey for each high school in Virginia are available publicly, I am informing your agency that I intend to employ your survey and accompanying results as an instrument in my study.

I appreciate the work that you and your agency continue to perform in an effort to assist school staff, parents, and communities in understanding the complexities of school climate. I would be happy to share the results of my study upon completion. If you are interested, please email me at _____.

Thanks again for all that you do to support Virginia's public schools.

Sincerely,

Robbie W. Mason
Doctoral Candidate
Liberty University

Robbie W. Mason

August 23, 2021

Dr. Shelley Loving-Ryder
Asst. Superintendent for Accountability
Virginia Department of Education
101 N 14th St.
Richmond VA, 23219

Re: 2018 Virginia School Quality Profiles

Dear Dr. Loving-Ryder,

I am a currently a doctoral candidate at Liberty University and I am completing my dissertation entitled, *The Relationship Between Student Perceptions of School Climate Domains and Academic Acheivement in Rural Schools.* The purpose of my study is to determine whether academic achievement in rural Virginia high schools as measured by standardized test results can be predicted by a linear combination of the five school climate domains included in the 2018 version of the Virginia Secondary School Climate Survey.

I am informing your agency that I intend to employ the school pass rates on the 2018 reading standards of learning assessment as the measure of academic achievement in my study. These pass rates will be collected from the School Quality Profiles published annually, and provided publicly, by the VDOE for each Virginia high school.

I appreciate the work that you and your agency continue to perform in an effort to assist school staff, parents, and communities in understanding the achievement levels of the students in their districts. I would be happy to share the results of my study upon completion. If you are interested, please email me at _____.

Thanks again for all that you do to support Virginia's public schools.

Sincerely,

Robbie W. Mason
Doctoral Candidate
Liberty University