ABSTRACT

Title of Dissertation: TEACHER RETENTION AS A PREDICTOR OF STUDENT PERCEPTIONS OF SCHOOL CLIMATE

Julie Miller, Doctor of Philosophy, 2024

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This dissertation examines the relationship between teacher retention and student perceptions of school climate in an urban school district, both in individual school years and across multiple school years. This secondary analysis uses a school-level measure of teacher retention from New York City (NYC) public schools and measures of school climate constructed from the student version of the NYC School Surveys for 2014-2015 through 2018-2019. Specifically, I constructed an overall measure of school climate that was a school-level, unweighted mean and I used exploratory factor analysis which resulted in three factors (Teacher Support, Classroom Behavior, and School Safety).

Using linear regression for individual school years, I found teacher retention rates collected in the fall were a significant, positive predictor of school-wide averages of student school climate survey scores collected in the spring. Using a fixed effects regression model of repeated measures I also found a significant, positive relationship between teacher retention and student perceptions of school climate over the five-year period. Teacher retention was a

significant positive predictor of the Teacher Support factor in the fixed effects regression of repeated measures for 2015-2016 through 2018-2019 and also in three of the five individual school years. Teacher retention had a significant, positive relationship with the Classroom Behavior factor in each individual school year but was not significantly related in the multi-year model. Teacher retention was not significantly related to the School Safety factor in any individual school year nor in the multi-year model.

TEACHER RETENTION AS A PREDICTOR OF STUDENT PERCEPTIONS OF SCHOOL CLIMATE

by

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Dedication

To the teachers and students at Saint Ignatius who taught me so much and to Michael and Maxwell who I love with my whole heart.

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Chapter 1: Introduction

The purpose of this study is to examine the relationship between teacher retention and student perceptions of school climate. This study used the teacher retention data from October of a school year to predict student perceptions of school climate in the spring of the same school year. This is different from most of the research on teacher retention and school climate which used school climate, often from the teachers' perspective, in the spring of one year to predict teacher retention in the following school year. Using teacher retention to predict student school climate scores allowed me to center the student experience. Studying how students view their school climate can provide an important window into how students perceive a wide range of experiences in school.

This study examines how student perceptions of school climate are related to turnover, both in a single year and across time. School climate surveys set out to measure many different aspects of a student's school day, from how safe the school is, to the student's relationships with peers and teachers, to the academic atmosphere of the school. In addition to student perceptions of school climate being important in their own right, because students in all schools deserve an environment where they can flourish academically and where their social-emotional needs are met, focusing on student instead of teacher perceptions of school climate also offers some methodological advantages, as discussed in detail in the methods section.

Along with the overall measure of school climate, I was particularly interested in the relationship between teacher retention and two dimensions of school climate, student-teacher relationships and safety, order, and discipline. I chose these two

dimensions because they are experienced by both teachers and students and can be changed at the school level by school personnel. Safety, order, and discipline is related to teacher retention (Ingersoll & May, 2012; Ingersoll & Smith, 2003; Koth et al., 2008) and teachers rate teacher-student relationships as crucial for teacher satisfaction (Bradley & Loadman, 2005; Shann, 1998) which is related to teacher retention (Boyd et al., 2011). Therefore, focusing on these two dimensions allowed for students' experiences to be centered while also studying factors the literature has identified as playing a role in teachers' (voluntary) retention decisions. Consequently, I decided to study the relationship between school-wide rates of teacher retention and student perceptions of school climate, student-teacher relationships, and safety, order, and discipline.

In addition to being important in its own right, school climate is important due to its relationship with students' academic achievement and socio-emotional outcomes. Studies have found school climate is positively related to students' grades, academic aspirations, and growth in mathematics and reading test scores (DeAngelis & Presley, 2011; Shukla et al., 2016; Zullig et al., 2011). Across urbanicity and grade-level, positive measures of overall school climate were associated with better academic performance, although the direction of this relationship is unclear. In addition to overall measures of school climate, student-teacher relationships and safety, order, and discipline, are also positively related to students' GPA, increased graduation rates, and mathematics and reading test scores (Davis & Dupper, 2004; DeAngelis & Presley, 2011; Scales et al., 2020; Thapa, 2013). School climate is also positively related to socio-emotional student outcomes such as adjustment to school,

lower rates of problematic behavior, and depressive symptoms (Esposito, 1999; Shukla et al., 2016; Way et al., 2007). Additionally, more positive student-teacher relationships decreased the risk of peer victimization or being a victim of violent crime (Bryson & Childs, 2018; Sulkowski & Simmons, 2018) and are positively related to students' academic motivation and engagement (Eccles & Roeser, 2011).

While the literature shows strong connections between a positive school climate and better schooling experiences for students, the overlap between school climate definitions and school effectiveness (or other outcomes) can make it difficult to compare studies. For instance, school safety is often included as a dimension of school climate, but also overlaps with an outcome such as violence prevention. Additionally, the direction of the relationship between school climate and student outcomes is not always clear—nor necessarily uni-directional. For example, positive school climate is associated with less problematic student behaviors, but this relationship could be cyclical; as students perceive the school climate to be more positive, they might be less likely to exhibit problematic behaviors, which could mean they perceive the school climate as even more positive as they and their peers exhibit fewer problematic behaviors.

Teacher retention is also an important area for research. The steady churn of teachers in urban schools is often lamented for the cost to schools, both monetary (Simon & Johnson, 2015) and in time spent by the remaining teachers and school administrators to hire and induct new teachers (Jacob, 2007; Marinell & Coca, 2013; Simon & Johnson, 2015). Schools with more minoritized students or with higher rates of students from households with low socioeconomic status have more teacher

turnover than schools with fewer minoritized students or students from households with high socioeconomic status (Carver-Thomas & Darling-Hammond, 2019; Holme et al., 2018; Nguyen, 2021; Sorensen & Ladd, 2020). High teacher turnover means pulling money away from other important budget items such as teacher salaries, classroom supplies, and the upkeep of the school building (Minarik et al., 2010), whether this turnover is voluntary or involuntary. Remaining teachers may devote extra time to supporting new teachers, see their teaching assignments disrupted, and receive repeated or inadequate professional development as professional development is aimed at new teachers (Guin, 2004; Jacob, 2007; Marinell & Coca, 2013; Smith et al., 2014), which could further exasperate any issues the school is facing because they do not have adequate time or resources left to address them. High levels of teacher attrition year after year can disrupt many aspects of the school and thwart efforts for school improvement.

However, one under-studied aspect is how teacher retention in schools is related to how students perceive the school climate. While previous research has found a positive relationship between school climate and teacher retention, this research usually includes teacher perceptions of school climate, either alone or with other respondent groups (Cohen, McCabe, et al., 2009; Cohen, Pickeral, et al., 2009; Robinson et al., 2016; Thapa et al., 2013; Thapa, 2013). While not all teacher turnover is voluntary, and at times the line between voluntary and involuntary turnover can be blurry, if a teacher cannot tolerate the school's climate, they can decide to leave that school. However, students often do not have the ability to easily move to another school. Instead, as new teachers come and go, not enough attention

is paid to the students who are left behind, especially beyond their test scores. While the academic consequences of high teacher turnover are obviously important (Ronfeldt et al., 2013; Sorensen & Ladd, 2020), how students perceive their school experience is also important. Students deserve to feel safe and cared for at school and this study seeks to center the student experience (as measured by school climate surveys).

Overview of Research Questions

In this study, I examined the relationship between teacher turnover and student perceptions of school climate, with a special focus on student-teacher relationships and safety, order, and discipline. This study sought to examine the student experience by answering questions about how teacher turnover is related to how students feel about their school's climate. In addition to looking at single-year data, I also examined teacher retention rates across time, that is across the length of this study (2014-2019). The research questions are:

> R1: What is the relationship between school-level rates of teacher retention and (average) student perceptions of school climate (or student-teacher relationships and safety, order and discipline) during one school year?
>
> R2: What is the relationship between school-level rates of teacher retention and (average) student perceptions of school climate (or student-teacher relationships and safety, order and discipline) across multiple school years?

Similar Studies

In my review of the literature, I found two studies, Kraft et al. (2016) and Mitchell et al. (2010), that include questions from student versions of a school climate survey and examine the relationship between school climate and teacher retention as part of their studies. However, although they include student perceptions of school climate, neither of these studies is focused on the relationship between student perceptions of school climate and teacher retention rates. Therefore, while this study is influenced by their work, it is not duplicative. These studies, along with key differences to this current study, are discussed in detail below.

One of these studies, Kraft et al. (2016), also examined the relationship between school climate and teacher retention using the NYC School Survey. The main analysis of the study used 33 items from the teacher version of the Likert-scale survey, broken into four dimensions of school climate. They found a relationship between teacher perceptions of school climate and teacher turnover. As part of their supplemental analysis, Kraft et al (2016) used questions from the student version of the NYC School Survey to check for common source bias. However, because they were using the student version of the survey to check for common source bias in the teacher responses, they only used the 16 items from the student version of the survey that mapped onto their existing measures developed from the teacher version. The supplemental analysis found that teacher turnover was related to students' perceptions of school climate in middle schools. Because the aim of their study was not specifically to examine *student's* perceptions of school, the measure of student perceptions of school climate was limited by only being able to include these 16

survey items. My study also used questions from the NYC School Survey and examines the relationship with teacher retention rates and school climate. However, I included all of the questions about school climate from the student version of the NYC School Survey to center student perceptions of school climate. Additionally, this study used the redesigned NYC School Survey while Kraft et al. (2016) use the original version of this survey (details on the differences between the two versions are discussed in chapter 2).

Mitchell et al. (2010) examined how perceptions of school climate differ between students and teachers in a quantitative study of 1,881 fifth grade students and 90 fifth grade teachers from 37 public elementary schools in Maryland. Faculty turnover rates were included as one aspect of school-level instability in their HLM models and student perceptions of school climate was the outcome variable. Student perceptions of school climate were not significantly related to teacher retention, although they approached significance in one model ($p<0.1$). There are two main differences between Mitchell et al. (2010) and this study. First, this study examined the perceptions of school climate by middle and high school students using Likert scale (strongly disagree to strongly agree) items. Mitchell et al (2010) surveyed fifth grade students with students choosing agree or disagree as questions were read aloud by the research team. Faculty turnover may affect elementary students differently than older students, as typically older students have classes with more teachers throughout the day. Because of this, middle and high school students could be more likely to have a direct relationship with a teacher who leaves than elementary students who usually only have a few teachers each year.

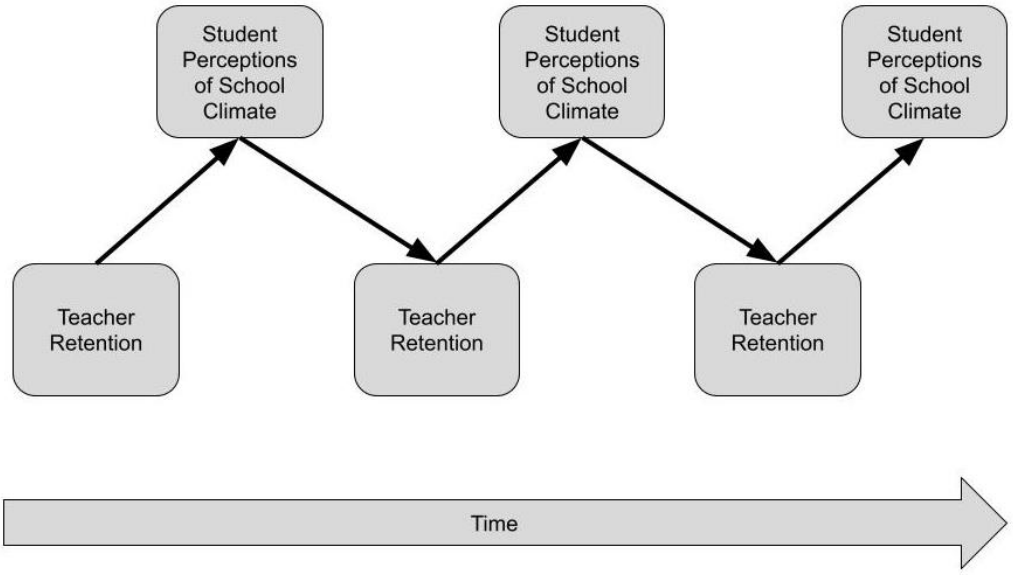
The other difference between this study and Mitchell et al. (2010) is in the treatment of classroom conduct. Mitchell et al. (2010) included a measure of classroom disorder in their first level of their HLM models and an overall measure of school climate as the outcome variable. They measured school climate with the elementary version of the School Development Program School Climate Survey (SCS) which includes order and discipline as one of the eight facets of school climate in the survey. Particularly given the typical organization of elementary schools where much of a students' day can be spent in only a few classroom climates, classroom disorder could affect how students view the overall climate of the school. Controlling for the classroom disorder is conceptualizing school climate differently than I intend to in this study. In this study, I included survey items about how students perceive the behavior of students in their classes in the safety, order, and discipline dimension as well as the overall measure of school climate, as I was particularly interested in how school-wide rates of faculty turnover influence student behavior.

Theoretical Framework

I am conceptualizing school climate (as perceived by students) and teacher retention as cyclical or iterative, continuously affecting each other, during and across school years. Teacher retention affects school climate; school climate affects teachers' retention decisions; this pattern continues across school years. Figure 1 illustrates how the relationship between teacher retention and student perceptions of school climate is conceived in this study. As students graduate or leave a school for other reasons, the collective student perceptions of school climate will naturally change. Similarly, although teachers can leave schools throughout the year, teacher

staffing changes often occur in the summer before the start of a new school year, which of course also coincides with the largest changes in student body composition.

Figure 1



Thus, in addition to looking at this relationship in a single school year, I conceptualize this relationship across several school years because a single year of retention data might not show the whole picture at a school. Holme et al. (2018) argue "single-year measures of turnover can conceal deeper, underlying chronic staffing problems" (p. 63) and therefore, they defined different types of turnover, including longitudinal measures of turnover. For example, they maintain chronic instability (schools with high teacher turnover year after year) and cumulative instability (schools where a large percent of the faculty turns over across a few years). In different ways, either of these can be disruptive for schools (Holme et al., 2018).

Allensworth et al. (2009) examined the relationship between school climate and teacher retention, using school climate surveys to predict teacher retention in the following two school years. They hypothesized the relationship between school climate and teacher retention may be cyclical; schools that have negative school climate are not able to retain teachers which makes it even more difficult to improve school climate and therefore begin retaining teachers. Marinell and Coca (2013), using teacher surveys that asked teachers about the school climate and their intentions for the following school year and interviews with teachers from their four case study sites, also found some evidence of this cycle in New York City (NYC) middle schools:

> Not surprisingly, our findings suggest that a challenging school climate may increase teacher turnover and that a constant churning of teachers may, in turn, make the school climate all the more challenging. Perhaps this is most evident around the issue of school discipline. (p. 32)

Furthermore, teachers at schools with high rates of turnover believed students did not respect or trust new teachers which they thought further exacerbated student discipline problems (Marinell & Coca, 2013). However, students' views were not included in the study, so researchers were not able to confirm students felt a lack of respect or trust for their new teachers.

Because many aspects of school climate are relationship-driven, it seems likely that only teacher retention can provide the continuity of relationships (both teacher-teacher and student-teacher) that is imperative for schools to improve their climate. However, without an improved school climate, it can be difficult for schools

to retain teachers because teachers are more likely to leave a school with a negative school climate than a positive school climate (Guin, 2004; Thapa et al., 2013). This teacher turnover, in turn, makes it even more difficult to improve school climate the following year, and the cycle continues.

Teacher turnover can disrupt relationships between students and teachers which can directly influence how students view school climate, especially measures of student-teacher relationships. As teachers come and go, this "repeated turnover thwarts the kind of continuity needed to build sustained, trustful relationships among teachers, students, and families" (Simon & Johnson, 2015, p. 5). Teacher turnover can affect other teachers at the school, not just by disrupting professional relationships, but also by creating extra work for the teachers who remain at the school as they have to mentor the replacement teachers and try to maintain continuity in curriculum and programs at the school (Guin, 2004). In their aforementioned study of NYC middle schools, Marinell and Coca (2013) found high rates of cumulative teacher turnover[1] can:

> make it difficult for principals, and for teachers who do not leave their schools, to establish organizational norms and a shared vision for their schools' teaching and learning environment. Furthermore, this turnover may compromise the continuity of the relationships between middle school teachers and administrators, students, parents, and the staff at organizations that partner with middle schools (p. 8).

[1] Specifically, they found 27% of middle school teachers in NYC left their school placement within the first year, 55% in the first three years, and 66% within the first five years.

This churn of teachers can make it difficult to improve any issues at the school, as schools need to focus time and resources on acclimating new teachers to the school and to any existing plans for improvement. As one veteran teacher in a NYC middle school describes, "'It's hard to turn around a bad school when you constantly have to improve new staff. It's very difficult'" (Marinell & Coca, 2013, p. 33-34).

Teacher turnover can also disrupt the instructional program at a school (Guin, 2004). High turnover rates at schools also contribute to changing teaching assignments and larger class sizes, both of which may also contribute to a cycle of high teacher turnover (Marinell & Coca, 2013). These added strains on teachers' limited time can leave less time for the teachers who remain at the school to invest in relationships with their students, improve their teaching, and complete professional development that could improve their classroom environment. Similarly, administrators must spend time and money to replace teachers who leave their school, directing resources away from other aspects of the school (Marinell & Coca, 2013).

These factors can lead to teacher turnover becoming disruptive to many aspects of school life, including school climate, beyond the individual classrooms affected by teacher turnover. In fact, even when controlling for teacher quality, Ronfeldt et al. (2013) found higher rates of teacher turnover in a grade-level team had a negative effect on student achievement even for the students of teachers who stayed compared to years with lower rates of teacher turnover. They argue, beyond the effects to individual classrooms or students of individual teachers, teacher turnover, particularly high rates of turnover, can be more broadly disruptive to the school:

> Turnover, however, may have a broader organizational influence that reaches beyond leaving teachers, replacement teachers, and their students. Where turnover is considered to have a disruptive organizational influence, all members of a school community are vulnerable, including staying teachers and their students. (p. 7)

I theorize teacher turnover also has a disruptive effect on student perceptions of school climate. That is, given these many aspects of schooling that are disrupted by teacher turnover, I believe teacher turnover can affect student perceptions of school climate beyond individual classrooms but at the school-level.

Clarification Dimensions vs. Factors

Both dimension and factor are used to refer to discrete aspects of school climate (ex. student-teacher relationships). While these terms are related, they are not used interchangeably in the literature or this paper. Dimensions are used to delineate discrete aspects of school climate and are often theoretical. Factors serve to reduce the available data and measure or approximate aspects of school climate. Dimensions differ from factors in that dimensions may include parts of school climate that the researchers are unable to measure. Factors generally refer to a group of survey questions (i.e. items) that are related to each other. Therefore, I use factor to refer to a group of questions a study is using to measure smaller pieces of the overall school climate (i.e., I use the term to refer to the results of factor analysis in analyzing a school climate survey). I use dimension more broadly to refer to how studies are defining different aspects of school climate.

Overview of Paper

In chapter two, I examine how school climate is defined in the literature including which dimensions of school climate are included in studies and how those dimensions are defined. I also include how I define school climate in this study. Next, I examine the definition of working conditions, and how working conditions are similar to and different from school climate. Then I explore the relationship between teacher retention and school climate and between teacher retention and working conditions. Finally, I discuss how perceptions of school climate vary by respondent (teachers, students, and parents) and by student race, which I revisit in the methods section. In chapter three, first I discuss the research questions and the data sources analyzed in this study. Next, I outline the measures of school climate, including the factor analysis of questions related to student-teacher relationships, and safety, order, and discipline, and the models I used to answer the research questions. Chapter four outlines the results of this study. Chapter five is a discussion of the implications and limitations of those results.

Chapter 2: Review of the Literature

School climate is often undefined, ill-defined, or defined by virtue of the dimensions of school climate included in the study. The lack of consistency in the definition for school climate can cause confusion in studies and makes comparisons across the literature difficult. Furthermore, teacher retention studies often examine the working conditions that are related to teacher attrition, but many of the components of working conditions overlap with the components of school climate such as school safety, order, and discipline and teacher relationships. In this chapter, I first explore how school climate is defined in studies examining school climate, the common dimensions of school climate, and the differences between school climate and school culture. Next, I explain how I am defining school climate and the dimensions I include for this study. Then I give an overview of common school climate survey design including the NYC School Survey. Next, I examine similarities between school climate and working conditions that are related to teacher retention in the literature. Finally, I explore how average perceptions of school climate can vary by respondent groups (e.g., teachers, students) and by the race and gender of student respondents.

This literature review does not aim to be exhaustive, but is instead a relevant review of research to help guide this study (see Maxwell, 2006 for more on relevant literature reviews). More specifically, while this study examines the relationship between student perceptions of school climate and teacher retention, this literature review focuses on school climate more broadly, examining how school climate is defined in the literature, how studies distinguish between different dimensions of school climate, and the similarities and differences between school climate and

working conditions. Although not exhaustive, after reviewing more than 30 studies, I felt I reached conceptual saturation and understood how school climate was conceptualized and measured in the field. Both school climate and teacher retention are popular areas of study, and this review seeks to situate itself in both areas of research.

Although this study seeks to answer the question of how teacher retention is related to *student* perceptions of school climate, I did not find many studies that addressed that relationship. I did find a small number of studies and literature reviews that examined the relationship between teacher retention and school climate (e.g., Cohen, McCabe, et al., 2009; Cohen, Pickeral, et al. 2009; Dahlkamp et al., 2017; Guin, 2004; Kraft et al. 2016; Marinell & Coca, 2013; Suarez & Wright, 2019; Thapa, 2013; Thapa et al., 2013). Most of these studies used either teacher perceptions of school climate or multiple respondent groups (i.e. teachers, students, and/or parents/guardians) in their analysis. Two of these studies, Kraft et al. (2016) and Mitchell et al. (2010), are of particular interest to this study, as they specifically examine student perceptions of school climate and teacher retention, but, as I explained in the previous chapter, both differ from this study.

Because of the small number of studies examining both teacher retention and school climate, I decided to expand my search to include studies that explored school climate beyond its relationship to teacher retention. Doing this enabled me to examine both formal definitions of school climate and operational definitions through the dimensions included in studies. This included reviewing dimensions of school climate in 34 studies to understand how researchers are sorting aspects of school climate into

dimensions. While this is not an exhaustive list of studies that include school climate, patterns began to emerge and I feel that these studies are representative of how scholars are defining school climate. Expanding my search also allowed me to more fully consider how I will be defining school climate in this study and which questions I would include in the student-teacher relationship and safety, order, and discipline dimensions.

There is also substantial literature that examines the relationship between teacher retention and working conditions. By reviewing the definitions and dimensions of school climate, I was able to then find similarities between school climate and working conditions. Given the substantial overlap in the definitions of school climate and working conditions, I also include a brief overview of the relationship between working conditions and teacher retention. Working conditions, however, are made up of perceptions of the adult employees in schools, so while these studies situate my research, they do not directly address how students are perceiving their school climates.

As is common in the field, almost all of the studies that measured overall school climate[2] in this review were quantitative studies. Most of these studies employed surveys with Likert-scale responses to measure perceptions of school climate from teachers or students. These findings are consistent with other reviews of the field (e.g., Hoy, 1990, Schoen & Teddlie, 2008) and I will discuss common school

[2] While qualitative research is often used to study aspects of school climate (e.g. school safety, teacher relationships), quantitative research is frequently used in studies of overall school climate.

climate surveys later in this chapter. In addition to the quantitative studies, there are six mixed method studies included in this review that measured some aspects of school climate; all of these studies used surveys and quantitative methods to analyze the data as one part of the study. Although most of the studies were quantitative, I did not restrict my review to quantitative studies and I included the qualitative aspects of the mixed methods study in my review.

Varying Definitions of School Climate

Although school climate research began in the 1960's (Wang & Degol, 2016), there is no agreed upon definition of school climate in the literature (Cohen, McCabe et al., 2009; Thapa, 2013; Wang & Degol, 2016) even as many studies aim to measure it. Anderson (1982) argues that there is a consensus among researchers that school climate exists, but that its definition is elusive. She refers to school climate as an "elusive Beast" (p. 371) or, better said, one of three beasts: the albatross, the unicorn, or the phoenix. Anderson (1982) argues some view school climate research as an undesirable area of research (the albatross), others as a unicorn—desirable but "unattainable," (p. 371), and still others as an area with great promise, both attainable and desirable despite earlier failures (the phoenix). More than just vivid description, employing mythological creatures to emphasize the elusive nature of school climate helps to underscore how difficult it is to define. Similarly, Hoy and Hannum (1997) identify two metaphors commonly used in school climate frameworks: health (from good to ailing) or personality (from open to closed) of the school. Metaphors such as these can be helpful in conceptualizing school climate.

In addition to metaphors and explicit definitions, other studies rely on implicit definitions derived from the dimensions of school climate they decide to include, and still others use the term with no clear definition. As Hoy and Hannum (1997) explain, "School climate… is a global construct that researchers often use loosely to group together studies of school environment, learning environment, learning climate, sense of community, leadership, academic climate, and social climate. Therein lies its strength and its weakness" (p. 295). Varying definitions, including differences in which dimensions of school climate are included, cause confusion in the field (Wang & Degol, 2016). The same problem is observed in legislative documents and state standards; for example, Cohen, McCabe, et al. (2009) found thirty-six states used "vague, meaningless definitions of school climate" (p. 181). Schools are asked to improve school climate, but no clear definition of school climate exists in many jurisdictions, making it nearly impossible to measure whether or not school climate has improved.

Common Elements in School Climate Definitions

Despite these difficulties and absence of a universal definition of school climate, there are some commonalities among the varying definitions. First, researchers seem to agree that school climate is a broad concept that includes many facets of the school, although which ones vary from study to study. For example, Jain et al. (2015) emphasize the broad-ranging nature of school climate as they "define school climate broadly as encompassing both the physical and social aspects of the learning and teaching environment" (p. 3). Similarly, Hoy (1990) emphasizes the broad, multifaceted nature of school climate:

> Following the lead of industrial and social psychologists, *school climate* is a broad term that refers to teachers' perceptions of their general work environment; it is influenced by the formal organization, informal organization, personalities of participants, and the leadership of the school. (p. 151)

Although the specific aspects included vary, both of these definitions include broad and wide-ranging facets of the school in their definition of school climate, which is common in much of the school climate literature. From the school building to relationships, these discrete characteristics "affect and help to define the broad concept of school climate" (Marshall, 2004, p. 1). The decision of which dimensions of school climate to include (or exclude) in a school climate study, as discussed in a later section, can give more detail to a broad definitions of school climate.

Relatedly, school climate seems to broadly be used to define how a school feels to the different school community members. Definitions are broad and ambiguous perhaps in part because which aspects of school climate are important may vary by school community. School climate as teachers' "general work environment" (Hoy, 1990, p. 151) will have different aspects that are important from school to school as groups of teachers might prioritize different social and physical aspects of their school. While certain aspects of school climate, such as the relationships between community members and the physical space the school occupies, are common in many studies, the relative importance to the community may vary between schools. For example, if you are in an adequate but not new building, you may not notice the physical environment much in your day-to-day school life.

However, if you are in a building that is substandard, without potable water or working heat for example, the physical building may become a focus of your school experience.

Another commonality among the different school climate definitions is the focus on the collective, whether collective experiences or collective perceptions of the school. Cohen, McCabe et al. (2009) argue that “each person contributes” to the school climate but “it is a group phenomenon that is larger than any one person’s experience” (p. 182). Similarly, Mitchell et al. (2010) define school climate as "the shared beliefs, values, and attitudes that shape interactions between the students, teachers, and administrators" (p. 272). The focus on the collective or shared experience, values, or perceptions is common in many studies. However, measuring a group experience can be problematic, as discussed later in this chapter, as different groups of students or teachers may perceive the same phenomenon differently or may have different experiences and relationships due to their group status.

Amongst the varying definitions of school climate, two frequently cited definitions are from The National School Climate Center (NSCC) (e.g., Bryson & Childs, 2018; Smith et al., 2014; Thapa, et al., 2013) and Cohen, McCabe et al. (2009) (e.g., Bryson & Childs, 2018; Scales et al., 2020; Voight, 2015; Voight et al., 2015; Zullig et al., 2018; Zullig et al., 2011). Oddly both the NSCC and Cohen, McCabe et al. (2009) use the exact same definition of school climate without referencing each other or another source, making the origination of this definition uncertain. However, both sources are commonly cited, and their combined citations

make this definition widely used in the more contemporary school climate literature base:

> school climate as the quality and character of school life. School climate is based on patterns of students', parents' and school personnel's experience of school life; it also reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures (Cohen, McCabe et al., 2009, p. 182; NSCC, n.d.).

Although the origins of this definition are unclear, the focus on patterns of experiences across groups (e.g., parents, teachers, students) in the school community and across domains emphasizes the broad concept that school climate encapsulates which is common in school climate literature.

Common Dimensions of School Climate

Much as there is no agreed upon definition of school climate, the dimensions of school climate that are measured also vary from study to study. As noted above, the lack of uniformity and, in some instances, transparency in dimensions in the field can make comparing studies difficult and may even lead to contradictory results as school climate is defined and measured differently between studies. I reviewed 34 studies[3] and found amongst the variation in dimensions between studies, there are some dimensions that are commonly measured as a part of school climate, including [perceptions of] relationships between members of the school community, leadership,

[3] The 34 studies listed in Table 1 divided school climate into multiple dimensions. I did not include studies that by design only measured some aspects of school climate. Articles that only measured school climate broadly and did not examine individual dimensions of school climate are also not included in this list. Although this list is not exhaustive, I believe it is representative of the larger literature base.

the physical environment, a measure of safety, order, and discipline, and measures of the academic environment. In this section, I will discuss how studies define these dimensions. A full list of dimensions for these 34 studies is included in Table 1.

Table 1 Review of Dimensions of School Climate

	Student-Teacher Relationships	Student-Student Relationships	Teaching & Learning	Academic Press/ Emphasis/ Support	Safety, Order, & Discipline	School Physical Environment	Parent-School Relationships	Leadership	Teacher-Teacher Relationships/ Professionalism/ Affiliation	Other
Anderson (1982)										Ecology, milieu, social system, culture
Bryson & Childs (2018)	X				X					Clarity/Fairness of Rules, Respect of Differences, School Connectedness
Cohen, McCabe, Michelli, & Pickeral (2009)	X(relationships)	X(relationships	X		X	X			X(relationships	
Creemers & Reezigt (1999)	X(relationships)	X(relationships)				X (broken into building and upkeep)	X(relationships)		X(relationships	culture
Dahlkamp et al. (2017)				X				X	X	
DeAngelis & Presley (2011)					X		X	X	X	
De Pedro et al. (2016)	X				X					Meaningful participation, School Connectedness
Esposito (1999)	X			X	X (Combined with Maintenance)	Maintenance (combined with security)	X(combined with community)	X		Community Relationships
Gage et al. (2016)	X	X			X					Adult support at home; student aggression toward others

	Student-Teacher Relationships	Student-Student Relationships	Teaching & Learning	Academic Press/ Emphasis/ Support	Safety, Order, & Discipline	School Physical Environment	Parent-School Relationships	Leadership	Teacher-Teacher Relationships/ Professionalism/ Affiliation	Other
Grayson & Alvarez (2008)	X	X	X	X	X (Combined with Maintenance)	Maintenance (combined with security)	X(combined with community)	X		Guidance, Student Activities, Community Relationships
Griffith (1999)	X		X		X	X	X			Helpfulness of School Staff, Student Satisfaction (seems outside of climate)
Hoy (1990)				X				X		Morale, Integrity, Available Materials
Hoy & Hannum (1997)				X				X (broken into collegial and principal influence)	X	Institutional Integrity, Available Materials
Jain, Cohen, Huang, Hanson, & Austin (2015)	X		X		X					Norms and standards
Marshall (2004)	X	X		X	X		X			Fairness, Respect, Trust, High Morale, opportunity for input, continuous academic and social growth, cohesiveness, school renewal, caring, Available Materials
Mehta, Atkins, & Frazier (2013)	X		X					X		Community Relationships, Available Materials
Mitchell, Bradshaw, &	X	X	X (academic progr am)	X	X	X	X	X	X	Fairness, Sharing of Resources,

	Student-Teacher Relationships	Student-Student Relationships	Teaching & Learning	Academic Press/ Emphasis/ Support	Safety, Order, & Discipline	School Physical Environment	Parent-School Relationships	Leadership	Teacher-Teacher Relationships/ Professionalism/ Affiliation	Other
Leaf (2010)										Integrity, Available Materials
National School Climate Center	X	X	X		X	X		X		Social Media, School Connectedness
Ramsey et al. (2016)				X	X					School Connectedness, Parental Involvement
Rhodes, Camic, Milburn, & Lowe (2009)	X	X	X	X	X			X (broken into collegial and principal influence)	X	Institutional Integrity, Consistency and Clarity of Rules, student decision-making, Support for Cultural Pluralism, Available Materials
Rudasill et al. (2018)	X(relationships)	X(relationships)			X				X(relationships	Shared beliefs and values
Schoen & Teddlie (2008)			X					X(as part of organizational structure)	X	Student Centered Focus, Organizational Structure
Shukla et al. (2016)	X			X	X					Student willingness to seek help, affective and cognitive engagement, bullying, victimization
Smith, Connolly, & Pryseski (2014)	X	X	X		X	X		X	X	School Connectedness
Suarez & Wright (2019)									X	Truancy, School Influence, Socio-emotional, Classroom Duties, Curriculum Influence, Job

	Student-Teacher Relationships	Student-Student Relationships	Teaching & Learning	Academic Press/ Emphasis/ Support	Safety, Order, & Discipline	School Physical Environment	Parent-School Relationships	Leadership	Teacher-Teacher Relationships/ Professionalism/ Affiliation	Other
										interference
Thapa (2013)	X(relationships)	X(relationships)	X		X		X(relationships)		X(relationships	Institutional Environment, School Improvement Process
Thapa, Cohen, Guffey, & Higgins-D'Alessandro (2013)	X		X		X	X				School Improvement Process
Uline, Wolsey, Tschannen-Moran, & Lin (2010)				X		X (separate from climate)		X	X	Community Relationships
Wang & Degol (2016)			X		X	X		X	X	Community Relationships, Available Materials
Wang, Selman, Dishion, & Stormshak (2010)	X	X		X	X					
Way, Reddy, & Rhodes (2007)	X	X			X					Autonomy in Classroom
Zullig, Huebner, & Patton (2011)	X	X		X	X	X				Academic Satisfaction, Perceived Exclusion, School Connectedness
Zullig, Koopman, Patton, & Ubbes (2010)	X	X		X	X	X				Academic Satisfaction, Perceived Exclusion, School Connectedness
Zullig, Ward, Huebner, & Daily (2018)	X	X		X	X	X	X			Academic Satisfaction, Student Engagement, Perceived Exclusio

	Student-Teacher Relationships	Student-Student Relationships	Teaching & Learning	Academic Press/ Emphasis/ Support	Safety, Order, & Discipline	School Physical Environment	Parent-School Relationships	Leadership	Teacher-Teacher Relationships/ Professionalism/ Affiliation	Other
										n, School Connectedness

Defining Relationship Dimensions of School Climate

There is a general consensus in the literature that school climate includes the social environment, including relationships between teachers and teachers (sometimes called collegiality or professional community), teachers and students, students and students, teachers and administrators, the school and parents, and the school and the community. To varying degrees, empirical studies attempt to measure the quality of these relationships. Most prominently, student-teacher relationships were included in 24 out of 34 of the reviewed articles (see Table 1), making it the second most included dimension (safety, order, and discipline is included in 25 articles). This is perhaps unsurprising because, in addition to the importance of student-teacher relationships, this dimension can be included on both teacher and student surveys, allowing studies focused on either student or teacher perceptions of school climate to include this dimension. Although these relationships can be measured separately, some studies measure them in small groups—for example combining parent and community relationships with schools (e.g., Esposito, 1999; Grayson & Alvarez, 2008)— or pool them together to form one relationship dimension (e.g., Cohen, McCabe, et al. 2009).

Relationships are sometimes included in other related dimensions of school climate instead of being measured separately. For example, the relationships between administrators and teachers are often included as part of a school leadership

dimension (as discussed in detail in the next section). Similarly, teacher-teacher relationships are often included in a wider measure of teacher behavior which measures several overlapping facets of teachers' professional life. For example, in their Professional Teacher Behavior factor Dahlkamp et al. (2017) ask teachers about their cooperation and their "respect for colleague competence" (p. 364). Wang and Degol (2016) include teacher relationships in a sub-dimension they label "Quality of relationships" which is made up of trust, affiliation, and interpersonal relationships between teachers, other staff, and students. Similarly, teacher relationships are included in a broader relationships dimension in several studies (e.g., Cohen, McCabe et al., 2009; Creemers & Reezigt, 1999; Rudasill et al., 2018; Thapa, 2013). Studies that used the Organizational Health Inventory for Middle Schools called this dimension teacher affiliation which measures teacher engagement and commitment to the students and their colleagues (Hoy & Hannum, 1997; Mitchell et al., 2010; Rhodes et al., 2009). Teacher affiliation also tries to capture teacher collegiality and teacher to teacher interactions (Hoy & Hannum, 1997).

Defining School Leadership

Another common dimension, school leadership, appears in 14 of the 34 studies. The school leadership dimension is usually a measure of teacher perceptions of school administrators, with a focus on teacher perceptions of how the school principal performs several tasks at school. In some studies, school leadership dimensions ask teachers how supportive they feel their principal is. The leadership dimension can also include whether faculty input is valued when administrators are making decisions or if power is shared by administrators with teachers; this dimension is commonly called collegial leadership. Some studies also include a

principal's ability to secure resources for teachers and influence their superiors in support of their teachers as part of a dimension measuring school leadership (e.g., Hoy & Hannum, 1997; Rhodes et al., 2009). Some studies divide questions about school leadership into more than one dimension. For example, Rhodes et al. (2009) and Hoy and Hannum (1997) have collegial leadership measured separately from principal influence.

Defining Academic Environment

Many studies include a measure of the academic environment of the school. In some studies, this is conceptualized as the academic press or academic emphasis at the school. This dimension tends to measure the way students or teachers perceive the importance of academic success or hard work by members of the school community. For examples, Rhodes et al. (2009) defined academic press as how focused students and school staff were on "academic excellence" using questions such as "'Students respect others who get good grades'" (p. 716). Researchers include other aspects of the academic environment in their school climate studies. For example, some ask about the academic support available to students; others include the academic program or the curriculum. Professional development is sometimes included in an academic dimension (e.g., Wang & Degol, 2016), but others include it as a part of the teacher collegiality or professional community (e.g., Schoen & Teddlie, 2008). This is an example of how overlapping concepts or dimensions between studies can make it difficult to assess results from one study to another.

Defining Safety, Order, and Discipline

Safety, order, and discipline, included in 25 of the 34 reviewed studies, is one of the most commonly included dimensions in school climate studies. Safety can be

defined as both the physical safety and socio-emotional safety of school community members (e.g., Cohen, McCabe et al., 2009; NSCC, n.d.). The application of school rules, that is whether they are clear and consistently applied to students, is another aspect of school climate often included in the safety, order, and discipline dimension (e.g., Rhodes et al., 2009; Shukla et al., 2016; Zullig et al., 2010). Perhaps one of the reasons this dimension is included in so many studies of school climate is that it is experienced by students, teachers, and administrators and is a concern for parents. This dimension is commonly measured in both student and teacher surveys, although students may perceive the safety, order, and discipline of the school differently than adults in the building. Instances of bullying are sometimes included in this dimension (e.g., Cohen, McCabe, et al., 2009; Jain et al., 2014), which, given the recent media and legislative focus on bullying in schools, may also contribute to the prevalence of safety, order, and discipline in school climate research.

Defining Physical Environment

A dimension for the physical environment is included in 13 of the 34 studies and can include several aspects of the school building and grounds. For example, Creemers and Reezigt (1999) include two dimensions of the physical environment, making the distinction between the school buildings' physical condition and the upkeep of the buildings. The physical environment can include many different aspects of the school from athletic fields to furniture or classroom layout. For example, Uline et al. (2010) found classroom flexibility, especially classroom furniture, to be an important aspect of the physical environment to both teachers and students. The physical environment is sometimes seen as related to safety. For example, Esposito

(1999) and Grayson and Alvarez (2008) combine the maintenance of the school and school safety into one dimension.

School Climate Versus School Culture

While some studies include school culture as a dimension of school climate (e.g., Anderson, 1982; Creemers & Reezigt, 1999), many more do not (see Table 1 for details). Much like school climate, school culture is often ambiguously defined and at times used almost interchangeably with school climate (Hoy, 1990; Schoen & Teddlie, 2008). Particularly in studies looking to improve student or teacher outcomes (ex. student test scores, student behavior, teacher retention) by improving other aspects of the school, there is not always a clear distinction between school climate and school culture. However, several scholars argue for establishing clarity between the different, if overlapping, theoretical constructs, and this section will give a brief overview of some of the similarities, differences, and inconsistencies between how school climate and school culture are defined, measured, and used in the literature.

When exploring the similarities and differences between school climate and school culture, Hoy (1990) argues:

> Although climate and culture both refer to the general atmosphere or feel of the school, they evolve from different perspectives, use different research strategies, and concentrate on different organizational aspects—perceptions of behavior (climate) or shared values and ideologies (culture) (p. 163).

Similarly, both Van Houtte (2005) and Schoen and Teddlie (2008) argue that school climate and school culture are related concepts, but they disagree on how to conceptualize that relationship. After reviewing the literature, Schoen and Teddlie

(2008) conceptualize school culture as the broader construct and school climate as the espoused beliefs, which can include participants' perceptions, of school culture; "It seemed probable that psychometric surveys of perceptions frequently used to study school climate are ways of eliciting espoused beliefs" (p. 139). Schoen and Teddlie (2008) assert that although there is overlap in the definitions of school climate and school culture, definitions of climate are more "specific and explicit" compared to definitions of culture which are "more general and holistic" (p. 133). Contrarily, Van Houtte (2005) argues school climate is a broader term than school culture and encompasses many different dimensions of schools, including school culture.

Additionally, Van Houtte (2005) asserts that school climate focuses on the shared perceptions of different aspects of the school whereas school culture is the shared beliefs or assumptions in a school community. He argues that while culture measures what the individual believes, climate measures what the individual perceive their colleagues or peers to believe (Van Houtte, 2005), though many school climate survey questions also include questions about individual perceptions of their own relationships, etc. (see the review of surveys in Appendix C for examples). Hoy (1990) also argues school climate includes perceptions of school community members whereas culture is "a system of shared orientations that hold a unit together and give it a distinct identity" (p. 157).

However, other scholars do not always make the distinction between shared perceptions and shared beliefs clear in definitions of school climate. For example, Wang and Degol (2016) assert:

> many researchers conceptualize school climate as the shared beliefs, values, and attitudes that shape interactions between students and adults and set parameters of acceptable behavior and norms for the school (Brookover et al. 1978; Emmons et al. 1996; Esposito 1999; Kuperminc et al. 1997)" (p. 316).

Wang and Degol's definition of school climate may be an example of the lack of clarity in definitions in the field more than of theoretical differences. For example, Esposito (1999), citing Kelley et al. (1986), defines school climate as "*the perceptions* [emphasis added] of the physical and psychological school environment" (p. 366), focusing on the perceptions of the community members, not their shared beliefs as in the definition in Wang and Degol (2016). Similarly, Mitchell et al. (2010) define school climate as the shared beliefs, values, and attitudes rather than the perceptions of the school community, but their study uses surveys that gather the perceptions of teachers and students of different dimensions of the school to measure school climate, further muddying the waters in how school climate is defined and measured. While these studies are not focused on the differences between school climate and school culture, Wang and Degol's and Mitchell and colleagues' definitions illustrate the ambiguity and confusion present in the field.

Perhaps due to the differences in definitions, the methods used to study school climate versus school culture also tend to vary. School climate is often studied using surveys and the data is analyzed using quantitative methods (Hoy, 1990; Schoen & Teddlie, 2008) as is discussed in detail in the methods section. The studies in this review overwhelmingly examine school climate using surveys and quantitative methods. On the other hand, school culture is more often studied with qualitative

methodology (Hoy, 1990; Schoen & Teddlie, 2008). School culture research has "intellectual roots in anthropology and sociology" and is often the dependent variable in studies (Hoy, 1990, p. 162).

School Climate in this Study

Consistent with the literature, I am defining school climate broadly as the collective perceptions of school community members of the both the physical and social environment of the school. As mentioned previously, since I examined the relationship between teacher retention and students' perceptions of school climate, I centered the aspects of climate where students have first-hand knowledge but are also cited by teachers as influential in their decisions to stay at or leave a school (I will discuss in detail the influences of working conditions and school climate on teacher retention in the next section). Therefore, I examined student-teacher relationships and safety, order, and discipline.

Although teachers and students exist in the same buildings and are experiencing the same physical environment, their perceptions of school climate often differ as discussed later in this chapter. Teachers and students may not be privy to all the same aspects of the school because they may participate in different school subcultures. For example, students may not have intimate knowledge of how the principal treats teachers, while teachers may not fully understand student peer relationships at a school. Because I am examining the relationship between teacher retention and students' perceptions of school climate, in addition to using a measure of the overall school climate, I wanted to examine dimensions of school climate that both teachers and students experience directly (student-teacher relationships and

safety, order, and discipline). Although their perceptions as to what makes for a positive relationship might differ, both students and teachers have personal knowledge of student-teacher relationships. Similarly, safety, order and discipline are experienced by both teachers and students although from different viewpoints. In addition to students having first-hand experience with student-teacher relationships and safety, order, and discipline, these dimensions are also related to teacher retention, as I discuss in detail in a later section.

Although both teachers and students experience the physical school building, I did not focus on that aspect of school climate for a couple of reasons. First, and most importantly, making big changes to the physical school building is usually outside of the influence of teachers, building administrators, students, or parents, unlike student-teacher relationships and safety, order, and discipline. Building projects are expensive and generally controlled at the district-level or even at the state-level. Secondly, while building cleanliness might be within the control of the school building administrators, Uline et al. (2010) found students had difficulty differentiating between parts of the building that were in need of maintenance from those that were dirty. For these reasons, although the physical building is an important aspect of school climate both students and teachers experience, I did not focus on it in this study.

Measuring School Climate

While school climate is an elusive concept (Anderson, 1982), school districts and researchers want to be able to measure it. Although definitions and underlying theory vary, school climate surveys are abundant, perhaps due to the positive student and teacher outcomes linked to a positive school climate. School districts are often

interested in measuring school climate so they can improve it (and, in turn, hopefully improve student outcomes), and surveys are a popular way to measure school climate. Educational researchers are interested in improving surveys to try to more accurately measure overall school climate and its dimensions.

School climate is most commonly measured using surveys distributed to a subset of students, teachers, administrators, and parents (Hoy, 1990; Roach & Kratochwill, 2004; Schoen & Teddlie, 2008); many surveys use Likert-type items (Ramelow et al., 2015; Wang & Degol, 2016). In a review of almost 300 empirical school climate studies, Wang and Degol (2016) found over 90% measured school climate using self-reported surveys, which are relatively inexpensive and are easy to administer to many participants. School climate is also measured through interviews, focus groups, and direct observations by researchers (Wang & Degol, 2016). Student school climate surveys are administered to students from early elementary school (where they are often read aloud to the students) through high school. However, even when read aloud, teachers noticed the younger elementary students struggled to complete the survey and recommended against using their surveys (Bear et al., 2011).

While surveys aim to assess how students perceive different aspects of school climate such as school safety, interpersonal relationships, and the academic environment, they are designed with varying attention to survey construction and different degrees of reliability and validity (Ramelow et al., 2015). This section will discuss the design and implementation of common school climate surveys in K-12 schools in the United States, followed by an in-depth discussion of the NYC School Survey.

Review of Common School Climate Surveys

Although many educators, policymakers, and researchers want to measure school climate, "there is little consensus… regarding the definitions and measurement of school climate" (Bradshaw et al., 2014, p. 594). In reviews of school climate surveys, researchers found that, although the theoretical framings and constructs measured might vary, there is also substantial overlap between the surveys (Kohl & Steffgen, 2013; Olsen et al., 2018). School climate surveys, whether designed for individual school districts or to be used more broadly across the country, are generally designed to measure separate dimensions of school climate in hopes of providing a fuller picture of areas of strength and improvement at schools. Table 2 provides a detailed look at some of the commonly[4] used student versions of school climate surveys. Although the table is not exhaustive, it does include a group of student school climate surveys that I believe is representative of commonly used surveys.

As Table 2 shows, there are considerable differences in the length of the survey (from 29-106 items), with the NYC School Survey on the longer side, containing 61 to 66 items depending on the students' grade level. All but one of the surveys has a teacher or staff version and most of the surveys include a parent version. The NYC School Survey has a student, teacher, and parent version. There is substantial overlap in the types of questions each school climate survey asks, but the names of the dimensions/factors (and questions included in each dimension or factor)

[4] Table 2 includes all student surveys that were included in multiple articles reviewed for this paper except the Organizational Health Index (OHI), which does not have a student version.

vary from survey to survey. The types of questions included in the factor analysis for the two dimensions of school climate, student-teacher relationships and safety, order, and discipline, are discussed in detail in the methods chapter and Appendix C.

Table 2 Select Student School Climate Surveys

Survey Instrument	**# of Items**	**Grade Levels**	**Factors/Dimensions**	**Other Survey Participants**
California School Climate, Health, and Learning Survey (CAL-SCHLS)[1]	106	5-12	Academic Rigor and Supports; Respectful Relationships and Cultural Sensitivity; Relevance of Classroom Lessons; Student Learning Motivation and Classroom Involvement; Discipline and Enforcement of Rules; Quality of Facilities Maintenance	Staff; Parents
Classroom Environment Scale (CES)[2]	90	6-12	Relationship (Involvement; Affiliation; Teacher Support); Personal Growth/Goal Orientation (Task Orientation; Competition; Order and Organization; Rule Clarity); System Maintenance and Change (Teacher Control; Innovation)	None
Comprehensive School Climate Inventory (CSCI)[3]	30-56	2-12	Physical Appearance; Faculty Relations; Student Interactions; Leadership and Decision-Making; Discipline and Management Environment; Learning, Instruction and Assessment; Attitude and Culture; Community Relations	Teachers; Parent and Community
Consortium of Chicago School Research (CCSR)[4]	Unavailable	4-12	Effective Leaders; Collaborative Teachers; Involved Families; Supportive Environment; Ambitious Instruction	Teachers
Maryland Safe and Supportive Schools (MDS3)[5]	168	9-12	Safety; Bullying and Aggression; Substance Use; Connection to Teachers; Student Connectedness; Academic Engagement; School Connectedness; Parent Engagement; Equity; Rules and Consequences; Physical Comfort; Support; Disorder	Staff; Parents
Meriden School Climate Survey[6]	38	3-12	Adult Support at School; School Safety; Respect for Differences; Adult Support at Home; Academic Support at Home; Peer Support; Aggression Toward Others	Staff; Parents
Modified Delaware School Climate Survey Student (M-DSCS-S)[7]	29	3-12	Teacher-Student Relations; Student-Student Relations; Fairness of Rules; School Safety; Liking of School	Staff; Parents
NYC School Survey (Updated Version)[8]	61-66	6-12	Rigorous Instruction; Supportive Environment; Collaborative Teachers; Effective School Leaders; Strong Family-Community Ties; Trust	Teachers; Parents

School Climate Assessment Instrument (SCAI)[3]	30-79	2-12	Physical Appearance; Faculty Relations; Student Interactions; Leadership/Decisions; Discipline Environment; Learning/Assessment; Attitude and Culture; Community Relations	Staff; Parents
School Climate Measure (SCM)[9]	39	6-12	Positive Student-Teacher Relationships; School Connectedness; Academic Support; Order and Discipline; School Physical Environment; School Social Environment; Perceived Exclusions/Privilege; Academic Satisfaction	None
School Climate Survey (SCS) abbreviated version[10]	37	Unavailable	Fairness; Order and Discipline; Sharing of Resources; Student Interpersonal Relations; Student-Teacher relations; General School Climate	Staff; Parents

1. CalSCHLS (2020); Voight and Hanson (2012)
2. Booren et al. (2011)
3. Alliance for the Study of School Climate (2019)
4. UChicago Consortium on School Research (2020)
5. Bradshaw et al. (2014); National Center on Safe Supportive Learning Environments (2018)
6. Connecticut State Department of Education (2020); Gage et al. (2016)
7. American Institute of Research (2021); Bear et al. (2011)
8. NYC Department of Education (2020a)
9. Zullig et al. (2010); Zullig et al. (2014)
10. Kohl and Steffgen (2013); Voight and Hanson (2012)

School and Researcher Collaboration

With the variation in common school climate surveys, schools need to consider their definition of school climate and the underlying theory used in the survey design to ensure the survey aligns with what they are trying to measure (Roach & Kratochwill, 2004). Some states and local school districts have designed their own surveys to meet local needs and/or their own definition of school climate (Gage et al., 2016). Some surveys designed by local school districts, such as the original NYC School Survey, became almost a laundry list of questions because questions were added by different stakeholders without an overarching plan for the survey design (Merrill et al., 2018). Surveys can become too long and schools are not always clear on what they were trying to measure or if the survey is accomplishing their goals. Given these survey design issues, some school districts formed partnerships with

researchers to develop or redesign school climate surveys. These collaborations can work to balance a school district's desire for a survey that is comprehensive yet easy and fast to administer with creating a survey that meets reliability and validity standards (see Ding et al., 2011; Gage et al., 2016).

The Consortium on Chicago School Research Surveys

One of the most influential researcher and school collaborations is the work of the Consortium on Chicago School Research (CCSR) at the University of Chicago and the Chicago Public Schools. Chicago Public Schools underwent drastic structural changes in decision-making and reform efforts following the Chicago School Reform Act of 1988 (Bryk et al., 2010). This reform sought to decentralize decision-making and responsibility by shifting them from the central office to Local School Councils. In studying this reform effort, Bryk et al. (2010) identified five key organizational features (school leadership, parent-community-school ties, professional capacity, student-centered learning climate, and instructional guidance) they believed were essential for school improvement (as measured by standardized test scores and school attendance); researchers then set about measuring these five organizational features.

Cataloguing all the survey items used in Chicago public schools starting in 1990, Bryk et al. (2010) developed a survey that aligned with their updated conceptual framework. The survey versions (student, teacher, and principal) were designed to measure the five organization subsystems above and the 14 organizational indicators of the subsystems (e.g. inclusive principal leadership, teachers' ties to the community, teacher background, professional community, safety and order) outlined in their conceptual framework (Bryk et al., 2010). The CCSR

survey laid the groundwork for the early and current versions of NYC School Survey (Merrill et al., 2018; Merrill & Lafayette, 2018; Nathanson, McCormick, et al, 2013).

New York City School Surveys

This study uses the Redesigned NYC School Survey to measure school climate as part of a secondary analysis. This survey is the largest education census in the United States (Merrill et al., 2018). The NYC school district administers a survey yearly to all middle and high school students (grades 6-12), teachers, and parents. Although there have been some issues with the survey, as detailed below, recent iterations have strengthened the survey design and the survey remains widely used in educational research (ex. Davis & Warner, 2018; Goldkind & Farmer, 2013; Hamlin, 2020; Marinell & Coca, 2013). The NYC School Survey has had two main iterations (with small changes made to those surveys as needed). The survey design for the original NYC School Survey and the Redesigned NYC School Survey are covered in detail in this section.

Original New York City School Survey

The NYC School Survey, building on the research of the CCSR including drawing items from the CCSR survey, was first developed in 2005 and piloted in the spring of 2006 (Merrill et al., 2018; Nathanson, McCormick, et al, 2013). The district developed three versions of the survey—students, teachers, and parents—with input from a variety of stakeholders including students, parents, teachers, principals, and representatives from the teachers' union (Nathanson, Cole, et al., 2013). The original versions of the NYC School Survey became quite lengthy as stakeholders added

questions of interest to them without a coherent plan for the full survey (Merrill & Lafayette, 2018). This piecemeal approach to designing the survey may have contributed to issues researchers found in their analysis of the original survey, as discussed in the next section. Data collection began in the 2006-2007 school year and the scores from the School Survey were used as part of the school's annual accountability rating (Nathanson, Cole, et al., 2013). Although there is concern that including school climate surveys in accountability ratings could bias responses in hopes of getting more favorable school climate scores, Nathanson, Cole and colleagues (2013) believe bias is not a major concern with the NYC School Survey. They argue it is unlikely for three respondent groups (students, teachers, and parents) to all be biased, particularly so similarly biased. Furthermore, they found substantial within group variations which suggests the respondents are not primarily motivated by the accountability score (Nathanson, Cole, et al., 2013).

Analysis of Original School Survey

The original NYC School Surveys, piloted in 2006 and administered from 2007-2014, were designed to measure four dimensions of school climate: academic expectations, engagement, communication, and safety. However, after analysis, researchers discovered the surveys (student, teacher, and parent versions) did not capture four separate factors but rather one large factor (Merrill & Lafayette, 2018; Nathanson, Cole, et al., 2013; Nathanson, McCormick, et al, 2013). They found high correlation between factors (for example, in 2008 all but three correlations were at or

above 0.70[5]), and, when they did second-order confirmatory factor analysis, they found that the model fit was better when loading onto the "second-order combined School Survey factor, without assigning them to a single reporting category" (Nathanson, Cole, et al., 2013, p. 20).

Analysis also found high internal consistency in the original surveys to the point of redundancy between survey items (Nathanson, Cole, et al., 2013). Using the Monte-Carlo experiment, Nathanson, Cole et al. (2013) determined the surveys (student, teacher, and parent versions) could reasonably capture the four dimensions with between 50% to 75% of the original questions, and if they eliminated the four dimensions structure, only 36% of the questions were needed to capture the overall school climate. Another problem with the original version of the survey was its inability to measure differences between schools; the original NYC School Survey did not show much variance between schools but rather captured the variance between individuals at the same school (Nathanson, Cole, et al., 2013). However, researchers did find schools with higher School Survey scores also had higher mathematics and ELA test scores in most models[6] (Nathanson, Cole, et al., 2013), which pointed to the survey capturing some of the differences between schools. Although there was a desire to keep the survey items consistent to be able to make comparisons over time, it became clear the survey needed to be updated (Nathanson,

[5] In 2008, the correlation between communication and safety & respect was below the 0.70 threshold for three respondent groups: middle school students (0.69), middle school students at K-8 schools (0.58), and high school teachers (0.66)

[6] In some years, the teacher School Survey scores were not significant.

McCormick, et al., 2013) and including researchers in the redesign would be beneficial.

Redesigned New York City Survey

In 2014 the NYC school district, under new leadership, decided to redesign the School Survey with the assistance of the Research Alliance (Merrill et al., 2018; Merrill & Lafayette, 2018). The redesign came at the same time the school district was developing their own framework for school improvement. NYC Department of Education's Framework for Great Schools was based on Chicago's school improvement framework, but adapted to meet the local contexts and to include recent research on school climate as identified through a review of the literature by the Research Alliance (Merrill et al., 2018). The NYC Department of Education identified six elements in their framework (Rigorous Instruction, Collaborative Teachers, Supportive Environment, Effective School Leadership, Strong Family-Community Ties, and Trust) they believed would improve student achievement (Merrill & Lafayette, 2018). The new School Survey was designed to align with the Framework for Great Schools (Merrill et al., 2018; Merrill & Lafayette, 2018). Due to the tight timeline to redesign the survey, the working group agreed to have a redesigned survey ready for the spring of 2015 with the understanding it would need further consideration for the 2015-2016 school year (Merrill & Lafayette, 2018).

While redesigning the survey, the working group relied heavily on previous research on school climate surveys for the creation of measures and survey items. Twenty of the 32 measures in the redesigned survey were taken from the work of the CCSR, nine additional measures were drawn from the literature, and three measures

were newly created; the redesigned survey drew items from the 2001, 2010, and 2012 versions of the CCSR survey (Merrill & Lafayette, 2018). After deciding what to measure, the working group decided which respondent group(s) would have knowledge of each construct and designed three versions of the survey (for teachers, students, and parents) (Merrill & Lafayette, 2018). Because elementary students were not surveyed, the team decided to include some of the questions from the student survey (for those in grades 6-12) on the surveys for elementary teacher (Merrill & Lafayette, 2018).

Given the condensed timeline to finish the survey, there was limited time for feedback from stakeholders before the survey needed to be submitted for printing. However, because the teacher survey was administered entirely online (whereas the student and parent surveys included a paper option), they had time to conduct a focus group with teachers to get feedback on the School Survey which allowed them to shorten the survey and clarify some items before publication (Merrill & Lafayette, 2018). Because of the success of the teacher focus group, parent and student focus groups were formed in the summer of 2015 to gain feedback on their School Surveys for the 2015-2016 survey (Merrill & Lafayette, 2018). Smaller changes have been made to the survey since the redesign— such as the addition of a question about cyberbullying— but the majority of the survey has remained the same up to the present.

Analysis of the Redesigned NYC School Survey

This study uses the redesigned NYC School Survey, and one strength of this data is that all students are invited to complete the survey and there is a high response rate, which hopefully will result in a large and representative sample. For example,

the district-wide response rates for the 2014-2015 NYC School Surveys were high for teachers (above 80% for elementary, middle, and high school teachers) and students (over 90% for middle school students and about 75% for high school students), but parents were below the 70% threshold targeted by the working group (Merrill & Lafayette, 2018). The response rate of middle and high school students at each school is of particular interest for this study. At the school-level, almost all middle schools and about 75% of high schools met or exceeded the working group's goal of a 70% response rate threshold for students (Merrill & Lafayette, 2018).

The Survey redesign team was hopeful the high response rates for students would indicate the results were representative of the population of students. Merrill and Lafayette (2018) examined demographic information between the group of students who completed the survey and those who did not; they found the only statistically significant difference between the groups was that the non-survey completers were more likely to be chronically absent. This difference is unsurprising since the student surveys were completed at school. Statistically, the scores of chronically absent students who completed the survey were about 0.2 standard deviations lower than those of other students in their responses to questions that addressed the dimensions of Academic Press and Student Peer Interactions (Merrill & Lafayette, 2018). As such the surveyed student sample likely would rate those two dimensions higher than would the student population. Overall, the sample of students seemed to be representative of the population.

Merrill and Lafayette (2018) also assessed the reliability of each of the six factors in the redesigned survey and found each was reliable with a Cronbach's alpha

greater than or equal to 0.70. They also analyzed the survey's face and content validity and within-school agreement (measured with intra-class correlations) and, based on this, made suggestions to the district for ways to improve the survey. Their analysis of the 2015-2016 survey showed improvement in face and content validity with those changes (Merrill & Lafayette, 2018). There was not high within school agreement for the different dimensions of school climate on the student version of the 2014-2015 (ICCs ranging from 0.04 to 0.11) meaning students perceived aspects of the school differently from one another (Merrill & Lafayette, 2018). Given the individual nature of some survey measures, such as their student-teacher trust, it is not surprising that within-school agreement might be low because, for example, levels of trust might vary considerably between students. However, given the large sample size for most schools, even without high within-school agreement, many of the measures had good school-level precision (Merrill & Lafayette, 2018). Despite possible within school agreement concerns, I think the overall strengths of the survey design and large sample size make the NYC School Survey a good choice for this study.

Teacher Retention

As discussed previously, while Kraft et al (2016) and Mitchell et al. (2010) use student school climate surveys, more studies examined the relationship between school climate and teacher retention using teacher surveys or combining multiple respondent groups in their analysis. Several literature reviews found a positive relationship between teacher retention and school climate as reported by teachers, sometimes in combination with other respondents (Cohen, McCabe, et al., 2009;

Cohen, Pickeral, et al. 2009; Robinson et al., 2016; Thapa et al., 2013; Thapa, 2013). In a mixed methods study of a large urban district, Guin (2004) found a significant negative correlation between teacher turnover and teacher perceptions of school climate. She reported that schools with higher turnover rates also suffer from instructional program disruption, repetitive professional development, and less trust and collaboration between teachers compared to schools with lower turnover rates. Allensworth et al. (2009) had similar findings in Chicago, including a positive relationship between school climate, as measured by principal, teacher and student surveys, and teacher retention. Discussing these findings, Allensworth (2012) hypothesizes the relationship between retention and school climate could be cyclical: "Many schools are stuck in a cycle of teacher loss that is hard to break—teachers leave because of poor school climate and low achievement, but these are hard to improve when there is constant turnover" (p. 2).

Teacher retention has also been shown to be related to the two dimensions of particular interest in this study, student-teacher relationships and safety, order, and discipline. For example, students from schools with more attrition rated their schools as less orderly than students from schools with less turnover (Koth et al., 2008). In two studies of urban schools, relationships with students were identified as a crucial component of teacher career satisfaction (Bradley & Loadman, 2005; Shann, 1998), and job dissatisfaction is an important factor in teachers' decisions to remain in or leave a school (Ingersoll, 2001; Nguyen & Springer, 2021). After reviewing empirical studies of school climate and retention, Cohen, McCabe et al. (2009) found student-teacher relationships, an important aspect of school climate, was related to teacher

retention. After reviewing six studies of teacher retention, Simon and Johnson (2015) argue high-levels of teacher turnover at a school can also damage the ability of teachers and students to form strong bonds: “repeated turnover thwarts the kind of continuity needed to build sustained, trustful relationships among teachers, students, and families” (p. 5).

Teacher Retention and Working Conditions

In addition to studies examining the relationships between teacher retention and school climate, the retention literature often examines how working conditions influences teachers’ decisions to stay or leave a school. Johnson (2006) defines working conditions as including the physical environment (e.g. building and other resources), organizational structures that “define teachers’ formal positions and relationships with others in the school” (e.g. workload, autonomy, and supervision), sociological features (e.g. status or student characteristics), political features (e.g. decision-making), cultural features (e.g. norms and traditions), psychological features that might “sustain or deplete” the individual, and the educational features (e.g. curriculum) (p 2). There is significant overlap between the aspects of working conditions and dimensions of school climate. For example, working conditions and school climate both include aspects of teachers’ relationships with each other, with students, and with administrators. Working conditions and school climate also both include facets of school safety, order, and discipline. Additionally, school facilities and material resources are aspects of both working conditions and school climate, as are some measures of leadership beyond the teacher-administrator relationship. However, unlike school climate which is experienced by all members of the school

community, including teachers, students, and families, working conditions are the experiences of teachers and other school employees.

Teachers often cite working conditions as influential in their decisions to remain in or leave a school (Allensworth, 2012; Ingersoll & Smith, 2003; Ingersoll, 2001; Smith & Johnson, 2015). Johnson et al. (2011) found working conditions were more influential in teachers' decisions to remain at a particular school than to remain in teaching. In a review of 159 studies, Nguyen and Springer (2021) found better school facilities, adequate teaching supplies, and teacher autonomy were each related to higher teacher retention rates. In a survey of teachers in Washington, D.C., Buckley et al. (2004) found a positive correlation between perceived quality of school facilities and teacher retention intentions. In a study of rural and suburban Maryland public schools, Koth et al. (2008) found that "faculty turnover was related to order and discipline, such that students from school with higher turnover described the school as less orderly" (p. 101). Ingersoll and May (2012) found that mathematics and science teachers from schools with better perceived working conditions, specifically fewer student discipline problems, better support from school administrators, more teacher influence in schoolwide decisions, more classroom autonomy for teachers, and teacher access to necessary materials, had lower attrition rates. Additionally, they found schools with higher levels of one of these organizational features were more likely to have higher levels of one or more of the other organizational features (Boyd et al., 2011; Ingersoll & May, 2012). Working conditions also influence teachers' decisions to stay in the profession. In a study of first-year teachers, teachers reported that student discipline, levels of support from

school administrators, student motivation, and teacher influence in decision-making contributed to their decision to leave teaching (Ingersoll & Smith, 2003). Several studies found administrative support was related to teacher retention either directly or indirectly through their influence on other working conditions (Carver-Thomas & Darling-Hammond, 2019; Nguyen, 2021; Nguyen et al., 2020).

Horng (2009) uses conjoint analysis[7] to examine teachers' preferences in school characteristics. When choosing between schools, teachers placed the most importance on school facilities being clean and safe, followed by administrative support, class size, commute time, additional salary, resources for students, and input on school-wide decision-making all before student body demographics. Horng found that each of the working conditions was significantly more important to teachers than each of the student body characteristics (student SES, student race/ethnicity, and student academic performance); school facilities, on average, were twice as important to teachers when they were choosing between school profiles than student demographics. This study, however, asked teachers to make fictitious choices, so it is possible the findings would be different if teachers were making actual job decisions. For example, teachers might be reluctant to admit either to themselves or others, even on an anonymous survey, that they did not want to teach minoritized students. However, the adaptive nature of the conjoint analysis in this study allowed researchers to study how teachers react to hypothetical tradeoffs between different

[7] Teachers were asked to choose between fictious schools with differing groups of school characteristics to determine how teachers would prioritize these aspects when choosing a workplace.

school characteristics, combinations of characteristics which may or may not be available in the teacher's preferred geographic area.

In reality, urban schools and schools with a large number of minoritized students or students from low socioeconomic families often struggle to retain teachers (Borman & Dowling, 2008; Carver-Thomas & Darling-Hammond, 2019; Guin, 2004; Holme et al, 2018; Nguyen, 2021; Sorensen &Ladd, 2020). While numerous studies have found a correlation between student body demographics and retention (Borman & Dowling, 2008; Ingersoll & May, 2012; Lochmiller et al., 2016; Nguyen & Springer, 2021), these same schools often suffer from poor working conditions that influence teachers' retention decisions (Simon & Johnson, 2015). In a study of over 25,000 teachers in Massachusetts public schools, more of the variance in teachers' career plans was explained by working conditions than by the demographics of the student body, leading researchers to posit the differences in outcomes is due to "the poor work environment in which low-income and minority students are taught" (Johnson et al., 2011, p. 20). In a study of 6,733 elementary and secondary teachers, urban teachers cited a lack of administrative support, influence in decision-making, student discipline, student motivation, and low salary as contributing to their decision to leave their school (Ingersoll, 2001). Similarly, Grant and Brantlinger (2022) found school climate conditions, such as student behavior and teacher collegiality, influenced a teacher's retention decision.

Although most studies found a relationship between teacher retention and school climate or working conditions, two studies failed to find statistically significant relationships. In her study, Hughes (2012) did not find a significant

relationship between school facilities and resources or principal support and teacher retention[8]; however, teachers perceived these dimensions on average quite positively with ratings of approximately five[9] out of six for both, which may explain why she was unable to find a significant relationship. Dahlkamp et al. (2017) in a study of eleven principals and 233 teachers in Southeast Texas used hierarchical linear modelling to examine potential relationships between school climate, teacher retention, and principal efficacy (teacher and school characteristics were not included in the model). They did not find significant relationships between teacher retention and collegial leadership or achievement press, but the study contained a small sample of schools from one suburban district in Texas which may be why their results differed from other research.

Differences in Perceptions of Climate

As discussed previously, school climate is often measured as the collective perceptions of a distinct group in the school community (ex. teachers), but members of these groups are not a monolith. This study measures school climate with the collective perceptions of students at each school. Therefore, it is important to examine how individual perceptions of school climate vary between and within schools to better understand how it could affect the measurement of school climate. Some of the differences in perceptions in school climate are related to differences between schools. For example, teachers in California reported a less positive school climate in

[8] The model also included teacher characteristics (experience, degree attainment, and grade-level taught) and school characteristics (student SES, school size, and standardized test scores) (Hughes, 2012).
[9] School facilities and resources M=4.92, SD=0.72 and principal support M=5.09, SD=0.95 (Hughes, 2012)

schools with students from lower socioeconomic classes compared to higher socioeconomic classes, majority Black and Hispanic schools compared to majority White schools, low-performing schools compared to higher performing schools, high schools compared to middle schools compared to elementary schools, and schools in large cities compared to mid-size cities, suburban communities, or rural areas (Jain et al., 2015). However, there are also differences in perceptions within the same school. Mitchell et al. (2010) found that while between school differences account for much of the variability in climate ratings, perceptions do also vary by individual characteristics of members within one school community. Cohen, Pickeral, et al. (2009) argue "the surprising discrepancies in perceptions among various groups" (p. 47) are an excellent starting point for school improvement. For example, they argue that rather than focusing on the average score for school safety between all respondent groups, noticing that students report more bullying than parents or teachers perceive allows schools to engage with students to understand the problem and develop potential solutions. The following section reviews differences in perceptions between teachers and students and also differences in perceptions for students by race.

Teachers and Students

Despite being in the same school, students and teachers can perceive climate differently from each other. For example, in a study[10] where students and teachers in

[10] However, one limitation of the study was several items were accidentally omitted when the survey was copied, which may have affected the measure, although researchers still found high internal consistency (Booren et al., 2011).

the Pacific Northwest used the same survey to assess different aspects of the school, teachers rated a measure of connection/climate statistically significantly more highly than students (Booren et al., 2011). Another study found students' perceptions of school climate are more affected by school-level factors such as student-teacher ratios or student mobility than teachers whereas teachers' perceptions of climate are more affected by classroom-level factors such as classroom management (Mitchell et al., 2010). In fact, Mitchell et al. (2010) found "teacher ratings of the overall climate were not associated with student ratings of the overall climate" (p. 276). However, in this study teachers and students completed different school climate surveys which complicates direct comparison of results because the two surveys could have measured different aspects of school climate.

Other studies did find a relationship between student and teacher responses on school climate surveys even as results varied by respondent group. For example, Ramsey and her colleagues (2017) examined differences by respondent groups (students, staff, parents) in school climate surveys for 4,244 students, 727 staff, and 3,133 parents from Baltimore city elementary schools. Their study included the 17 survey items that were parallel between the three surveys, which only allowed them to compare four dimensions of school climate: connectedness, safety, academic emphasis, and parental involvement (Ramsey et al., 2017). While there was variation by respondent group, the direction of the relationship varied by dimension of school climate with respondent groups rating the dimensions that were most closely related to their own behavior lower than other respondent groups. Specifically, students rated academic emphasis and parental involvement more positively than staff, but staff had

more positive perceptions of connectedness and safety than students (Ramsey et al., 2017). This study did not include an overall measure of school climate because there were not parallel questions for all of their dimensions of school climate. Despite their limitations, these studies do suggest teachers and students perceive school climate differently, although the direction and magnitude may vary based on how school climate is measured and may differ across dimensions.

Student Race

Several studies examined how students' perceptions of school climate and its dimensions varied by their race and/or ethnicity. Using a latent class analysis of survey data from 577,026 California students, Asian, Black, Latino, and multiracial students were more likely than White students to be a member of the "negative climate" latent class which was "defined by low levels of caring relationships, school connectedness, safety, and meaningful participation" while White students were more likely to be in the "positive climate" latent class than their peers (De Pedro et al., 2016, p. 14). While some differences in perceptions of school climate between students of different races may be due to systemic differences in the types of schools they attend, this does not account for all the differences. In a similar latent class study of 47,631 students that examined within school differences in perceptions of school climate in high schools in Virginia, the "positive climate" latent class had fewer Black and multiracial students but more Asian students than the "negative climate" latent class (Shukla et al., 2016).

Some studies found Black and Latinx students reported a less positive school climate than White students in the same school. For example, Mitchell et al. (2010)

found that White students rated overall climate higher than minoritized students at the same school in a study of fifth grade teachers and students in suburban and rural schools in Maryland. Similarly, in a study in California of 187,120 seventh grade students, Black and Hispanic students reported lower levels of perceived safety, connectedness, and adult-student relationships than their White peers in the same schools (Voight et al., 2015). In a study of Maryland high schools examining school support using multi-level analysis to account for school-level factors, Black students perceived lower levels of teacher caring and equity than White students while controlling for maternal education and socioeconomic status (Bottiani et al., 2016). In a study of sixth through twelfth grade students, Native American, Black, Latino, Asian, and multiracial students all had lower connectedness scores than White students even after controlling for school-level covariates (Anyon et al., 2016). Voigt et al. (2015) found the differences in the perceived school climate between Black and White students was attributed to within school differences. However, the differences in perceived school climate between White and Hispanic students varied by dimension with safety and connectedness being attributed to between school differences while adult-student relationship and opportunities for meaningful student participation differences were a result of within school differences (Voigt et al., 2015). Shukla et al. (2016) in examining within school differences in school climate concluded: “These findings indicate that student experiences of school climate are not homogenous and arguably are not adequately characterized by overall school means” (p. 301).

It seems possible that the composition of the student body may play a role in the within school differences in student perceptions of school climate. Bottiani et al. (2016) found the gap in perceived equity[11] was larger in more homogenous schools than in more racially diverse schools. Students who perceived oppression or discrimination in the school viewed adults as less caring or respectful, whether they were in the oppressed group or not (Anyon et al., 2016). Relatedly, racial disparities in discipline led to students of all races feeling less connectedness to their school (Anyon et al., 2016). One study, however, found that across all of the dimensions of school climate they measured, African American students perceived a more positive school climate than White or Hispanic students (Bryson & Childs, 2018). The authors hypothesized that one reason their results differed from other studies is the high percentage (50-55%) of minoritized students in the urban schools included in their study (Bryson & Childs, 2018). This hypothesis seems to be supported by the decreasing gap in perceptions of equity between Black and White students as schools became more diverse in the study conducted by Bottiani et al. (2016).

Especially as student body averages of perceptions of school climate are often used in decision-making for school improvement plans, the findings of substantial differences in perceptions of school climate by race of the students are worrisome. Particularly in schools where students of color make up only a small percentage of the student body, their experiences may be erased if school climate surveys are not examined by racial subgroups: “The findings from this study problematize the

[11] Bottiani et al. (2016) include equity as a separate factor that includes questions about cultural relevant teaching materials and fairness in treatment of students. Other studies include these types of questions in larger dimensions such as “Fairness” (see Table 1).

concept of a ‘school climate’ by showing that different student racial subgroups within a particular middle school may have significantly different experiences of safety, connectedness, relationships with adults, and opportunities for participation” (Voight, et al., 2015, p. 263). In addition, as school climate is related to student outcomes, those may vary by race as well. For example, Voigt et al. (2015) found a significant relationship between the differences of perceived school climate by race and the racial achievement gap. However, it is not always possible, nor advisable, to examine school climate by race, especially in instances where students could lose their anonymity if results are examined by subgroups due to the small number of students in a subgroup. Although the NYC School survey results are not reported by student race, I discuss including student demographic information as control variables in the methods chapter.

Conclusion

A school’s climate is made up of perceptions by the members of the school community of the physical attributes of the environment and the behaviors of the people who inhabit the environment. The relationships that are formed influence how teachers and students view their work or learning environment. In urban schools, teacher turnover can be alarmingly high, disrupting the relationships students can form with their teachers. Urban schools are often staffed by teachers who are less experienced and stay at the school for fewer years than their suburban counterparts (Jacob, 2007), and the conversation around teacher retention often focuses on test scores or the costs associated with training new teachers. However, students spend many of their waking hours at school, and their healthy development and happy

childhood cannot be reduced to test scores or school budgets. Students often have little choice of which school they spend so many hours in, and their perceptions of the school climate can have wide ranging consequences. The constant churn of teachers in a school can disrupt students' relationships and could negatively impact how they perceive their relationships with their teachers, the safety, order, and discipline of their school, or the school climate as a whole. Students can feel teachers are simply biding their time in a school with a bad school climate until they can find a "better" job. For example, in a qualitative study of five schools in Baltimore City, students described their school as having two types of teachers—those who care about the students' success and those that were trying to leave (Smith et al., 2014).

The school climate also plays a role in teachers' retention decisions. While a teacher's decision to stay at a school, move to a new school, or leave teaching altogether is complicated, working conditions, many of which are dimensions of school climate, influence teachers' decision-making. As teachers turn over at high rates, collegial relationships, trust, and collaboration can be interrupted or damaged, which may in turn exacerbate the turnover problem at the school as teachers experience a more negative school climate. The teachers who remain may have to put in extra work training new teachers or continually take part in professional development aimed at novice teachers rather than having professional development tailored to their needs (Guin, 2004). These commitments can take valuable time and energy away from other professional activities that could help students' academic or social growth or help teachers feel fulfilled.

School climate and teacher retention are related to student outcomes (both academic and social) and each other. Given the nature of their interconnected relationships, it can be difficult to distinguish the direction or individual contribution of their relationships to each other. However, the research is clear that a more positive school climate and a stable and qualified teaching force are related to better student outcomes. A positive school climate is a positive work environment for teachers, leading both to a better daily work experience for teachers and working conditions that entice teachers to stay at a school from year to year. A positive school climate for students is a worthy goal in and of itself, including stable and caring relationships with adults at school and a safe and orderly learning environment.

Chapter 3: Methods

Most studies that examine the relationship between teacher retention and working conditions or school climate do so from a teacher-centric lens, looking at how teacher perceptions of school climate in one year predict teacher retention the following year. While studies tend to focus on how teacher retention is related to teacher perceptions of school climate, including teacher-student relationships and school safety, order, and discipline (e.g. Cohen et al., 2009; Marinell & Coca, 2013; Thapa et al., 2013) less attention is paid to how changes in rates of teacher attrition may be associated with how students view the school climate, specifically their relationships with their teachers or the safety, order, and discipline of their schools. This study explored the relationship between teacher retention rates and school climate in a way that centers the student experience.

For example, in this study I used the teacher retention data from the fall of a school year to look for a relationship to the student perceptions of school climate in the spring of the same school year. This is different sequentially from many school climate studies where school climate data from the spring of one school year is used to look for a relationship with teacher retention in the fall of the following school year (e.g. Kraft et al. 2016). While I am not able to prove causation, using teacher retention from the fall and school climate surveys from the spring of the same school year fits with my analytical model where teacher retention is the independent variable and student perceptions of school climate is the dependent variable.

This chapter outlines the methods used in this study. I will use school-level measures of student perceptions of school climate from the NYC School Survey and school-level rates of teacher retention data from the NYC Board of Education to

investigate their potential relationship in NYC public middle and high schools. Specifically, this study examined students' perceptions in two ways, with an overall measure of school climate and with factors formed from questions about student-teacher relationships and safety, order, and discipline. It looked at the relationship between student perceptions of school climate and teacher retention both for individual school years using linear regression and across multiple school years using fixed effects regression for repeated measures. This chapter begins with the research questions for this study, followed by an overview of the data. Next, this chapter outlines the methods used to construct measures of school climate and to measure the relationship between school climate and teacher retention.

Research Questions

This study examines the relationship between teacher retention and students' perceptions of school climate, with a particular focus on their perceptions of student-teacher relationships and safety, order, and discipline. It looks at both the relationship between student perceptions of school climate with teacher retention in a given year and with teacher retention over time. The research questions are:

R1: What is the relationship between school-level rates of teacher retention and (average) student perceptions of school climate during one school year?

R1a: What is the relationship between school-level rates of teacher retention and (average) student perceptions of student-teacher relationships and safety, order, and discipline during one school year?

R2: What is the relationship between school-level rates of teacher retention and (average) student perceptions of school climate across multiple school years?

R2a: What is the relationship between school-level rates of teacher retention and (average) student perceptions of student-teacher relationships and safety, order, and discipline across multiple school years?

Data Sources

In this study, I performed a secondary analysis of data from public middle and high schools in NYC. The teacher retention rates are from the NYC Board of Education and the school climate data is publicly available at the school-level from the NYC School Survey administered by the district to all public schools in NYC. The data used for the control variables (percent of students who are Black, Hispanic, or multiracial, percent of English Language Learners (ELL), the school's poverty count as a proxy for socioeconomic status, and school attendance rate) is also publicly available data from NYC schools. Control variables will be discussed in detail in a later section. This section discusses the school climate surveys and teacher retention data in detail, followed by a discussion of how I created school climate measures, both an overall school climate measure and factors that include questions related to student-teacher relationships and safety, order, and discipline, for this study.

Student School Climate Surveys

I analyzed the student version of the redesigned NYC School survey, so data includes the 2014-2015 school year through the 2018-2019[12] school year. This survey is administered to all students in grades six through twelve so only schools with at least some of their students in those grades are included. As mentioned previously, I used school-level averages of student response scores on the NYC School Survey. In addition to centering students' experiences, using student surveys with teacher retention rates affords some methodological advantages. First, using the same sample of individuals for both the dependent and independent variables can bias results towards finding significance because of the shared variance between the variables (Wang & Degol, 2016). Teachers might respond to surveys about school conditions particularly negatively to justify their decision to leave or conversely particularly positively if they are planning to stay resulting in common source bias (Boyd et al., 2011). When comparing teachers' perceptions of working conditions at the same school, Boyd et al. (2011) found "teachers rate their schools worse when they are less satisfied, regardless of the actual working conditions at their school" (p. 310). Although this could be a result of teachers experiencing working conditions differently based on differences between their physical classrooms, differences in the students they teach, or even differential treatment by colleagues or administrators, using student school climate surveys eliminates potential common-source bias.

[12] I did not include the 2019-2020 school year in the analysis due to the low student response rate of approximately 35% due to Covid-19 (NYC Department of Education, 2020b).

Secondly, as mentioned previously, Mitchell et al. (2010) found students' perceptions of school climate were more influenced by school-level factors than teachers' perceptions which were more influenced by classroom-level factors. However, in that study teachers and students were given different surveys which makes direct comparison difficult. I am interested in the school as the unit of analysis, which, given Mitchell et al.'s (2010) results, further supports the use of student surveys instead of teacher surveys. Both the use of school-level analysis and the construction of school climate measures are discussed in full later in this chapter.

Teacher Retention

The independent variable of teacher retention is from the NYC Board of Education which calculates the number of teachers in October who were also employed at that school the previous school year. This school-wide retention rate categorizes teachers as either stayers or leavers (movers, or teachers leaving their current school to teach in a new school, are characterized as leavers in this study). I am interested in if teachers staying (or leaving) a school is related to how students perceive the school climate. Since movers are leaving a particular school (and the students who attend that school), their decision to change schools, while possibly beneficial to the school they are joining in many ways, reflects a break in the student-teacher relationship at their current school. Therefore, this study focuses on school-level stayers and leavers (i.e. district movers and leavers will be treated the same).

School-Level Analysis

Many studies in the school climate literature focus on school-level data (for examples using the NYC School Surveys see Davis & Warner, 2018; Goldkind & Farmer, 2013; Marinell & Coca, 2013) rather than at an individual- or classroom-level. One reason may be the desire of school districts to ensure that responses cannot be linked to individual respondents perhaps to encourage survey participation or because student respondents are minors. Guaranteeing anonymity may be particularly important for surveys administered by schools or school districts where teachers or students might fear retribution for negative responses. Given that the NYC School Survey is used as part of school accountability ratings (Nathanson, Cole, et al., 2013), preserving participant anonymity by reporting data at the school-level can allow for honest participation from respondents who are worried they could be identified by their answers to demographic information.

In addition to practical reasons for analyzing data at the school-level, some scholars argue that if school climate is conceived as a school-level construct, it should be measured at the school-level and not the individual or classroom-level. For example, Van Horn (2003) argues that school-level data, not individual-level data is the correct level of measurement for school climate because "school climate is a property of schools that is experienced to a greater or lesser degree by all school participants" (p. 1017). He found student scores on a school climate survey predicted between-school differences (Van Horn, 2003). Although there were differences between participants as well, he contributed those differences in ratings to their "lack of knowledge, limited experience, and biases" (Van Horn, 2003, p. 1017). Analysis of

school climate data also suggests that school-level analysis can be appropriate. For example, Bradshaw et al. (2014) in a study of 58 Maryland high schools found the variance in school climate scores was more associated with the clustering of students in schools than classrooms. Furthermore, analyzing samples from multiple schools at the individual student or teacher level can lead to an over-representation of larger schools in the data set and creates nested data that must be accounted for (Wang & Degol, 2016).

Conversely, there are some researchers who argue school-level averages of school climate is not the appropriate level of measure. Ramsey et al. (2016), in a study of Baltimore City elementary students (grades 3-5), school staff, and parents found more variation in perceptions of school climate at the individual level than the school level. However, it is possible that these results were influenced by only studying elementary students who are less likely to move freely around the building to classes with several different teachers, limiting their knowledge of the school environment to only a few classrooms. School-wide averages of student school climate surveys could also obfuscate differences in student experiences by race, gender, class, etc. Ramelow et al. (2015) argue "aggregating individual ratings data to form a single group-level indicator assumes little variation in the perceptions of different groups within the school and does not allow an investigation of diversity in perceptions of the school climate" (p. 740). School-level averages of school climate do not allow for the exploration of those differences, which is a concern for this study, as discussed in the literature review.

While there are advantages and disadvantages for measuring school climate at the school-level, I believe school-level is the suitable level of analysis for school climate for this study. Because I am conceptualizing school climate as the collective perceptions of school community members, I measured it as a school-level construct. Additionally, as stated, the data does not track individual student surveys, in part to ensure their anonymity. The NYC school survey data cannot be disaggregated by subgroups, but school demographics (such as racial makeup of student body, grade-levels at the school, or a school poverty measure) are included in the model. Although there are some limitations to using only school-level analysis, for this study, I believe it is an appropriate level of analysis to answer my research questions.

School Climate Measures

Measures of student perceptions of school climate are the dependent variables for this study. To answer the research questions about school climate broadly, I used a school climate composite score, discussed below. To measure student-teacher relationships and safety, order, and discipline, I created factors from the questions of interest, as outlined later in this section. For my analysis, I used the school climate composite score and the factors for both the single-year analysis for each school year (2014-2015 to 2018-2019) and for the panel analysis I used the composite score for school years 2014-2015 through 2018-2019 and the factors from school years 2015-

2016 through 2018-2019 due to differences in the survey questions as discussed below.

School Climate Composite Score

To answer the research questions about overall school climate, I created a composite score for each school using the student survey responses. For this measure, I only used questions that are included on the surveys for all students in grades 6-12 in a given year, eliminating questions that are asked only to high school or only to middle school students so the score is consistent for all of the schools included in a given year (see Appendix A for a list of questions for each year). I reverse coded all negatively worded questions so the most positive answer has the highest score (4). For questions that have a "Don't Know" option, I did not include those responses in the item averages. I then calculated the sum of the item means and divided the sum by the total number of questions included from that year's survey. The school climate composite score is a school-level, unweighted mean calculated from the mean score reported for each survey item. I used the mean of the sum of items as the survey changed slightly from year to year, so this allowed for comparisons across school years.

While most studies of school climate reviewed in this paper measure dimensions or factors of school climate instead of school climate as a whole (see Table 1), a few studies used an overall measure of school climate which they constructed as an unweighted mean of survey items. For example, Mitchell et al. (2010) used a 53-item school climate survey where students could choose agree or disagree. They summed the scores and divided by the number of items to create an

overall measure of school climate for students. Similarly, Scales et al. (2019) created a 4-item school climate survey and then computed the average score for each school as an overall measure of school climate.

Merrill et al. (2018), in their work on redesigning the NYC School Survey, use a "survey score," which is the unweighted mean of any element or measure from the survey and allows for quick comparison between schools; they argue it "allows for analysis that examines the relationship between school-level measures of climate and capacity with other school-level outcomes" (p. 11). The NYC school district relies on the survey score to compare schools within the district (Merrill et al., 2018), however, these scores are used to compare elements or measures instead of an overall school climate score. Because I only used student surveys, I could not recreate the survey scores for each element. Coupled with the fact I am interested in an overall measure of school climate, I decided to create a composite score using the mean of all of the survey items included on both the middle and high school surveys, similar to Mitchell et al (2010) and Scales et al (2019).

This composite score allowed for a simple comparison between schools and an examination of the relationship between how students perceive school climate (as measured by their responses to the school climate survey) and teacher retention. However, one limitation is the composite score could over- or under-represent certain aspects of school climate as there may be more items devoted to one dimension over another. Given that I only included student perceptions of school climate, by design I only measured the school climate from the student perspective, which naturally limited the dimensions of school climate I could measure. To address this limitation, I

did exploratory factor analysis for survey items from the two dimensions of school climate (student-teacher relationships and safety, order, and discipline) which are experienced by students and identified in the literature as being related to teacher retention.

Dimensions of School Climate

In addition to the overall school climate measure (a composite score of all school climate questions included in the study) discussed above, this study also included factors created from survey items in the NYC School Survey related to student-teacher relationships and safety, order, and discipline. As mentioned previously, I am interested in including these dimensions because the retention literature has identified student-teacher relationships and school safety, order, or discipline as influential in teachers' satisfaction or their retention decisions, and they overlap with common aspects of working conditions. Both of these dimensions, unlike other aspects of school climate that are influential on teachers' retention decisions, are under the control of the individual school community, especially the teachers and administrators at the school.

Therefore, I decided to create factors from items from the student perspective about student-teacher relationships and safety, order, and discipline. Both of these dimensions are often measured using school climate survey questions to create factors, and I reviewed school climate studies for commonalities in the formation of these factors to inform which questions to include in the factor analysis for this study. (See Table 2 for more information about these school climate surveys). This section discusses the structure of the NYC School Survey and the questions from the survey

that I included and the factor analysis. For a review of how other studies measure student-teacher relationship and safety, order, and discipline, see Appendix C.

NYC Survey Elements

As mentioned previously, the redesigned NYC School Survey was designed to measure the six "elements" of the Framework for Great Schools: Rigorous Instruction, Collaborative Teachers, Supportive Environment, Effective School Leadership, Strong Family-Community Ties, and Trust (Merrill & Lafayette, 2018; NYC Department of Education, 2019a). Elements are further broken down into "measures"[13] that contain groups of survey questions from the student, teacher, and/or parent survey, with each element containing questions from at least two respondent groups, but respondent groups were not asked questions from every element. For example, in the 2018-2019 survey, student questions were included in the Rigorous Instruction, Collaborative Teachers, Supportive Environment, and Trust elements (NYC Department of Education, 2019a).

While NYC schools use the combined student, teacher, and parent versions of the survey to measure certain aspects of school climate (i.e., "elements" and "measures"), their structure is not universally used by researchers. For example, the

[13] Rigorous Instruction includes course clarity, quality of student discussions, Common Core shifts in literacy, and Common Core shifts in math.
Supportive Environment includes safety, social emotional measure, press towards academic achievement, peer interactions, classroom behavior, personal attention and support, peer support for academic work, next-level guidance.
Collaborative Teachers includes peer collaboration, collective responsibility, school commitment, reflective dialogue, cultural awareness, inclusive classroom instruction, innovation, focus on student learning, professional development, and school commitment.
Effective School Leadership includes inclusive principal leadership, teacher influence, principal instructional leadership, school leadership team, and program coherence.
Strong Family-Community Ties includes parent involvement in schools and teacher outreach to parents.
Trust includes parent-teacher trust, parent-principal trust, student-teacher trust, teacher-teacher trust, teacher-principal trust, and central-teacher trust.

original version of the NYC School survey set out to measure academic expectations, communication, engagement, and safety and respect, and some studies used that structure in their study (eg., Davis & Warner, 2018) while others only include some of the subscales (or "measures") created by the district instead (ex. Goldkind & Farmer, 2013).

However, other studies eschew NYC's structure completely and instead focus on different dimensions or factors of school climate. For example, using the original NYC School Survey, Kraft et al. (2016), use their own factors: Leadership and Professional Development, High Academic Expectations for Students, Teacher Relationships and Collaboration, and School Safety and Order. Hamlin's (2020) factors from the original NYC School Survey include School Safety, Relational Environment, Personal Connectedness, and Academic Engagement. I also created factors instead of using the elements defined by the NYC School Survey. As this study is interested in dimensions of school climate that students and teachers both directly experience, I used factor analysis to create measures with items that asked students about student-teacher relationships and safety, order, and discipline. The questions included in the factor analysis come from the Collaborative Teachers, Supportive Environment, and Trust elements.

Student-Teacher Relationship

Because I am interested in how student-teacher relationships are related to teacher retention, I included items that examine several aspects of that relationship similar to many of the studies I reviewed (see Appendix C). Specifically, I decided to include the survey questions asking students if teachers listen to them and respect them, including questions about respecting students' culture and backgrounds in my

factor analysis to try to measure student-teacher relationships. Although the NYC School Survey does not include a question directly asking if teachers care for their students, it includes several questions asking about specific behaviors that can demonstrate care, such as "There is at least one adult in the school I can confide in" or "When my teachers tell me not to do something, I know they have a good reason" (NYC Department of Education, 2019b). I included these questions in my factor analysis.

The line between student-teacher relationships and teacher pedagogy or curricular decisions is more difficult to navigate than questions about care, listening, and respect. Although good relationships can play a role in the classroom, the strength of the curriculum or the school's lesson-planning support are outside of the scope of this study. Therefore, in my factor analysis, I decided to omit questions about the curriculum or daily lessons. As much as possible, I wanted to separate the relational aspect of student-teacher interactions that are typically included in a Student-Teacher Relationship Factor from professional requirements or pedagogical approach, which could be included in several different factors. For this reason, I also did not include questions about written feedback on work or clarity of teacher expectations. Further, I believe that good teaching, while often built on relationships, is not the same as the student-teacher relationship. Teachers may have good relationships with students while not effectively planning or delivering lessons or being qualified to teach the subject they are assigned. Conversely, teachers may give very clear feedback on written work but not have good relationships with students. I wanted to, as much as possible, separate how students view their relationships with

teachers from how they view their classes, their academic achievement, or the school's curriculum.

However, I decided to include questions about teachers' willingness to provide extra academic support to students because they asked students about individualized academic support or guidance. Because this support could be provided during or outside of class, it could reveal classroom procedures that allow for more individualized attention to students or show teachers are spending out of class time helping students. I decided to include these questions in the factor analysis because they asked students how they felt about the academic support they received individually rather than about the attention or feedback all students received during class. In other words, due to the personalized nature of these questions, they seem to ask students more about their relationships with teachers, albeit from professional lens, than about teaching. The full list of questions included in factor analysis can be found in Appendix A.

School Safety, Order, and Discipline

In addition to survey questions that address student-teacher relationships, I also included questions about student behaviors, school rules, and their overall safety in the factor analysis. Students were asked how they perceived safety in the school as a whole and in particular areas of the school (such as hallways or outside the school building). They were asked about bullying, violence, illegal substance abuse, and gang activity. Students also answered questions asking if discipline is applied fairly and how well their classmates behave in their classes both when teachers are watching and when they are not. I did not include questions about cyberbullying or how safe students feel on their commute to school as teachers do not have as much

control over those aspects of school safety. The full list of questions I included in the factor analysis can be found in Appendix A, listed by year.

Factor Analysis

As mentioned previously, the literature identifies both student-teacher relationships and safety, order, and discipline as related to teacher retention, but the NYC Survey was not specifically designed with these two dimensions. However, it does include many survey items that ask students about student-teacher relationships and safety, order, and discipline. Therefore, I decided to do exploratory factor analysis with these survey items. Exploratory factor analysis allowed me to create factors to use as the dependent variables in both yearly "snapshots" using linear regression and in panel analysis.

Factors for Panel Analysis

One difficulty with examining the factors across the five-year time span in this study is that the researchers made changes to the survey, in particular to questions between the 2014-2015 survey and the subsequent years. Due to the limited time researchers had to write the survey before it needed to go to the printers, they knew they would need to make several changes after meeting with student focus groups (Merrill & Lafayette, 2018). For example, in the 2014-2015 survey, several questions begin with the framing "Think about the class that you attend first on Mondays. In that class…", but this framing is dropped in the 2015-2016 school year and beyond. Additionally, several questions were added or deleted between the 2014-2015 school year and 2015-2016. A few questions were changed or added after the 2015-2016 survey, but in general, the survey has stayed the same (To see a year-by-year analysis

of the survey, see Appendix A). Therefore, I will only include the student surveys from the school years 2015-2016 through 2018-2019 for the factor analysis for panel analysis.

In addition to the wording changing between years, the numbering is also not consistent across years, so I assigned each question a letter that I used to identify it across years in the factor analysis. After each question had a letter assigned, I merged the data into long form for school years 2015-2016 through 2018-2019. I included questions that had small changes in wording from year to year, but I did not include questions that were not included in each version of the survey in the factors used for the panel analysis. For this exploratory factor analysis, 28 questions were included. I used factor analysis in SPSS to analyze the questions using principal component analysis with varimax rotation including the survey items that address student-teacher relationships and safety, order, and discipline (see Appendix A for the detailed list of questions). As mentioned previously, I did not include "Don't Know" responses in the item averages, and I scored items such that a score of 1 is given to the least favorable response and a 4 to the most favorable response, reverse coding where necessary. I analyzed questions about both student-teacher relationships and school safety, order, and discipline simultaneously to look for underlying factors for those questions and to check for possible correlation between the items or factors. (Given the overlap of questions between the school climate composite score and the factors, the composite score is not included in models with any of the school climate factors.)

After examining eigenvalues and the scree plot, I determined there were three uncorrelated factors in the combined data. Using the factor loadings, I determined

which questions were in each factor and I checked the reliability of each factor using Cronbach's Alpha. After examining the Cronbach's Alpha, I decided to eliminate the question I labeled CK ("At this school students drink alcohol, use illegal drugs, or abuse prescription drugs while at school"). Then I reran the factor analysis for the remaining 27 questions, excluding question CK, and ran reliability analysis for the new factors. I then ran reliability analysis for each year with those three factors (see Table 3). The scree plot and factor loadings for the combined data can be found in Appendix D.

Table 3 Cronbach's Alpha for Factors for Panel Analysis

Factor	**Combined 2015-2019**	**2015-16**	**2016-27**	**2017-18**	**2018-19**
Teacher Support	0.974	0.974	0.974	0.975	0.975
Classroom Behavior	0.980	0.979	0.981	0.982	0.982
School Safety	0.957	0.962	0.959	0.960	0.959

Factors for Individual School Years

In addition to the factor analysis for the combined data, I also did exploratory factor analysis for each year of the survey 2014-2015 through 2018-2019, following the process outlined above. By doing factor analysis for each year individually, I was able to include additional questions that were only asked in some years of the survey administration. This allowed the 2014-2015 survey to be included in the yearly snapshot analysis. I included 29 questions for each year, but after reliability analysis, question CK was eliminated for each year. Each year of analysis created three factors, although the composition of each was slightly different from year to year. The factors created for each year were used to analyze single-year snapshots of the relationship between these factors and teacher retention. The Cronbach's Alphas for each factor in

each year were greater than 0.95. The scree plot, factor loadings, and Cronbach's Alpha can be found in Appendix D and the questions included in each factor in Appendix E.

Factor Composition

The exploratory factor analysis from the questions about student-teacher relationships and safety, order and discipline for both the panel analysis and the yearly snapshots resulted in three factors: Teacher Support, Classroom Behavior, and School Safety. It was not surprising that the two dimensions resulted in three factors, as several other studies I reviewed also had multiple factors for Safety, Order, and Discipline. For example, Furlong et al. (2005) found three factors about safety, order, and discipline: Campus Disruptions, Substance Use & Weapon-Carrying, and Total Danger. For a more complete review of Safety, Order, and Discipline factors, see Appendix C.

The composition of these factors varied slightly from year-to-year. The Teacher Support factor generally consisted of questions about how students felt their teachers supported them, both academically and emotionally. For example, each iteration of the Teacher Support factor included "My teachers notice if I have trouble learning something" and "There is at least one adult in the school that I can confide in." The Classroom Behavior factor had questions about how students felt their peers behaved during class, such as "In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?" and "In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?" The School Safety factor included questions about bullying, physical fighting, and gang activity at school as well as feelings of safety outside the

classroom such as “I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.” Appendix E has a list of the questions included in each factor for the yearly snapshots and Appendix F has a list of the questions included in the factors for the panel analysis.

Model

I used linear regression and panel analysis (fixed effects regression of repeated measures) to answer the research questions. For R1 (including the sub-questions), I performed a separate analysis using linear regression for each year of data in the study. For R2 (including the sub-questions), I used panel analysis to examine the relationship between teacher retention and student perceptions of school climate across all years of data and between teacher retention and student perceptions of student-teacher relationships and safety, order, and discipline across the 2015-2016 to 2018-2019 school years. I used the following models to answer the first set of research questions, the yearly snapshot analysis:

$$\text{R1: } Y_{sc} = \beta_0 + \beta_{trt}X_{trt} + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \varepsilon$$

$$\text{R1a: } Y_{fac1} = \beta_0 + \beta_{trt}X_{trt} + \beta_{fac2}X_{fac2} + \beta_{fac3}X_{fac3} + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \varepsilon$$

$$\text{R1a: } Y_{fac2} = \beta_0 + \beta_{trt}X_{trt} + \beta_{fac1}X_{fac1} + \beta_{fac3}X_{fac3} + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \varepsilon$$

$$\text{R1a: } Y_{fac3} = \beta_0 + \beta_{trt}X_{trt} + \beta_{fac1}X_{fac1} + \beta_{fac2}X_{fac2} + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \varepsilon$$

where Y_{sc} is a school climate composite measure, Y_{fac1} , Y_{fac2}, and Y_{fac3} are the factors formed from the questions about student-teacher relationships and safety, order, and discipline for year *t*, X_{trt} is the teacher retention in year *t*, X_2 is the percent of Black students, X_3 is the percent of Hispanic students, X_4 is the percent of multiracial students, X_5 is the percent of English Language Learner students, X_6 is the percent of students included in the poverty count, X_7 is the attendance rate, and X_8 is the student survey response rate and ε is the error term.

To answer the second set of research questions, I used the following model with fixed effects regression of repeated measures:

R2: $Y_{it} = \alpha_i + \beta X_{it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + v_i + \varepsilon_{it}$

R2a: $Y_{fac1it} = \alpha_i + \beta X_{it} + \beta_{fac2} X_{fac2it} + \beta_{fac3} X_{fac3it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + v_i + \varepsilon_{it}$

R2a: $Y_{faci2t} = \alpha_i + \beta X_{it} + \beta_{fac1} X_{fac1it} + \beta_{fac3} X_{fac3it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + v_i + \varepsilon_{it}$

R2a: $Y_{fac3it} = \alpha_i + \beta X_{it} + \beta_{fac1} X_{fac1it} + \beta_{fac2} X_{fac2it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + v_i + \varepsilon_{it}$

where Y_{it} is the school climate score for school *i* in year *t*, Y_{fac1it} , Y_{fac2it} and Y_{fac3it} are the factors formed from the questions about student-teacher relationships and safety, order, and discipline for school *i* in year *t*, α_i is the intercept for school *i*, X_{it} is the teacher retention rate for school *i* in year *t*, X_{2it} is the percent of Black students for school *i* in year *t*, X_{3it} is the percent of Hispanic students for school *i* in year *t*, X_{5it} is the percent of English Language Learner students for school *i* in year *t*, X_{6it} is

the percent of students included in the poverty count for school *i* in year *t*, X_{7it} is the attendance rate for school *i* in year *t*, and X_{8it} is the student survey response rate for school *i* in year *t*, v_i is the within-entity error term for school *i*, and ε_{it} is the overall error term. The next sections discuss the analysis in more detail, including the control variables I added to each model.

Single-year Relationships

To start, I analyzed yearly snapshots of the data from individual school years using linear regression. Because I am interested in how teacher retention affects student perceptions of school climate, I used the retention data from October of a school year and student survey data from the spring of the same school year. Although linear regression does not allow me to show causation, I chose to use teacher retention data that was collected before the school climate data because the student school climate surveys are my dependent variable. As discussed previously, this is sequentially different from many studies where school climate from the spring of one school year is used to predict teacher retention or teachers' retention intentions for the following school year.

Next, I analyzed yearly snapshots using the three factors I created for each school year. I ran a linear regression with one factor as the dependent variable and again using the teacher retention data from October of the school year as a predictor. I included the other two factors as control variables in the model to identify the unique contributions of each factor. I then repeated this linear regression with each of the other two factors as the dependent variable.

I also added student demographic information (race, ELL status, poverty rate, and attendance rate) into the model as control variables (control variables are discussed in full in a later section). I also wanted to be able to control for school climate scores from previous years. However, because the survey data was highly correlated between school years, I was not able to add the previous year's survey data into the model and get meaningful results. Therefore, I decided to use fixed effects regression for repeated measures as a second analysis of the data.

Fixed Effects Regression of Repeated Measures

In order to examine the relationship between student perceptions of school climate and teacher retention across time, I decided to use fixed effects regression of repeated measures. I used the Hausman test to determine I should use fixed effects instead of random effects. Then, in SPSS I created dummy variables for each school and then for each school year (2014-2015 to 2018-2019). One school and one school year were not included in the model to serve as the reference category. The average student school climate score was the dependent variable and teacher retention was the time variable predictor variable. The first model included just the dummy variables for each school except one with school climate as the dependent variable. The second model added school-wide retention rates and dummy variables for school years 2014-2015 through 2017-2018, with the school year 2018-2019 serving as the reference

category[14]. I then repeated this analysis three more times, once with each of the three factors created from the combined data as the dependent variable.

Control Variables

I included several control variables in the full model to try to isolate the relationship between school climate and teacher retention. Based on prior research, I decided to include students' race, percent of English Language Learners (ELL), the school's poverty count as a proxy for socioeconomic status, school attendance rate, and response rate as control variables and then test the model fit to determine the best model. This section discusses those control variables.

Studies have found differences in students' perceptions of school climate by race or ethnicity. Several studies found Black students and Hispanic students perceived school climate more negatively than their White peers (De Pedro et al., 2016; Mitchell et al., 2010; Voight et al., 2015). Bryson and Childs (2018), however, found Black students perceived school climate more positively than their White or Hispanic peers, perhaps because they studied urban schools with a more diverse student body than other studies. The racial or ethnic composition of the student body is also related to teacher retention with teachers more likely to leave schools when a majority of the student body is from minoritized groups (Borman & Dowling, 2008; Ingersoll & May, 2012). Therefore, I included the percent of Black, Hispanic, and multiracial (available for school years 2016-2017 through 2018-2019 only) students as control variables in my linear regression models. Given the limited availability of

[14] I chose to use 2018-2019 as the reference category instead of 2014-2015 because of the changes to the survey after it was administered in 2014-2015. Therefore, the survey in 2018-2019 was more similar to 2015-2016 through 2017-2018.

the percent of students who identify as multiracial, I only included percent of students who were Black and who were Hispanic in the panel analysis. I also included a control variable for the percent of students at a school that are ELL as many ELL students are also from minoritized groups. I checked for correlation between ELL students and student race variables.

I also included a control variable, the district's "poverty count," as a proxy for socioeconomic status. The districts' poverty count is the percent of students at the school who have families who have qualified for free and reduced lunch or received Human Resources Administration benefits. Hoy and Hannum (1997) found socioeconomic status to be related to all of the dimensions of school climate they measured, although most were weakly related. A study of 1,451 middle school students found students' socioeconomic status was related to students' initial ratings of school climate (Way et al., 2007). Levels of student poverty are also related to teacher retention with teachers more likely to leave schools with larger proportions of students from low socioeconomic status families (Ingersoll, 2001; Ingersoll & May, 2012; Jacob, 2007). Beginning in the 2016-2017 school year, the district changed their reporting for schools with a poverty count above 95% from an exact percent to "above 95%." For this study, all schools labeled "above 95%" for poverty count are coded as 95.001%.

I also included the schools' attendance rate as a control variable in the model. As discussed earlier, Merrill and Lafayette (2018) found chronically absent students were less likely to complete the survey and rated aspects of school climate more negatively than their peers. Although I am unable to track individual responses to

control for chronically absent students, I included school-wide attendance rate as a possible proxy.

Finally, I included a control variable in the full model for student response rate at the school level. I created a dichotomous variable for schools that had a 70% or greater response rate for students and those that had less than 70% response rate. I chose 70% as my cutoff because that was the goal set by researchers in collaboration with the district: "Researchers commonly consider a response rate of 70 percent or more to be an indicator that a survey captures the views of a broad sample of the population of interest" (Merrill et al., 2018, p. 8). As discussed previously, most NYC public schools met this threshold for students at both the high school and middle school level (Merrill & Lafayette, 2018).

Model Fit

To decide which control variables to include in the final models, I used SPSS to perform an *F*-test as I added each variable into a nested model for each yearly snapshot. Examining the change in R^2 for the different models, I found that each of the control variables[15] significantly improved the model in at least on year. Because each control variable was statistically significant and improved the model fit in at least one year, I decided to include all of the control variables in each model to keep the control variables consistent from year-to-year. For the panel analysis, for each dependent variable I ran the model with and without all of the control variables (except the percent of students who were multiracial). I report the findings for both

[15] The control variables included the percent of students who were Black, the percent of students who were Hispanic, the percent of students who were multiracial, the percent of students who were English Language Learners, the percent of students who were included in the poverty count, the average attendance rate, and the survey response rate.

the reduced and full models in Chapter 4. The district did not collect the percent of students who were multiracial until the 2016-2017 school year, so this control variable was only included in the one-year snapshot analysis for the 2016-2017 through 2018-2019 school years.

Checking Assumptions and Data Suitability

Because I used linear regression, I needed to meet four assumptions: linearity, normality of error terms, homoscedasticity, and independence. To check the assumptions of linearity, normality of error terms, and homoscedasticity, for each year of data, I used SPSS to plot the P-P plot and to plot the residuals versus the predicted values. The results of these tests can be found in the Appendix B. The assumption of independence appears to be met as the error terms for teacher retention and student perceptions of school climate should not be related. I checked the data for outliers and influential cases using Cook's number. Cook's number was below 1 for all data, so I did not identify any influential cases and decided not to remove any data. I also checked the predictors in the full model for multicollinearity using SPSS to predict each predictor by the others. I defined high multicollinearity as VIF greater than 10.

Chapter 4: Findings

This chapter begins with an overview of descriptive statistics the sample used in this study. Then, to address my first research question, I present the findings of the linear regression relating teacher retention and student perceptions of school climate for each individual school year from 2014-2015 through 2018-2019. First, I present these findings for an overall measure of school climate, and then for the factors formed from the exploratory factor analysis that included questions about student-teacher relationships and safety, order, and discipline for each school year (see chapter 3 for details). Next, I address the second research question with the findings of the fixed effects regression of repeated measures with an overall measure of student perceptions of school climate and then with the three factors formed in the exploratory factor analysis of the combined survey responses for the 2015-2016 through the 2018-2019 school years.

Descriptive Statistics

The dataset for each school year contains about 855 schools (with a range of 843 to 862 schools) after eliminating schools with missing data. Table 4 provides the details of the number of schools in the dataset for each school year. Table 5 give the mean and standard deviation for the school-level variables for student school climate scores, teacher retention rates, and the control variables (the percent of Black, Hispanic, and Multiracial students, the percent of students who are ELL, the percent of students included in the poverty count, the attendance rate, and the survey response rate) by school year. The mean of the school-level student school climate scores ranges from 2.97 to 3.15. The mean of the school-level student school climate scores

for 2015-2016 through 2018-2019 were similar with a range of 2.97 to 3.00 whereas 2014-2015 had a mean score of 3.15[16]. The mean school-level teacher retention rate for the five years in this study have a range of 83.89% to 85.87% and a mean of 85.12%.

Table 4 Number of Schools in Data Set

School Year	Student NYC School Survey	Retention Rate	Student Demographic Info	Attendance Rate	Valid N (Listwise)
2014-2015	1126	991	1033	932	843
2015-2016	1123	994	1049	918	860
2016-2017	1104	978	1055	899	862
2017-2018	1088	961	1066	886	854
2018-2019	1082	944	1078	870	854

Table 5 Descriptive Statistics 2014-2015 through 2018-2019

	2014-2015		**2015-2016**		**2016-2017**		**2017-2018**		**2018-2019**	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
School climate composite score	3.145	.176	2.999	.194	2.973	.193	2.98	.182	2.966	.184
Teacher retention rate	85.609	9.814	85.212	10.172	83.891	11.680	85.039	10.379	85.874	9.860
Percent of Black students	.333	.262	.327	.260	.318	.255	.310	.252	.304	.248
Percent of Hispanic students	.429	.248	.430	.248	.431	.247	.434	.246	.437	.246
Percent of Multiracial students	NA	NA	NA	NA	.006	.012	.007	.014	.008	.014
Percent of English Language Learners	.133	.159	.129	.153	.1398	.157	.143	.157	.143	.158
Percent of students meeting poverty count	.755	.169	.741	.173	.740	.180	.789	.175	.776	.176

[16] As mentioned previously, the 2014-2015 school year was the first year of the redesigned NYC School survey. However, after administering the survey in 2014-2015, several updates were made to the survey which then remained largely unchanged through 2018-2019. For the survey questions for each year, see Appendix A.

Average attendance rate	90.061	5.325	90.105	5.338	89.959	5.260	89.708	5.301	89.839	5.195
Survey response rate	.867	.340	.887	.3165	.882	.323	.879	.326	.891	.312

Single-Year Linear Regression with Overall Measure of School Climate

To examine the relationship between teacher retention and student perceptions of school climate for individual school years (research question 1), I used linear regression, fitting a model for each individual year which also included several control variables. For each school year, the overall model was significant with R^2 ranging from 0.145 to 0.220. Teacher retention was a positive, significant predictor of student perceptions of school climate in each individual school year. Some control variables were also significant, but which variables vary by year. Below are the results of the linear regression for each individual school year (2014-2015 through 2018-2019) for an overall measure of school climate.

2014-2015 School Year

The fitted model for the 2014-2015 school year is $Y_{sc} = 2.212 + .001X_{trt} - .024X_2 + .019X_3 + .226X_5 - .144X_6 + .010X_7 + .034X_8 + \varepsilon$ where Y_{sc} is the average student school climate score, X_{trt} is the teacher retention rate, X_2 is the percent of Black students, X_3 is the percent of Hispanic students, X_5 is the percent of English Language Learner students, X_6 is the percent of students included in the poverty count, X_7 is the attendance rate, and X_8 is the student survey response rate. Using SPSS to fit the model, I found the overall multiple regression to be statistically significant for $\alpha<0.05$ ($R^2=0.195$, $F(7, 835)=28.90$, $p<0.001$).

Teacher retention was a positive, significant predictor of student perceptions of school climate (t=2.387, p=0.017). A 10% increase in teacher retention corresponded with an increase 0.80 of a standard deviation in the overall school climate score. Several of the control variables were also significantly related for α<0.05 to student perceptions of school climate: percent of students who are English Language Learners (p<0.001), percent of students included in the poverty count (p=0.002), student attendance rate (p<0.001), and the dichotomous student survey response rate variable (p=.048). For details, see Table 6 below.

Table 6 Teacher Retention and Student Perceptions School Climate for 2014-2015

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	2.212	.131		16.944	<.001	1.956	2.468
Teacher retention rate	.001	.001	.080	2.387	.017	.000	.003
Percent of Black students	-.024	.034	-.036	-.710	.478	-.091	.043
Percent of Hispanic students	.019	.037	.026	.507	.612	-.053	.090
Percent of English Language Learners	.226	.041	.204	5.545	<.001	.146	.306
Percent of students meeting poverty count	-.144	.047	-.138	-3.065	.002	-.237	-.052
Average attendance rate	.010	.001	.289	7.491	<.001	.007	.012
Survey response rate	.034	.017	.066	1.978	.048	.000	.069

a. Dependent Variable: School Climate Composite Score (2014-15)
b. The school climate composite score is a school-level, unweighted mean calculated from the mean score reported for each survey item.

2015-2016 School Year

The fitted model for the 2015-2016 school year is $Y_{sc} = 1.820 + .003X_{trt} - .002X_2 + .062X_3 + .223X_5 - .181X_6 + .011X_7 + .035X_8 + \varepsilon$ where Y_{sc} is the average student school climate score, X_{trt} is the teacher retention rate, X_2 is the percent of Black students, X_3 is the percent of Hispanic students, X_5 is the percent of English Language Learner students, X_6 is the percent of students included in the poverty count, X_7 is the attendance rate, and X_8 is the student survey response rate. Using SPSS to fit the model, I found the overall multiple regression to be statistically significant for $\alpha<0.05$ ($R^2=0.220$, $F(7, 852)=34.241$, $p<0.001$).

There was a significant, positive relationship between teacher retention and student perceptions of school climate ($t=4.529$, $p<0.001$). A 10% increase in teacher retention corresponded with an increase of 1.47 standard deviations in the overall school climate score. Several of the control variables were also significantly related for $\alpha<0.05$ to student perceptions of school climate: percent of students who are English Language Learners ($p<0.001$), percent of students included in the poverty count ($p<0.001$), and student attendance rate ($p<0.001$). For details, see Table 7 below.

Table 7 Teacher Retention and Student Perceptions School Climate for 2015-2016

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B

	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1.820	.135		13.479	<.001	1.555	2.085
Teacher retention rate	.003	.001	.147	4.529	<.001	.002	.004
Percent of Black students	-.002	.037	-.002	-.050	.960	-.074	.070
Percent of Hispanic students	.062	.040	.079	1.548	.122	-.017	.140
Percent of English Language Learners	.223	.045	.175	4.913	<.001	.134	.312
Percent of students meeting poverty count	-.181	.049	-.161	-3.697	<.001	-.277	-.085
Average attendance rate	.011	.001	.301	8.001	<.001	.008	.014
Survey response rate	.035	.020	.058	1.754	.080	-.004	.075

a. Dependent Variable: School climate composite score (2015-16)

b. The school climate composite score is a school-level, unweighted mean calculated from the mean score reported for each survey item.

2016-2017 School Year

The fitted model for the 2016-2017 school year is $Y_{sc} = 1.918 + .003X_{trt} + .023X_2 + .044X_3 + 1.481X_4 + .238X_5 - .065X_6 + .008X_7 + .078X_8 + \varepsilon$ where Y_{sc} is the average student school climate score, X_{trt} is the teacher retention rate, X_2 is the percent of Black students, X_3 is the percent of Hispanic students, X_4 is the percent of multiracial students, X_5 is the percent of English Language Learner students, X_6 is the percent of students included in the poverty count, X_7 is the attendance rate, and X_8 is the student survey response rate. Using SPSS to fit the model, I found the overall multiple regression to be statistically significant for $\alpha<0.05$ ($R^2=0.190$, $F(8, 853)=25.028$, $p<0.001$).

Teacher retention was a positive, significant predictor of student perceptions of school climate (t=4.586, $p<0.001$). A 10% increase in teacher retention corresponded with an increase of 1.55 standard deviations in the overall school climate score. Several of the control variables were also significantly related for $\alpha<0.05$ to student perceptions of school climate: percent of multiracial students ($p=0.021$), percent of students who are English Language Learners ($p<0.001$), student attendance rate ($p<0.001$), and the dichotomous student survey response rate variable ($p<0.001$). For details, see Table 8 below.

Table 8 Teacher Retention and Student Perceptions School Climate for 2016-2017

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	1.918	.137		13.953	<.001	1.648	2.188
Teacher retention rate	.003	.001	.155	4.586	<.001	.001	.004
Percent of Black students	.023	.038	.030	.595	.552	-.052	.097
Percent of Hispanic students	.044	.040	.056	1.115	.265	-.034	.122
Percent of Multiracial students	1.481	.642	.094	2.309	.021	.222	2.741
Percent of English Language Learners	.238	.045	.194	5.339	<.001	.150	.325
Percent of students meeting poverty count	-.065	.054	-.061	-1.221	.222	-.171	.040
Average attendance rate	.008	.001	.227	5.894	<.001	.006	.011
Survey response rate	.078	.020	.131	3.953	<.001	.039	.117

a. Dependent Variable: School climate composite score (2016-17)

b. The school climate composite score is a school-level, unweighted mean calculated from the mean score reported for each survey item.

2017-2018 School Year

The fitted model for the 2017-2018 school year is $Y_{sc} = 2.019 + .003X_{trt} - .023X_2 - .023X_3 + 1.947X_4 + .207X_5 + .152X_6 + .005X_7 + .085X_8 + \varepsilon$ where Y_{sc} is the average student school climate score, X_{trt} is the teacher retention rate, X_2 is the percent of Black students, X_3 is the percent of Hispanic students, X_4 is the percent of multiracial students, X_5 is the percent of English Language Learner students, X_6 is the percent of students included in the poverty count, X_7 is the attendance rate, and X_8 is the student survey response rate. Using SPSS to fit the model, I found the overall multiple regression to be statistically significant for $\alpha<0.05$ ($R^2=0.150$, $F(8, 845)=18.587$, $p<0.001$).

There was a significant, positive relationship between teacher retention and student perceptions of school climate ($t=5.116$, $p<0.001$). A 10% increase in teacher retention corresponded with an increase of 1.73 standard deviations in the overall school climate score. Several of the control variables were also significantly related for $\alpha<0.05$ to student perceptions of school climate: percent of multiracial students ($p=0.001$), percent of students who are English Language Learners ($p<0.001$), percent of students included in the poverty count ($p=0.015$), student attendance rate ($p<0.001$), and the dichotomous student survey response rate variable ($p<0.001$). For details, see Table 9 below.

Table 9 Teacher Retention and Student Perceptions School Climate for 2017-2018

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	2.019	.143		14.097	<.001	1.738	2.300
Teacher retention rate	.003	.001	.173	5.116	<.001	.002	.004
Percent of Black students	-.023	.038	-.031	-.587	.557	-.098	.053
Percent of Hispanic students	-.023	.039	-.031	-.581	.562	-.100	.054
Percent of Multiracial students	1.947	.591	.145	3.293	.001	.786	3.108
Percent of English Language Learners	.207	.045	.179	4.566	<.001	.118	.296
Percent of students meeting poverty count	.152	.063	.146	2.427	.015	.029	.275
Average attendance rate	.005	.001	.156	3.971	<.001	.003	.008
Survey response rate	.085	.019	.153	4.497	<.001	.048	.122

a. Dependent Variable: School climate composite score (2017-18)

b. The school climate composite score is a school-level, unweighted mean calculated from the mean score reported for each survey item.

2018-2019 School Year

The fitted model for the 2018-2019 school year is $Y_{sc} = 1.99 + .004X_{trt} - .027X_2 - .023X_3 + 2.316X_4 + .252X_5 + .160X_6 + .005X_7 + .034X_8 + \varepsilon$ where Y_{sc} is the average student school climate score, X_{trt} is the teacher retention rate, X_2 is the percent of Black students, X_3 is the percent of Hispanic students, X_4 is the percent of multiracial students, X_5 is the percent of English Language Learner students, X_6 is the percent of students included in the poverty count, X_7 is the attendance rate, and X_8 is the student survey response rate. Using SPSS to fit the model, I found the overall

multiple regression to be statistically significant for $\alpha<0.05$ ($R^2=0.151$, $F(8, 845)=18.761$, $p<0.001$).

Teacher retention was a positive, significant predictor of student perceptions of school climate ($t=5.977$, $p<0.001$). A 10% increase in teacher retention corresponded with an increase of 2.06 standard deviations in overall school climate. Several of the control variables were also significantly related for $\alpha<0.05$ to student perceptions of school climate: percent of multiracial students ($p<0.001$), percent of students who are English Language Learners ($p<0.001$), percent of students included in the poverty count ($p=0.016$) and student attendance rate ($p<0.001$). For details, see Table 10 below.

Table 10 Teacher Retention and Student Perceptions School Climate for 2018-2019

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	1.999	.150		13.355	<.001	1.705	2.293
Teacher retention rate	.004	.001	.206	5.977	<.001	.003	.005
Percent of Black students	-.027	.040	-.036	-.671	.502	-.106	.052
Percent of Hispanic students	-.026	.040	-.034	-.641	.522	-.105	.053
Percent of Multiracial students	2.316	.578	.182	4.008	<.001	1.182	3.450
Percent of English Language Learners	.252	.046	.215	5.481	<.001	.161	.342
Percent of students meeting poverty count	.160	.066	.152	2.415	.016	.030	.289
Average attendance rate	.005	.001	.140	3.420	<.001	.002	.008
Survey response rate	.034	.021	.057	1.640	.101	-.007	.074

a. Dependent Variable: School climate composite score (2018-19)
b. The school climate composite score is a school-level, unweighted mean calculated from the mean score reported for each survey item.

Single-Year Linear Regression with Factors

To examine the relationship between teacher retention and student perceptions of student-teacher relationships and safety, order, and discipline for individual years (research question 1a), I used linear regression with the three factors[17] created from questions from the student survey, fitting three models for each individual year with each of the factors as the dependent variable (Tables 15-22). Each model also included several control variables, including the other two factors. For each of the individual school years all three of the models were significant, but teacher retention was only a significant predictor of some of the factors.

Teacher retention was a positive, significant predictor of the Classroom Behavior factor in each school year and of the Teacher Support factor in three school years, although the composition of these factors[18] varies slightly from year to year. Teacher retention was not significantly related to the School Safety factor, which included questions about bullying, physical fights, and gang activity, in any of the school years in this study. Table 11 summarizes the results for the relationship between teacher retention and each of the dependent variables (the overall measure of school climate, Teacher Support, Classroom Behavior, and School Safety) for each school year. Then, the results of the linear regression for each individual school year

[17] Three factors were constructed for each year although the composition varies slightly from year to year. The exploratory factor analysis included all of the questions for each individual year about student-teacher relationships and safety, order, and discipline, as discussed in Chapter 3. See Appendix E for the survey questions included in the factors for each year
[18] See Appendix E for the questions included in each factor for each year

(2014-2015 through 2018-2019) using the factors created from exploratory factor analysis for each individual school year are below.

Table 11 Teacher Retention and Dependent Variables for Individual School Years

Student Perceptions of School Climate						
Teacher Retention		2014-15	2015-16	2016-17	2017-18	2018-19
Standardized Coefficient	Beta	0.080*	0.147**	0.155**	0.173**	0.206**
Student Perceptions of Teacher Support						
Teacher Retention		2014-15	2015-16	2016-17	2017-18	2018-19
Standardized Coefficient	Beta	0.009	0.097**	0.066*	0.052	0.130**
Student Perceptions of Classroom Behavior						
Teacher Retention		2014-15	2015-16	2016-17	2017-18	2018-19
Standardized Coefficient	Beta	0.103**	0.146**	0.114**	0.147**	0.106**
Student Perceptions of School Safety						
Teacher Retention		2014-15	2015-16	2016-17	2017-18	2018-19
Standardized Coefficient	Beta	0.046	0.003	.035	0.026	0.058

*p<0.05, **p<0.01

2014-2015 School Year

For the 2014-2015 school year, I used SPSS to fit three models, one where each of the three factors was the dependent variable. Although all three models were significant, teacher retention was a positive, significant predictor in only one model (t=2.949, p=0.003), where the dependent variable was the Classroom Behavior factor which is composed of questions about how students behave in class (see Appendix E for full list of questions). A 10% increase in teacher retention corresponded with an increase of 1.03 standard deviations in the Classroom Behavior measure. The percent of Black students (p<0.001), percent of Hispanic students (p<0.001), percent of English Language Learners (p<0.001), and the school's attendance rate (p<0.001) were also significant predictors in the model where the Classroom Behavior factor

was the dependent variable. In this model, R^2=0.121, F(9, 833)=12.709, p<0.001. See Table 12 for details. Teacher retention was not significantly related to the Teacher Support factor (t=0.253, p=0.800) nor to the School Safety factor (t=1.686, p=0.092).

Table 12 Teacher Retention and Classroom Behavior Factor for 2014-2015

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	4.350	.723		6.019	<.001	2.931	5.769
Retention Rate	.009	.003	.103	2.949	.003	.003	.015
Percent of Black students	-.692	.192	-.206	-3.610	<.001	-1.069	-.316
Percent of Hispanic students	-.835	.194	-.234	-4.310	<.001	-1.215	-.455
Percent of English Language Learners	.863	.227	.155	3.808	<.001	.418	1.308
Percent of students meeting poverty count	-.266	.253	-.051	-1.051	.294	-.762	.231
Average attendance rate	-.048	.007	-.287	-6.675	<.001	-.062	-.034
Survey response rate	-.166	.092	-.064	-1.811	.071	-.347	.014
Teacher Support Factor	.011	.031	.013	.375	.708	-.049	.071
School Safety Factor	.053	.038	.061	1.391	.164	-.022	.128

a. Dependent Variable: Classroom Behavior Factor

2015-2016 School Year

For the 2015-2016 school year, I used SPSS to fit three models, one where each of the three factors was the dependent variable. All three models were significant and teacher retention was a significant predictor in two of the three models. Teacher retention was a positive, significant predictor (t=4.367, p<0.001) of the Classroom Behavior factor (see Appendix E for full list of questions). A 10%

increase in teacher retention corresponded with an increase of 1.46 standard deviations in the Classroom Behavior measure. The percent of Hispanic students (p=0.005), percent of English Language Learners (p<0.001), the school's attendance rate (p<0.001) and the School Safety factor (p=0.002) were also significant predictors in the model where Classroom Behavior was the dependent variable. See Table 13 for details. In this model, R^2=0.172, F(9, 850)=20.839, p<0.001.

Teacher retention was a positive, significant predictor (t=2.921, p=0.004) of the Teacher Support factor which is composed of questions about teachers support of and respect for students (see Appendix E for full list of questions). A 10% increase in teacher retention corresponded with an increase of 0.97 standard deviations in the Teacher Support measure. The percent of Black students (p<0.001), the percent of Hispanic students (p<0.001), percent of English Language Learners (p<0.001), and the school's attendance rate (p<0.001) were also significant predictors in the model where Teacher Support was the dependent variable. See Table 14 for details. In this model, R^2=0.201, F(9, 850)=23.726, p<0.001. Teacher retention was not significantly related to the School Safety factor (t=0.113, p=0.910).

Table 13 Teacher Retention and Classroom Behavior Factor for 2015-2016

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	2.663	.701		3.799	<.001	1.287	4.039
Retention Rate	.013	.003	.146	4.367	<.001	.007	.019
Percent of Black students	-.046	.187	-.013	-.246	.805	-.412	.320

Percent of Hispanic students	-.546	.194	-.149	-2.815	.005	-.927	-.165
Percent of English Language Learners	2.349	.228	.394	10.293	<.001	1.901	2.797
Percent of students meeting poverty count	-.140	.238	-.027	-.589	.556	-.608	.328
Average attendance rate	-.040	.007	-.235	-5.689	<.001	-.054	-.026
Survey response rate	-.107	.097	-.037	-1.102	.271	-.299	.084
Teacher Support Factor	.007	.031	.008	.223	.823	-.055	.069
School Safety Factor	.109	.035	.121	3.140	.002	.041	.177

a. Dependent Variable: Classroom Behavior Factor

Table 14 Teacher Retention and Teacher Support Factor for 2016-2017

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	-8.516	.713		-11.951	<.001	-9.914	-7.117
Retention Rate	.010	.003	.097	2.921	.004	.003	.016
Percent of Black students	.964	.201	.250	4.805	<.001	.570	1.358
Percent of Hispanic students	1.027	.210	.254	4.902	<.001	.616	1.438
Percent of English Language Learners	1.209	.260	.184	4.644	<.001	.698	1.720
Percent of students meeting poverty count	-.327	.260	-.056	-1.260	.208	-.837	.183
Average attendance rate	.075	.007	.401	10.236	<.001	.061	.090
Survey response rate	.280	.106	.088	2.645	.008	.072	.488
School Safety Factor	-.054	.038	-.054	-1.412	.158	-.128	.021
Classroom Behavior Factor	.008	.037	.008	.223	.823	-.065	.082

a. Dependent Variable: Teacher Support Factor

2016-2017 School Year

For the 2016-2017 school year, I used SPSS to fit three models, one where each of the three factors was the dependent variable. All three models were significant and teacher retention was a significant predictor in two of the three models. Teacher retention was a positive, significant predictor ($t=3.478$ $p<0.001$) of the Classroom Behavior factor (see Appendix E for full list of questions). A 10% increase in teacher retention corresponded with an increase of 1.14 standard deviations in the Classroom Behavior measure. The percent of Black students ($p=0.034$), percent of English Language Learners ($p<0.001$), and the school's attendance rate ($p<0.001$), and the Teacher Support factor ($p<0.001$) were also significant predictors in that model. See Table 15 for details. In this model, $R^2=0.250$, $F(10, 851)=28.306$, $p<0.001$.

Teacher retention was a positive, significant predictor ($t=2.027$, $p=0.043$) of the Teacher Support factor (see Appendix E for full list of questions). A 10% increase in teacher retention corresponded with an increase of 0.66 standard deviations in the Teacher Support measure. The percent of Black students ($p=0.010$), percent of Hispanic students ($p<0.001$), percent of multiracial students ($p<0.001$), percent of English Language Learners ($p=0.010$), the school's attendance rate ($p<0.001$), the student survey response rate ($p<0.001$), the Classroom Behavior factor ($p<0.001$), and the School Safety factor ($p=0.003$) were also significant predictors in that model. See Table 16 for details. In this model, $R^2=0.279$, $F(10, 851)=32.855$, $p<0.001$. Teacher retention was not significantly related to the School Safety factor ($t=1.087$, $p=0.278$).

Table 15 Teacher Retention and Classroom Behavior Factor for 2016-2017

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	2.149	.686		3.132	.002	.802	3.496
Retention Rate	.009	.003	.114	3.478	<.001	.004	.014
Percent of Black students	.382	.180	.107	2.121	.034	.028	.736
Percent of Hispanic students	-.230	.184	-.062	-1.254	.210	-.590	.130
Percent of Multiracial students	-5.685	2.963	-.076	-1.919	.055	-11.500	.130
Percent of English Language Learners	2.687	.205	.464	13.112	<.001	2.285	3.090
Percent of students meeting poverty count	-.098	.246	-.019	-.401	.689	-.581	.384
Average attendance rate	-.036	.007	-.209	-5.244	<.001	-.050	-.023
Survey response rate	.094	.091	.033	1.040	.299	-.084	.273
Teacher Support Factor	.159	.031	.174	5.052	<.001	.097	.220
School Safety	.058	.032	.064	1.835	.067	-.004	.121

a. Dependent Variable: Classroom Behavior Factor

Table 16 Teacher Retention and Teacher Support Factor for 2016-2017

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	-9.132	.674		-13.550	<.001	-10.454	-7.809
Retention Rate	.006	.003	.066	2.027	.043	.000	.011
Percent of Black students	.500	.194	.127	2.580	.010	.120	.880
Percent of Hispanic students	.953	.195	.235	4.886	<.001	.570	1.336
Percent of Multiracial students	17.087	3.142	.208	5.438	<.001	10.920	23.254

Percent of English Language Learners	-.625	.241	-.098	-2.592	.010	-1.098	-.152
Percent of students meeting poverty count	.265	.264	.048	1.003	.316	-.254	.784
Average attendance rate	.083	.007	.438	11.943	<.001	.070	.097
Survey response rate	.406	.097	.131	4.195	<.001	.216	.596
Classroom Behavior Factor	.184	.036	.167	5.052	<.001	.112	.255
School Safety Factor	-.101	.034	-.100	-2.956	.003	-.168	-.034

a. Dependent Variable: Teacher Support Factor

2017-2018 School Year

For the 2017-2018 school year, I used SPSS to fit three models, one where each of the three factors was the dependent variable. Although all three models were significant, teacher retention was a positive, significant predictor in only one model (t=4.879, $p<0.001$), where the dependent variable was the Classroom Behavior factor. The composition of the Classroom Behavior factor for 2017-2018 was slightly different than other years in this study and included some questions about teacher respect and support with the questions about students' behavior in class (see Appendix E for full list of questions). A 10% increase in teacher retention corresponded with an increase of 1.47 standard deviations in the Classroom Support measure. The percent of Hispanic students ($p<0.001$), percent of English Language Learners ($p<0.001$), percent of students who are included in the school's poverty count ($p<0.001$), the school's attendance rate ($p<0.001$), and both of the other factors ($p<0.001$) were also significant predictors in this model where the Classroom Behavior factor was the dependent variable. See Table 17 for details. In this model, $R^2=0.338$, F(10,

843)=42.974, p<0.001. Teacher retention was not significantly related to the Teacher Support factor (t=1.605, p=0.109) nor to the School Safety factor (t=0.803, p=0.422).

Table 17 Teacher Retention and Classroom Behavior Factor for 2017-2018

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	1.163	.675		1.723	.085	-.162	2.488
Retention Rate	.013	.003	.147	4.879	<.001	.008	.018
Percent of Black students	-.289	.172	-.081	-1.683	.093	-.627	.048
Percent of Hispanic students	-1.008	.174	-.276	-5.802	<.001	-1.348	-.667
Percent of Multiracial students	1.159	2.619	.017	.442	.658	-3.982	6.300
Percent of English Language Learners	2.144	.199	.376	10.790	<.001	1.754	2.535
Percent of students meeting poverty count	1.999	.279	.389	7.164	<.001	1.452	2.547
Average attendance rate	-.040	.006	-.239	-6.503	<.001	-.053	-.028
Survey response rate	.075	.084	.027	.890	.374	-.090	.239
Teacher Support Factor	.140	.029	.155	4.896	<.001	.084	.196
School Safety Factor	.118	.029	.131	4.024	<.001	.061	.176

a. Dependent Variable: Classroom Behavior Factor

2018-2019 School Year

For the 2018-2019 school year, I used SPSS to fit three models, one where each of the three factors was the dependent variable. All three models were significant and teacher retention was a significant predictor in two of the three models. Teacher retention was a positive, significant predictor (t=3.476 p<0.001) of the Classroom Behavior factor which was composed of questions about how students behave in class and about teacher care (see Appendix E for full list of questions). A

10% increase in teacher retention corresponded with an increase of 1.06 standard deviations in the Classroom Behavior measure. The percent of Black students (p=0.048), percent of Hispanic students (p<0.001), percent of English Language Learners (p<0.001), percent of students included in the school's poverty count (p<0.001), the school's attendance rate (p<0.001), the Teacher Support factor (p=0.005) and the School Safety factor (p<0.001) were also significant predictors in the model where Classroom Behavior was the dependent variable. See Table 18 for details. In this model, R^2=0.355, F(10, 843)=46.458, p<0.001.

Teacher retention was a positive, significant predictor (t=3.876, p<0.001) of the Teacher Support factor which is composed of questions about teacher support and respect (see Appendix E for full list of questions). A 10% increase in teacher retention corresponded with an increase of 1.30 standard deviations in the Teacher Support measure. The percent of Black students (p<0.001), percent of Hispanic students (p<0.001), percent of multiracial students (p<0.001), percent of students included in the school's poverty count (p=0.006), the school's attendance rate (p<0.001), the Classroom Behavior factor (p=0.005), and the School Safety factor (p=0.041) were also significant predictors in the model with the Teacher Support factor as the dependent variable. See Table 19 for details. In this model, R^2=0.215, F(10, 843)=23.105, p<0.001. Teacher retention was not significantly related to the School Safety factor (t=1.866, p=0.062).

Table 18 Teacher Retention and Classroom Behavior Factor for 2018-2019

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	2.910	.687		4.236	<.001	1.562	4.258
Retention Rate	.010	.003	.106	3.476	<.001	.004	.015
Percent of Black students	-.344	.173	-.096	-1.983	.048	-.684	-.003
Percent of Hispanic students	-1.177	.171	-.326	-6.886	<.001	-1.512	-.841
Percent of Multiracial students	-3.155	2.487	-.051	-1.269	.205	-8.036	1.726
Percent of English Language Learners	2.058	.194	.366	10.602	<.001	1.677	2.439
Percent of students meeting poverty count	1.786	.284	.353	6.281	<.001	1.228	2.344
Average attendance rate	-.053	.006	-.311	-8.253	<.001	-.066	-.040
Survey response rate	.062	.087	.022	.713	.476	-.108	.232
Teacher Support Factor	.079	.028	.087	2.788	.005	.023	.134
School Safety Factor	.180	.029	.207	6.230	<.001	.123	.237

a. Dependent Variable: Classroom Behavior Factor

Table 19 Teacher Retention and Teacher Support Factor for 2018-2019

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	-10.042	.770		-13.040	<.001	-11.554	-8.531
Retention Rate	.013	.003	.130	3.876	<.001	.006	.019
Percent of Black students	.906	.209	.230	4.333	<.001	.495	1.316
Percent of Hispanic students	.998	.211	.251	4.732	<.001	.584	1.412

Percent of Multiracial students	19.233	2.954	.284	6.511	<.001	13.435	25.031
Percent of English Language Learners	.243	.251	.039	.966	.334	-.250	.736
Percent of students meeting poverty count	.962	.352	.173	2.731	.006	.271	1.653
Average attendance rate	.079	.008	.417	10.243	<.001	.064	.094
Survey response rate	.189	.105	.060	1.796	.073	-.018	.395
Classroom Behavior	.116	.042	.105	2.788	.005	.034	.198
School Safety	-.074	.036	-.077	-2.051	.041	-.144	-.003

a. Dependent Variable: Teacher Support Factor

Fixed Effects Regression of Repeated Measures for an Overall Measure of School Climate

To answer research question 2, I used a fixed effects regression with repeated measures model with an overall measure of school climate as the dependent variable. In the full model, with one school and the 2018-2019 school year as the reference categories, and with all of the control variables, teacher retention was positively and significantly (t=5.179, $p<0.001$) related to student's perceptions of school climate[19] (See Table 20 for details). There were 4,273 observations in the model.

A 10% increase in teacher retention corresponded with an increase of 0.51 standard deviations in the school climate measure. For each year the school climate was significantly more positive than the reference category of 2018-2019 for $\alpha<0.05$. When you add the control variables into the model, all of the years remained significant. Fitting a model with the dummy variables for schools as predictors, I

[19] In a reduced model which only included the dummy variables for each school and school year, and teacher retention as predictors of the overall measure of school climate, teacher retention was still positively and significantly (t=5.391, p<0.001) related to student perceptions of school climate

found between school differences accounted for 72.6% of the variation in the schoolwide averages of student school climate scores. After adding teacher retention and the dummy variables for each school year, the model accounted for 84.2% of the variation in student school climate scores, and the full model accounted for 84.8% of the variation.

Table 20 Teacher Retention and Student Perceptions of School Climate for 2014-2019

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std Error	Beta	t	Sig.
Teacher Retention Rate	.001	.000	.051	5.179	<.001
2014-2015	.191	.005	.384	40.764	<.001
2015-2016	.046	.005	.093	9.962	<.001
2016-2017	.017	.004	.034	3.817	<.001
2017-2018	.015	.004	.031	3.605	<.001
Percent of Black students	-.245	.080	-.317	-3.065	.002
Percent of Hispanic students	-.128	.079	-.159	-1.606	.108
Percent of English Language Learners	.327	.071	.259	4.590	<.001
Percent of students meeting poverty count	.142	.031	.126	4.543	<.001
Average attendance rate	.009	.001	.254	8.183	<.001
Survey response rate	.002	.006	.004	.380	.704

a. Dependent Variable: School climate composite score
b. The school climate composite score is a school-level, unweighted mean calculated from the mean score reported for each survey item.

Fixed Effects Regression of Repeated Measures with Factors

To answer research question 2a, I created three fixed effects regression models with one school and the 2018-2019 school year as the reference categories, one for each of the three factors created in the exploratory factor analysis for the combined 2015-2016 through 2018-2019 school years. Teacher retention was only a significantly related to one factor ($p<0.05$). Teacher retention was a positive, significant predictor in the full model (t=2.836, $p=0.005$) of the Teacher Support factor[20] (See Table 21 for details). There were 3,430 observations in this model.

A 10% increase in teacher retention corresponded with an increase of 0.33 standard deviations in the Teacher Support measure. Fitting a model with the dummy variables for schools as predictors, I found between school differences accounted for 83.9% of the variation in the Teacher Support factor. After adding teacher retention and the dummy variables for each school year, the model accounted for 85.1% of the variation in the Teacher Support factor; the full model accounted for 85.5% of the variation in the Teacher Support factor.

Teacher retention was not a significant predictor of the Classroom Behavior factor in the reduced (t=1.778, $p=0.076$) or full model (t=1.867, $p=0.062$). Fitting a

[20] In a reduced model which only included the dummy variables for each school and school year, and teacher retention, with the Teacher Support factor as the dependent variable, teacher retention was a positive significant predictor of the Teacher Support factor (t=3.432, p<0.001).

model with the dummy variables for schools as predictors, I found between school differences accounted for 81.1% of the variation in the Classroom Behavior factor. After adding teacher retention and the dummy variables for each school year, the model accounted for 82.6% of the variation in the Classroom Behavior factor; the full model accounted for 83.1% of the variation in the Classroom Behavior factor.

Teacher retention was also not a significant predictor of the School Safety factor in the reduced (t=0.941, p=0.347) or full model (t=0.340, p=0.734). The School Safety factor included questions about fighting, gang activity, and bullying. Fitting a model with the dummy variables for schools as predictors, I found between school differences accounted for 75.3% of the variation in the School Safety factor. After adding teacher retention and the dummy variables for each school year, the model accounted for 89.9% of the variation in the School Safety factor; the full model accounted for 90.3% of the variation the School Safety factor. See Appendix F for a full list of questions for each factor.

Table 21 Teacher Retention and Teacher Support for 2015-2019

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std Error	Beta	t	Sig.
Teacher Retention Rate	.003	.001	.033	2.836	.005
Classroom Behavior Factor	.032	.021	.029	1.574	.116
School Safety Factor	.154	.024	.154	6.406	<.001
2015-2016	-.307	.033	-.133	-9.281	<.001
2016-2017	.092	.023	.040	3.931	<.001
2017-2018	.036	.022	.016	1.675	.094

Percent of Black students	-.055	.520	-.014	-.105	.916
Percent of Hispanic students	.588	.521	.145	1.288	.259
Percent of English Language Learners	.888	.454	.139	1.955	.051
Percent of students meeting poverty count	.212	.180	-.038	1.180	.238
Average attendance rate	.038	.008	.198	4.923	<.001
Survey response rate	-.007	.036	-.002	-.203	.839
a. Dependent Variable: Teacher Support Factor					

Chapter 5: Discussion

The purpose of this study was to examine the relationship between teacher retention and student perceptions of school climate with a special focus on student-teacher relationships and safety, order, and discipline. I used teacher retention from the fall of a school year to predict student perceptions of school climate in the spring of the same school year, unlike most of the prior research which used school climate in one school year to predict teacher retention in the following school year. I found a significant positive relationship between teacher retention and student perceptions of school climate, both in individual school years and across the five-years included in this study. In some models, I also found teacher retention to be a significant, positive predictor of student classroom behavior and teacher support of students.

In this chapter, first I will summarize the findings from this study and how they are situated in prior research in this field. I will begin with the findings for the overall measure of school climate and then move to the findings for the factors formed by questions about student-teacher relationship and safety, order, and discipline. Then I will review the student demographic control variables used in this study. Next, I will discuss the implications for practice, followed by the limitations and areas for future research.

Summary and Interpretation of Findings

Consistent with my expectations, teacher retention was a significant predictor of school climate, both in individual years and the five-year period I examined. Teacher retention was also a significant predictor of some of the factors created with

questions about student-teacher relationships and safety, order, and discipline, although this was not always the case, as discussed in more detail below. Although I found significant relationships between teacher retention and school climate and two of the factors, the effect size appeared modest. For example, in the most recent year in this study, 2018-2019, a 1% increase in teacher retention predicted a 0.004 increase in the student school climate survey or an increase of 0.206 standard deviations. However, in many schools in New York City, a 1% increase in the teacher retention rate is less than one teacher, so changes in the school's teacher retention rate are likely to be in larger intervals for small and medium-sized schools. For each school year the standard deviation in teacher retention was approximately 10%, and, using our example year of 2018-2019, a 10% increase in teacher retention was associated with a 2.06 standard deviation increase in the school climate measure, a substantial increase in how students perceive their school's climate.

For individual school years, a 10% increase in teacher retention, which was equivalent to about 1 standard deviation, was associated with between 0.8 and 2.06 standard deviations increase in school climate scores, between 1.03 and 1.47 standard deviations increase in student perceptions of Classroom Behavior, and between 0.66 and 1.30 standard deviations increase in student perceptions of Teacher Support. This suggests that improving teacher retention by just a handful of teachers each year could lead to real, measurable improvements in the student experience at a given school. This positive, significant relationship holds in the multi-year model for the overall measure of school climate, suggesting that if teacher retention continues to improve at the school, so do the student perceptions of school climate. However, in

this multi-year model using fixed effects regression of repeated measures, which accounted for the previous measures of school climate and teacher retention at that school, the effect size was smaller with a 10% increase in teacher retention associated with a 0.51 standard deviation increase in the school climate measure (or a 0.01 increase in the survey score).

Although in several years the effect size was substantial, in other models the effect size was more modest, particularly for the panel analysis, the Teacher Support factor and School Safety factor (which was not significantly related to teacher retention in any of the models). There could be several reasons some of effect sizes were modest. One reason may be this study could not differentiate between voluntary and involuntary attrition, nor between midyear and end-of-year retention. For example, it could be that combining voluntary and involuntary attrition together dilutes the effect of effectual teachers leaving, or that mid-year teacher departures have a larger (or smaller) effect on student perceptions of school climate than end-of-year attrition. It could also be there are issues with the school climate measurement that are affecting the effect size. Defining and measuring a complex concept like school climate is difficult, and it could be that the survey under-represented or did not measure aspects of school climate that were most sensitive to teacher retention. Additionally, although the response rate was generally high for the student survey, it could be that students did not understand some of the survey questions, did not answer the questions seriously, or simply rushed through taking the survey.

To answer the first research question, which focused on the relationship between teacher retention and school climate in individual school years, I used linear

regression with teacher retention as a predictor of an overall measure of school climate for each individual school year 2014-15 through 2018-2019. Similarly, for sub question 1a, I used linear regression with teacher retention as a predictor for the factors formed from questions about student-teacher relationships and safety, order, and discipline for each individual school year 2014-15 through 2018-2019. I used panel analysis to answer the second research question which asked about these relationships across multiple school years. I used data from the 2014-2015 through 2018-2019 school years for the model with the overall measure of school climate and data from the 2015-2016 through 2018-2019 school years for the factors formed from questions about student-teacher relationships and safety, order, and discipline. The following section reviews the findings first for an overall measure of student perceptions of school climate and then for the factors formed from the student survey questions about student-teacher relationships and safety, order, and discipline.

Overall Measure of School Climate

Prior research has generally found a positive relationship between school climate and teacher retention, although this research often uses teacher perceptions of school climate as at least one of the respondent groups (Cohen, McCabe et al., 2009; Cohen, Pickeral, et al. 2009; Guin, 2004; Robinson et al., 2016; Thapa et al., 2013; Thapa, 2013). Using student survey responses to check for common source bias in teacher surveys, Kraft et al. (2016) also found a positive relationship between student perceptions of school climate and teacher retention. Consistent with these studies, but looking at the relationship in reverse from prior researchers, I found teacher retention was a positive, significant predictor of an overall measure of student perceptions of

school climate in each individual school year. Using fixed effects regression of repeat measures to examine this relationship across multiple school years, I found teacher retention was a positive, significant predictor of an overall measure of school climate, although the effect size was modest in this model.

Given the results of prior research combined with this study, the findings suggest the relationship between teacher retention and school climate could be cyclical, with teacher retention in the fall predicting school climate in the spring, and school climate measured in the spring predicting teacher retention the following fall. More specifically, prior research used school climate data from one school year to predict teacher retention in the following school year. Then in this study, I used teacher retention rates gathered in October of one school year to predict student perceptions of school climate in the spring of the same school year, and fixed effects regression with repeat measures to examine that same relationship across multiple school years.

These findings suggest teacher retention and school climate are intertwined; teachers want to stay at a school with a positive school climate, and those returning teachers can allocate more time on improving the school climate if they do not have to spend time onboarding large numbers of new teachers or changing teaching assignments each year (Marinell & Coca, 2013). However, in schools with chronic teacher turnover problems, there is little time or energy left to address other issues at the school, such as deficiencies in the school's climate. High rates of teacher turnover, including chronic or cumulative turnover, are particularly prevalent in schools with large proportions of minoritized students or students living in poverty

(Holme et al., 2018), which could mean that minoritized students and students living in poverty are disproportionately attending schools where high turnover is impeding the improvement of school climate.

While prior research has tended to focus on the teacher experience at school, examining the relationship between teacher retention and either teacher perceptions of school climate or working conditions (Allensworth, 2012; Cohen, McCabe, et al., 2009; Cohen, Pickeral, et al. 2009; Ingersoll & Smith, 2003; Ingersoll, 2001; Robinson et al., 2016; Smith & Johnson, 2015; Thapa et al., 2013; Thapa, 2013), students also deserve to attend schools they view as safe and welcoming spaces. This study suggests that staying teachers are not just improving school climate from the teachers' perspective, but they are improving the way students view their school's climate as well. Breaking the cycle of high teacher turnover can lead to an improved school climate for both students and teachers.

Student-Teacher Relationships and Safety, Order, and Discipline

In addition to an overall measure of school climate, this study focused on two dimensions of school climate, student-teacher relationships and safety, order, and discipline. Students have first-hand experience with both student-teacher relationships and safety, order, and discipline, and both dimensions are cited by teachers as influential in their satisfaction and retention decisions (Bradley & Loadman, 2005; Ingersoll & May, 2012; Ingersoll & Smith, 2003; Koth et al., 2008; Shann, 1998). Because the survey was not designed to measure student-teacher relationships and safety, order, and discipline as separate factors, I included all of the questions about student-teacher relationships and safety, order, and discipline in the same exploratory

factor analysis. Factor analysis resulted in three factors for each individual school year and three factors for the combined data for the fixed effects regression of repeated measures, although the composition of the factors varies a bit year to year[21]. Questions about student behavior ended up in two factors, Classroom Behaviors and School Safety. The next two sections discuss the single-year and four-year results for the three factors; first I discuss the student behavior factors and then the Teacher Support factor.

Student Behavior Factors

Teacher retention was a positive, significant predictor of the Classroom Behavior factor in each individual school year, but the relationship was not significant in the fixed effects regression of repeated measures model. The Classroom Behavior factor included the questions about how students behaved in class, such as whether students "behave well even when the teacher isn't watching" or "pay attention when they are supposed to." In some years this same factor also includes questions about teachers' behavior, such as "My teachers treat me with respect" or "My teachers notice when I am upset" (in other years, these questions were in the Teacher Support factor). These findings suggest that although schools with higher retention rates also have more positive classroom behavior, there may be something else related to the classroom behavior and the retention, possibly including the classroom behavior from the previous year. For example, it could be that better student behavior in class leads to increased teacher retention, which leads to continued good student behavior in the classroom. Or, it could be schools with less

[21] See Appendix E for a full list of questions for each of the three factors for each individual year and Appendix F for the survey questions used in the three factors for the fixed effects regression for repeated measures.

teacher attrition are able to devote more professional development time to classroom management, or perhaps they have more supportive administrators, leading to both better classroom behavior and teacher retention.

The other factor with questions about student behavior was the School Safety Factor. This factor included questions about safety concerns such as bullying, physical fights, and gang activity. It was not significantly related to teacher retention in any year of this study nor in the panel analysis. This suggests that increasing teacher retention does not improve how students perceive school safety issues such as fighting, gang activity, and bullying at their school. It could be teacher retention is not sufficient to address such serious student behavior issues. Perhaps these more serious issues are generally referred to administrators or other school personnel instead of to teachers. Or perhaps it could be students are particularly sensitive to any fighting, bullying, or gang activity at their school and therefore the School Safety factor scores do not change for small improvements in these types of behaviors, or the survey is not good at capturing between school differences in school safety issues.

While these findings may seem partially contradictory with prior research, because the composition of safety, order, and discipline differ from study to study, a direct comparison is difficult. For example, Koth et al. (2008) looking at data from a single school year found students rated schools more positively on the Order and Discipline factor when there was less teacher attrition, however, teacher ratings of individual students' "disruptive or aggressive behaviors" (p. 98) were also included in the model. The Order and Discipline factor for Koth and colleagues' study included questions similar to those in both the Classroom Behavior and School Safety factors

from this study, making a direct comparison difficult. The single-year positive relationship between the Classroom Behavior factor and teacher retention is consistent with Kohl and Steffgen's finding that students from schools with higher rates of turnover "described the school as less orderly" (p. 101). Perhaps their inclusion of the teachers' ratings of individual students' aggressive and disruptive behavior in the model accounts for why their Order and Discipline factor was significantly related to teacher retention but this study's School Safety factor was not.

Much of the other prior research on the relationship between teacher retention and safety, order, and discipline focuses on teacher perceptions of safety, order, and discipline, but this study used student perceptions of school climate. Student and teacher perceptions of school climate can vary even within the same schools; for example, Mitchell et al. (2010) found that teachers' perceptions of school climate are more influenced by classroom-level factors while students' perceptions of school climate are more influenced by school-level factors. This seems to be consistent with the findings from this study, where the Classroom Behavior factor, which consists mainly of questions about students' behavior at the classroom-level, is significantly and positively related to teacher retention, whereas the School Safety factor, which includes questions about behavior such as gang activity, physical fights, and bullying, which are more likely school-level issues, was not significantly related to teacher retention. It could be that higher rates of teacher retention results in more teachers with experience in effective classroom management in the classroom, where they are able to improve classroom behavior, but that teachers do not have as much control over wider-school student behaviors such as fighting. Conversely it could be that

students' behavior in class more directly affects teachers than gang activity, fighting, or bullying, and therefore classroom behaviors are driving teachers' retention decisions.

Teacher Support

In the model using fixed effects regression of repeated measures for 2015-2016 through 2018-2019, teacher retention was significantly related to the Teacher Support factor, although the effect size was modest. A 10% increase in school climate was associated with a 0.33 standard deviation increase in the Teacher Support factor. In three of the five individual school years in this study, teacher retention was a significant positive predictor the Teacher Support factor (it was not significant in 2014-2015 and 2017-2018). The effect size for individual years, as with the model for the overall measure of school, had larger effect sizes than the panel analysis. A 10% increase in teacher retention was associated with between 0.66 and 1.30 standard deviation increase in the Teacher Support Score.

Questions about teacher behaviors were distributed between two factors, depending on the year[22]. In some years, the Classroom Behavior factor discussed above also included questions such as other "My teachers treat me with respect," "My teachers help me catch up if I am behind" and "When my teachers tell me not to do something, I know they have a good reason." In other years, those questions are included in the Teacher Support factor. The Teacher Support factor included questions such as "There is at least one adult in the school that I can confide in" and "My teachers notice if I have trouble learning something." The factor composition for

[22] For a list of the survey questions included in this factor in each year, see Appendix E and for the questions included in the factor from the combined data, see Appendix F.

the two years that were not significant were a bit different from the other years. Because of changes made to the survey before the 2015-2016 school year, the factor analysis for 2014-2015 included several questions that were framed differently or were not included on subsequent surveys. In 2017-2018, the Classroom Behavior factor, which was significantly related to teacher retention, absorbed several of the questions usually associated with teacher support, such as "My teachers support me when I am upset" and "My teachers treat me with respect" which could be why the Teacher Support factor was not significant that year. This could explain why those particular years there was not a significant relationship between teacher retention and the Teacher Support factor.

Because the student version of the NYC School Survey was not designed to specifically measure the student-teacher relationship dimension of school climate, it is more difficult to compare the results to prior research. However, given the significant positive relationship between student perceptions of Teacher Support and teacher retention, this study suggests that schools with higher rates of teacher retention have students that feel more supported by their teachers, both emotionally and academically. This is consistent with prior research that has found a positive relationship between student-teacher relationships and teacher retention (Cohen, McCabe, et al., 2009) or job satisfaction (Bradley & Loadman, 2005; Shann, 1998). In a qualitative study in Baltimore, students stressed the importance of teacher retention in student-teacher relationship when they described the two types of adults at their school: "the kind that was committed and fully engaged in helping students

with academic and personal struggles and the kind that was disengaged and leaving as soon as possible" (Smith et al., 2014, pp. 20-21).

Student Demographic Characteristics

Because data was reported at the school-level, I was unable to examine the relationship between individual student characteristics and perceptions of school climate. However, I included school-level student demographic characteristics in the models as control variables, as prior research showed that student perceptions of school climate varied based on demographic characteristics of the student. However, the direction of the relationship was not always consistent from study to study. For example, Bryson and Childs (2018) found African American students viewed school climate more positively than White or Hispanic students, while Mitchell et al. (2010) found White students reported a more positive school climate than their minoritized classmates. It could be the composition of the student body rather than an individual student's race plays a role in how students perceive the school climate (Bryson & Childs, 2018). Similarly, few consistent patterns of student demographic characteristics predicting school climate emerged in this study. The findings of this study suggest students at schools with larger proportions of ELL students perceive school climate more positively than schools with fewer ELL students. Higher attendance rates were correlated with higher school climate scores, although my analysis cannot determine the direction of the relationship. It could be students attend school more regularly when they perceive a positive school climate than when they perceive a negative school climate.

Although not the focus of this study, some student body demographic characteristics were significant predictors of student perceptions of school climate for snapshots of individual school years. The percent of students at a school who are ELL, the school's average attendance rate, and schools with at least 70% response rate were positive, significant predictors of school climate each school year of this study and the percent of multiracial students at a school was a positive, significant predictor in the years it was collected (2016-2017 through 2018-2019). The school's poverty count variable was a negative, significant predictor in 2014-2015 and 2015-2016 and a positive, significant predictor in 2017-2018 and 2018-2019 of school climate but was not significant in 2016-2017. The percentage of the student body that was Black and the percentage of the study body that was Hispanic were not significant predictors of student perceptions of school climate in the model for any of the individual school years.

In the model using fixed effects regression of repeated measures to examine the relationship between teacher retention and student perceptions of school climate, the percentage of the student body that was Black had a significant, negative relationship with students' perceptions of school climate. The percent of students who are ELL, the percent of students included in the school's poverty count, and the school's average attendance rate have a significant, positive relationship with students' perceptions school climate. None of the other student demographic characteristics were significant in the model; the percent of the student body that was multiracial was not included in this model because that data was not collected until the 2016-2017 school year.

Implications for Practice

Improving teacher retention rates can be beneficial to schools for a number of reasons, including improving school climate and student experiences. First, schools benefit by saving money and time on recruitment and onboarding when they retain teachers (Jacob, 2007; Marinell & Coca, 2013; Simon & Johnson, 2015). Schools with higher rates of teacher turnover also suffer from disruptions to the instructional program, repeated professional development, and less trust and collaboration between teachers than schools with lower rates of teacher retention (Guin, 2004). However, most of the teacher retention and turnover research has not centered the student experience. This study suggests that increasing teacher retention rates can improve how students perceive their school's climate. Student perceptions of school climate provide broad-reaching insights into how students experience school. Improving how students perceive the climate of their school is important in its own right, as all students deserve to go to a school where they feel safe, welcome, and respected. Given teacher retention's relationship to a number of positive school outcomes in addition to student perceptions of school climate, it is an area that deserves focus from school leaders.

Second, given the potential cyclical relationship between teacher retention and school climate, a focus on incremental improvements to rates of teacher retention could lead not only to improvements in student perceptions of school climate, but also to further improvements in teacher retention. Chronic teacher turnover can be disruptive to schools (Holme et al., 2018), and a "constant churn of teachers may… make the school climate all the more challenging" (Marinell & Coca, 2013, p. 32).

Although this study examined *student* perceptions of school climate instead of teacher perceptions, and student and teachers can view school climate differently, it still provides evidence of the possible benefit of school leaders focusing on improving teacher retention to improve school climate and future teacher retention.

However, improving teacher retention is not sufficient to address all areas of school climate. Teacher retention does not appear to be related to school safety matters such as bullying, fighting, and gang activity as measured by student surveys. Schools will need to implement other strategies to improve this aspect of school climate, which may include partnering with experts outside of the school. Schools and teachers are often tasked with solving wide-ranging issues that arise in a school even when they do not originate in the school. For example, gang activity is not limited to a school, but students involved in gang activity can affect all of the students at a school. While schools may be a sensible place to reach students, schools may need support in implementing changes especially when addressing complex issues or issues that mirror wider societal problems such as those found in the School Safety factor.

Limitations and Future Research

One limitation of this study is I used school-level (instead of individual or subgroup) analysis for both the school climate survey and the teacher retention rate. Although I think school-level is the appropriate level of analysis for this study, I was not able to analyze data to check if subgroups of students (race, grade-level, ELL status, etc.) perceived school climate significantly differently from the average. I included student demographics as control variables in the model to try to mitigate this

effect to the extent is exists. Additionally, the NYC School Survey had low levels of within-school agreement for some measures of school climate (Merrill & Lafayette, 2018). By only analyzing the school climate data as a schoolwide average, I was unable to examine the within-school agreement for the dimensions of school climate I was measuring. If individual students perceived aspects of the school climate significantly differently than their peers, I was unable to examine this phenomenon. Examining within-school agreement and reasons for possible variation could be an area for future research; future research could focus on individual student surveys to examine how student characteristics are related to how students perceive school climate and the relationship with teacher retention.

Additionally, in this study I examined the responses from any school with students in grades six through twelve in the same model. Future research could explore if there are different results depending on the grade configuration of the school. For example, the analysis from this study could be run separately for students who attend a middle school, students who attend a high school, and students from other grade configurations (e.g. a combined elementary-middle school). Future research could also examine if there are differential results for students from different grade-levels within the same school. In addition to the overall climate, middle and high school students may experience student-teacher relationships and safety, order, and discipline differently dependent on the type of school they attend, so future research could include both an overall measure of school climate and factors examining different dimensions of school climate.

Teacher retention was reported as a school-wide retention rate, so I was also not able to examine if teachers with certain characteristics (gender, race, age, experience-level, qualifications, grade-level or subject taught, etc.) were more likely to stay than other teachers. I was also not able to explore if there were any differences between voluntary and involuntary turnover, nor was I able to differentiate between mid-year and end-of-the-year departures. Although this study is operating under the assumption that teacher turnover has a disruptive effect on the entire school community, it could be that some types of teacher turnover would have more of an effect on some students than other. However, this study is limited to school-level retention rate and is not able to detect these types of patterns, but this could be an area for future research.

Another limitation of this study is that all of the teachers and students were from the same school district. There could be a mediating factor specific to this district which would make the findings less generalizable to other districts. For example, given that the school climate survey was used for school accountability, it could be that teachers would be particularly anxious about low school climate scores affecting their employment, causing them to leave schools with low school climate ratings for schools with more job security. Future research could follow-up with teachers about why they left the school or could also expand to include other school districts, particularly where school climate ratings are not included in school accountability scores.

The NYC School Survey is designed to measure dimensions of school climate using at least two respondent groups, so isolating student perspectives using the

district's framework can be difficult. This study focused on student-teacher relationships and safety, order, and discipline, and I used exploratory factor analysis to measure those dimensions. Future research could focus on other dimensions of school climate to better understand the relationship between teacher retention and how students perceive the school climate, possibly using exploratory factor analysis for all of the survey questions to explore the underlying patterns in how students respond to the survey. The parent survey could also be utilized, possibly in conjunction with the student survey, to examine school climate in general or student-teacher relationships and safety, order, and discipline in particular, as parents also have insight into their children's school experience. This could be especially valuable for younger students as the NYC School Survey is not administered to elementary students. Or, future research could use the combined parent, teacher, and student surveys to examine how teacher retention is related to the dimensions of school climate the full survey is designed to measure.

A future redesign of the survey should consider adding questions that ask students about aspects of the school climate that previous studies have identified as important to teacher retention. While the survey asks questions about whether students feel teachers support them personally, both emotionally and academically, the survey could also ask students about the student-teacher relationships they see between teachers and their peers, similar to how the survey asks about peer behavior in class. This could give a broader view of student-teacher relationships at a school. Students could also be asked about teacher-administrator relationships, teacher congeniality, and teacher autonomy, all related to teacher retention. Although

students may not have intimate knowledge of the relationships between teacher and administrators, for example, they could provide insight into administrators at their school. A question asking students if administrators and teachers work as a team would allow researchers to examine the relationship between teacher retention and administrator support without the worry of common source bias.

Some of the findings of this study point to areas for future research. For example, each school year (2014-2015 through 2017-2018) had a significantly more positive overall measure of school climate than 2018-2019. Future research could examine whether overall school climate scores continued to trend down post-pandemic, which could point to a need for more interventions to improve school climate. Second, because the factors that included questions about bullying, gang activity, and physical fights were not significantly related to teacher retention while the overall measure of school climate was, future research might want to examine if there are other interventions in conjunction with teacher retention that could improve school safety for students.

Finally, there are several other ways to expand on this study. First, future research could examine if student perceptions of school climate predict teacher retention for the following year. This could also include research into the relationship between student perceptions of school climate and teacher perceptions of school climate. Additionally, research could explore if certain survey items are driving the relationship between teacher retention and school climate. Future research could also examine if there are certain levels of retention that best support a positive school climate. It could be that some turnover, particularly of ineffectual teachers, is

beneficial to student perceptions of school climate. This study could be expanded to examine what levels of turnover are healthy for a positive school climate, with special attention to voluntary versus involuntary attrition and mid-year versus end-of-year attrition.

Conclusion

While prior research has focused on teacher perceptions of school climate or working conditions predicting teacher retention or teacher intentions, this study instead focuses on teacher retention as a predictor of student perceptions of school climate. School-wide rates of teacher retention were significantly and positively related to an overall measure of student perceptions of school climate both in individual school years and across multiple school years, although the effect size was more modest in the multi-year model. This suggests students view their school's climate more positively when more teachers remain at the school from year to year. Improving rates of teacher retention should be a focus for school leaders, particularly given the other positive outcomes from increased teacher retention and the importance of students' perceptions of school climate.

The relationship between teacher retention and questions about student-teacher relationships and safety, order, and discipline is more complicated. Exploratory factor analysis resulted in three factors for each individual school year and for the fixed effects regression of repeated measures. The School Safety factor was not significantly related to teacher retention. Teacher retention was a significant, positive predictor of the Classroom Behavior factor in each individual school year, but the relationship was not significant in the fixed effects regression of repeated

measures. Teacher retention was a significant, positive predictor of the Teacher Support factor in the fixed effects regression of repeated measures model and in three of the five individual school years. Future research could further examine the relationship between teacher retention and dimensions of school climate.

Appendices

Appendix A: NYC School Survey Student Version

Below are the questions asked to both middle and high school students from each year of the survey included in this study grouped by like question. Highlighted questions are similar questions but the wording changed between versions. Questions are marked with a Y if they are included in the factor analysis for the panel analysis (i.e. the combined factor analysis for school years 2015-2016 through 2018-2019). For the yearly snapshot, I included both the questions marked with a Y and those marked "snap only" for the years the question was asked.

Question Code	Factor Analysis	2018-2019	2017-2018	2016-2017	2015-2016	2014-2015
AA	N	1a. This school offers a wide enough variety of programs, classes and activities to keep me interested in school.	1a. This school offers a wide enough variety of programs, classes and activities to keep me interested in school.	1a. This school offers a wide enough variety of programs, classes and activities to keep me interested in school.	1a. This school offers a wide enough variety of programs, classes and activities to keep me interested in school.	10f. This school offers a wide enough variety of programs, classes and activities to keep me interested in school.
AB	N	1b. The programs, classes, and activities at this school encourage students to develop talent outside academics.	1b. The programs, classes, and activities at this school encourage students to develop talent outside academics.	1b. The programs, classes, and activities at this school encourage students to develop talent outside academics.	1b. The programs, classes, and activities at this school encourage students to develop talent outside academics.	10g. The programs, classes, and activities at this school encourage students to develop talent outside academics.
AC	N	1c. This school is kept clean.	1c. This school is kept clean.	1c. This school is kept clean.	1c. This school is kept clean.	10h. This school is kept clean.
AD	N	1d. Most students at this school treat each other with respect.	1d. Most students at this school treat each other with respect.	1d. Most students at this school treat each other with respect.	1d. Most students at this school treat each other with respect.	10j. Most students at this school treat each other with respect.
AE	N	1e. At this school, students with disabilities are included in all	1e. At this school students with disabilities are included in all school	1e. At this school students with disabilities are included in all school	1e. At this school students with disabilities are included in all school	10k. At this school students with disabilities are included in all school

		school activities (lunch, class trips, etc.).	activities (lunch, class trips, etc.).	activities (lunch, class trips, etc.).	activities (lunch, class trips, etc.).	activities (lunch, class trips, etc.).
AF	N	1f. My teachers use examples of students' different cultures/backgrounds/families in their lessons to make learning more meaningful for me.	1f. My teachers use examples of students' different cultures/backgrounds/families in their lessons to make learning more meaningful for me.	1f. My teachers use examples of students' different cultures/backgrounds/families in their lessons to make learning more meaningful for me.	1f. My teachers use examples of students' different cultures/backgrounds/families in their lessons to make learning more meaningful for me.	10a. My teachers incorporate students' cultures/ backgrounds into the curriculum to make learning more meaningful.
AG	N	1g. I see people of many races, ethnicities, cultures, and backgrounds represented in the curriculum.	1g. I see people of many races, ethnicities, cultures, and backgrounds represented in the curriculum.	1g. I see people of many races, ethnicities, cultures, and backgrounds represented in the curriculum.	1g. I see people of many races, ethnicities, cultures, and backgrounds represented in the curriculum.	10b. I see people of many cultures/backgrounds represented in the curriculum.
AH	SNAP ONLY	1h. In general, my teachers treat students from different cultures or backgrounds equally.	1h. In general, my teachers treat students from different cultures or backgrounds equally.	1h. In general, my teachers treat students from different cultures or backgrounds equally.		
AI	SNAP ONLY				1h. My teachers call on students of different races, ethnicities, cultures, and backgrounds.	
AJ	SNAP ONLY					10c. My teachers connect to students of different cultures/backgrounds.
AK	N					10d. My teachers can communicate well with parents/guardians from different cultures/backgrounds.
AL	Y	1i. I feel that my teachers respect my culture/background.	1i. I feel that my teachers respect my culture/background.	1i. I feel that my teachers respect my culture/background.	1i. I feel that my teachers respect my culture/background.	10e. My teachers appreciate my culture/background.
AM	N	1j. In general, my teachers make their lessons relevant to my everyday	1j. In general, my teachers make their lessons relevant to my everday life experiences.	1j. In general, my teachers make their lessons relevant to my everday life experiences.		

		life experiences.				
AN	N	1k. In general, my teachers present positive images of people from a variety of races, ethnicities, cultures, and backgrounds.	1k. In general, my teachers present positive images of people from a variety of races, ethnicities, cultures, and backgrounds.	1k. In general, my teachers present positive images of people from a variety of races, ethnicities, cultures, and backgrounds.		
AO	N	2a. I learn a lot from feedback on my work.	2a. I learn a lot from feedback on my work.	2a. I learn a lot from feedback on my work.	2a. I learn a lot from feedback on my work.	4a. Think about the class that you attend first on Mondays. How much do you agree with the following statements about that class? I learn a lot from feedback on my work.
AP	N	2b. It's clear what I need to do to get a good grade.	2b. It's clear what I need to do to get a good grade.	2b. It's clear what I need to do to get a good grade.	2b. It's clear what I need to do to get a good grade.	4b. Think about the class that you attend first on Mondays. How much do you agree with the following statements about that class? It's clear what I need to do to get a good grade.
AQ	N	2c. The work we do in class is good preparation for our class tests.	2c. The work we do in class is good preparation for our class tests.	2c. The work we do in class is good preparation for our class tests.	2c. The work we do in class is good preparation for our class tests.	4c. Think about the class that you attend first on Mondays. How much do you agree with the following statements about that class? The work we do in class is good preparation for our class tests.
AR	N	2d. The homework assignments help me learn the course material.	2d. The homework assignments help me learn the course material.	2d. The homework assignments help me learn the course material.	2d. The homework assignments help me learn the course material.	4d. Think about the class that you attend first on Mondays. How much do you agree with the following statements about that class? The homework assignments help me learn

						the course material.
AS	N	2e. I know what my teacher wants me to learn in class.	2e. I know what my teacher wants me to learn in class.	2e. I know what my teacher wants me to learn in class.	2e. I know what my teacher wants me to learn in class.	4e. Think about the class that you attend first on Mondays. How much do you agree with the following statements about that class? I know what my teacher wants me to learn in class.
AT	Y	3a. My teachers help me catch up if I am behind.	3a. My teachers help me catch up if I am behind.	3a. My teachers help me catch up if I am behind.	3a. My teachers help me catch up if I am behind.	8a. The teachers at this school help me catch up if I am behind.
AU	SNAP ONLY					8b. The teachers at this school are willing to give extra help on schoolwork if I need it.
AV	Y	3b. My teachers notice if I have trouble learning something.	3b. My teachers notice if I have trouble learning something.	3b. My teachers notice if I have trouble learning something.	3b. My teachers notice if I have trouble learning something.	8c. The teachers at this school notice if I have trouble learning something.
AW	Y	3c. My teachers give me specific suggestions about how I can improve my work in class.	3c. My teachers give me specific suggestions about how I can improve my work in class.	3c. My teachers give me specific suggestions about how I can improve my work in class.	3c. My teachers give me specific suggestions about how I can improve my work in class.	8d. The teachers at this school give me specific suggestions about how I can improve my work in class.
AX	SNAP ONLY					8e. The teachers at this school compliment me if I do good work.
AY	Y	3d. My teachers explain things a different way if I don't understand something in class.	3d. My teachers explain things a different way if I don't understand something in class.	3d. My teachers explain things a different way if I don't understand something in class.	3d. My teachers explain things a different way if I don't understand something in class.	8f. The teachers at this school explain things a different way if I don't understand something in class.
AZ	Y	3e. My teachers support me when I am upset.	3e. My teachers support me when I am upset.	3e. My teachers support me when I am upset.	3e. My teachers notice when I am upset.	8g. The teachers at this school notice when I am upset or having emotional difficulty.
BA	N	4a. I'm learning a lot in	4a. I'm learning a lot in my	4a. I'm learning a lot in my	5a. I'm learning a lot in	9a. I'm learning a lot in my

		my classes at this school to prepare me for the next level or grade.	classes at this school to prepare me for the next level or grade.	classes at this school to prepare me for the next level or grade.	my classes at this school to prepare me for the next level or grade.	classes at this school.
BB	Y	4b. There is at least one adult in the school that I can confide in.	4b. There is at least one adult in the school that I can confide in.	4b. There is at least one adult in the school that I can confide in.	5b. There is at least one adult in the school that I can confide in.	9c. There is at least one adult in the school that I can confide in.
BC	SNAP ONLY					9b. How much do you agree with the following statements? I feel safe and comfortable with my teachers at this school.
BD	Y	4c. My teachers will always listen to students' ideas.	4c. My teachers will always listen to students' ideas.	4c. My teachers will always listen to students' ideas.	5c. My teachers will always listen to students' ideas.	9d. My teachers will always listen to students' ideas.
BE	Y	4d. My teachers always do what they say they will do.	4d. My teachers always do what they say they will do.	4d. My teachers always do what they say they will do.	5d. My teachers always keep their promises.	9e. My teachers always keep their promises.
BF	Y	4e. My teachers treat me with respect.	4e. My teachers treat me with respect.	4e. My teachers treat me with respect.	5e. My teachers treat me with respect.	9f. My teachers treat me with respect.
BG	Y	4f. When my teachers tell me not to do something, I know they have a good reason.	4f. When my teachers tell me not to do something, I know they have a good reason.	4f. When my teachers tell me not to do something, I know they have a good reason.	5f. When my teachers tell me not to do something, I know they have a good reason.	9g. When my teachers tell me not to do something, I know they have a good reason.
BH	N	4g. My classes at this school really make me think critically.	4g. My classes at this school really make me think critically.	4g. My classes at this school really make me think critically.	5g. My classes at this school really make me think.	9h. My classes at this school really make me think.
BI	Y	4h. Discipline is applied fairly in my school.	4h. Discipline is applied fairly in my school.	4h. Discipline is applied fairly in my school.	5h. Discipline is applied fairly in my school.	
BJ	Y	4i. School Safety Agents promote a safe and respectful environment at this school.	4i. School Safety Agents promote a safe and respectful environment at this school.	4i. School Safety Agents promote a safe and respectful environment at this school.	5i. School Safety Agents promote a safe and respectful environment at this school.	
BK	N	5a. In how many of your classes are you challenged?	5a. In how many of your classes are you challenged?	5a. In how many of your classes are you challenged?	4a. In how many of your classes are you challenged?	2a. Think about the class that you attend first on Mondays. In that class, to what extent are you challenged?
BL	N					2b. Think about the class that you attend first

						on Mondays. In that class, to what extent do you have to work hard to do well?
BM	N	5b. In how many of your classes do your teachers ask difficult questions on tests?	5b. In how many of your classes do your teachers ask difficult questions on tests?	5b. In how many of your classes do your teachers ask difficult questions on tests?	4b. In how many of your classes do your teachers ask difficult questions on tests?	2c. Think about the class that you attend first on Mondays. In that class, to what extent do your teachers ask difficult questions on tests?
BN	N	5c. In how many of your classes do your teachers ask difficult questions in class?	5c. In how many of your classes do your teachers ask difficult questions in class?	5c. In how many of your classes do your teachers ask difficult questions in class?	4c. In how many of your classes do your teachers ask difficult questions in class?	2d. Think about the class that you attend first on Mondays. In that class, to what extent do your teachers ask difficult questions in class?
BO	N	5d. In how many of your classes do you work in small groups?	5d. In how many of your classes do you work in small groups?	5d. In how many of your classes do you work in small groups?	4d. In how many of your classes do you work in small groups?	
BP	N					7e. Students in this school enjoy working together on projects in classes.
BQ	N	5e. In how many of your classes do your teachers want students to become better thinkers, not just memorize things?	5e. In how many of your classes do your teachers want students to become better thinkers, not just memorize things?	5e. In how many of your classes do your teachers want students to become better thinkers, not just memorize things?	4e. In how many of your classes do your teachers want students to become better thinkers, not just memorize things?	5d. In my classes, my teachers want students to become better thinkers, not just memorize things.
BR	Y	6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?	6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?	6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?	6a. In how many of your classes at this school do students listen carefully when the teacher gives directions?	3b. Think about the class that you attend first on Mondays. In that class, to what extent do students listen carefully when the teacher gives directions?
BS	Y	6b. In how many of your classes at this school do YOU feel most	6b. In how many of your classes at this school do YOU feel most	6b. In how many of your classes at this school do YOU feel most	6b. In how many of your classes at this school do students follow	3c. Think about the class that you attend first on Mondays. In that class, to

		students follow the rules in class?	students follow the rules in class?	students follow the rules in class?	the rules in class?	what extent do students follow the rules in class?
BT	Y	6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?	6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?	6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?	6c. In how many of your classes at this school do students pay attention when they are supposed to?	3d. Think about the class that you attend first on Mondays. In that class, to what extent do students pay attention when they are supposed to?
BU	Y	6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?	6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?	6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?	6d. In how many of your classes at this school do students work when they are supposed to?	3e. Think about the class that you attend first on Mondays. In that class, to what extent do students work when they are supposed to?
BV	Y	6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?	6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?	6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?	6e. In how many of your classes at this school do students behave well even when the teacher isn't watching?	3f. Think about the class that you attend first on Mondays. In that class, to what extent do students behave well even when the teacher isn't watching?
BW	N	6f. In how many of your classes at this school do YOU feel most students feel it is important to come to school every day?	6f. In how many of your classes at this school do YOU feel most students feel it is important to come to school every day?	6f. In how many of your classes at this school do YOU feel most students feel it is important to come to school every day?	6f. In how many of your classes at this school do students feel it is important to come to school every day?	1a. How many of the students in your class(es) feel it is important to come to school every day?
BX	N	6g. In how many of your classes at this school do YOU feel most students feel it is important to pay attention in class?	6g. In how many of your classes at this school do YOU feel most students feel it is important to pay attention in class?	6g. In how many of your classes at this school do YOU feel most students feel it is important to pay attention in class?	6g. In how many of your classes at this school do students feel it is important to pay attention in class?	1b. How many of the students in your class(es) feel it is important to pay attention in class?
BY	N	6h. In how many of your classes at this school do YOU feel most students think doing homework is important?	6h. In how many of your classes at this school do YOU feel most students think doing homework is important?	6h. In how many of your classes at this school do YOU feel most students think doing homework is important?	6h. In how many of your classes at this school do students think doing homework is important?	1c. How many of the students in your class(es) think doing homework is important?

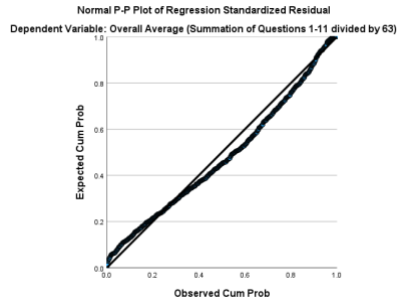
BZ	N	6i. In how many of your classes at this school do YOU feel most students try hard to get good grades?	6i. In how many of your classes at this school do YOU feel most students try hard to get good grades?	6i. In how many of your classes at this school do YOU feel most students try hard to get good grades?	6i. In how many of your classes at this school do students try hard to get good grades?	1d. How many of the students in your class(es) try hard to get good grades?
CA	Y	7a. I feel safe outside around this school.	7a. I feel safe outside around this school.	7a. I feel safe outside around this school.	7a. I feel safe outside around this school.	6a. I feel safe outside around this school.
CB	N	7b. I feel safe traveling between home and this school.	7b. I feel safe traveling between home and this school.	7b. I feel safe traveling between home and this school.	7b. I feel safe traveling between home and this school.	6b. I feel safe traveling between home and this school.
CC	Y	7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.	7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.	7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.	7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.	6c.I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.
CD	Y	7d. I feel safe in my classes at this school.	7d. I feel safe in my classes at this school.	7d. I feel safe in my classes at this school.	7d. I feel safe in my classes at this school.	6d. I feel safe in my classes at this school.
CE	Y	8a. At this school students harass, bully or intimidate other students.	8a. At this school students harass, bully or intimidate other students.	8a. At this school students harass, bully or intimidate other students.	8a. At this school students harass, bully or intimidate other students.	11a. At this school students harass or bully other students.
CF	Y	8b. At this school students harass, bully, or intimidate each other because of their race, religion, ethnicity, national origin, or citizenship/immigration status.	8b. At this school students harass, bully, or intimidate each other because of their race, religion, ethnicity, national origin, or citizenship/immigration status.	8b. At this school students harass, bully, or intimidate each other because of their race, religion, ethnicity, national origin, or citizenship/immigration status.	8b. At this school students harass, bully, or intimidate each other because of their race or ethnicity.	11b. How much do you agree with the following statements? At this school students harass or bully each other based on differences (such as race, color, ethnicity, national origin, citizenship/immigration status, religion, gender, gender identity, gender expression, sexual orientation, disability or weight).
CG	Y	8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or	8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or	8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or	8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or	

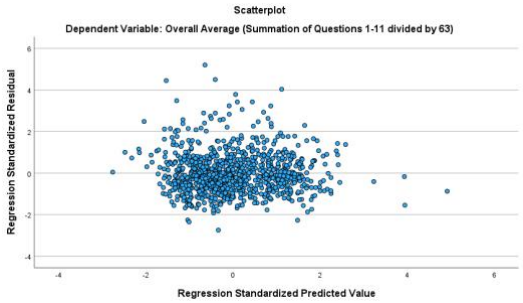
		sexual orientation.	sexual orientation.	sexual orientation.	sexual orientation.	
CH	Y	8d. At this school students harass, bully, or intimidate each other because of other differences, like disability or weight.	8d. At this school students harass, bully, or intimidate each other because of other differences, like disability or weight.	8d. At this school students harass, bully, or intimidate each other because of other differences, like disability or weight.	8d. At this school students harass, bully, or intimidate each other because of other differences, like national origin, citizenship/immigration status, religion, disability, or weight.	
CI	N	8e. At this school students harass, bully, or intimidate each other online (through mobile phones, social media, email, or other forms of electronic communication).				
CJ	Y	8f. At this school students get into physical fights.	8e. At this school students get into physical fights.	8e. At this school students get into physical fights.	8e. At this school students get into physical fights.	11c. At this school students get into physical fights.
CK	Y	8g. At this school students drink alcohol, use illegal drugs, or abuse prescription drugs while at school.	8f. At this school students drink alcohol, use illegal drugs, or abuse prescription drugs while at school.	8f. At this school students drink alcohol, use illegal drugs, or abuse prescription drugs while at school.	8f. At this school students drink alcohol, use illegal drugs, or abuse prescription drugs while at school.	11d. At this school students drink alcohol, use illegal drugs, or abuse prescription drugs while at school.
CL	Y	8h. At this school there is gang activity.	8g. At this school there is gang activity.	8g. At this school there is gang activity.	8g. At this school there is gang activity.	11e. How much do you agree with the following statements? At this school there is gang activity.
CM	SNAP ONLY					3a. Think about the class that you attend first on Mondays. In that class, to what extent do students work quietly and calmly?
CN	N					5a. In my classes, my

						teachers expect students to work hard.
CO	N					5b. In my classes, my teachers expect me to do my best all the time.
CP	N					5c. In my classes, my teachers expect me to learn from my peers.
CQ	N					7a. Students in this school get to know each other well in classes.
CR	N					7b. Students in this school are very interested in getting to know other students.
CS	N					7c. Students in this school enjoy doing things with each other during school activities.
CT	N					7d. Students in this school get to know each other really well.
CU	N					10i. Most of the teaching staff at this school are teaching me the organizational skills and work habits (like note-taking and keeping track of assignments) that I need to succeed in school.

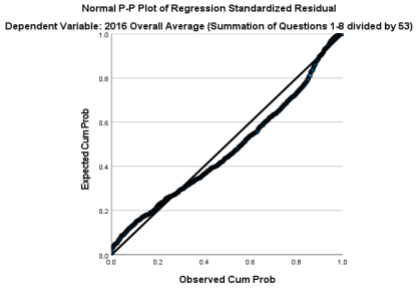
Appendix B: Assumption Testing

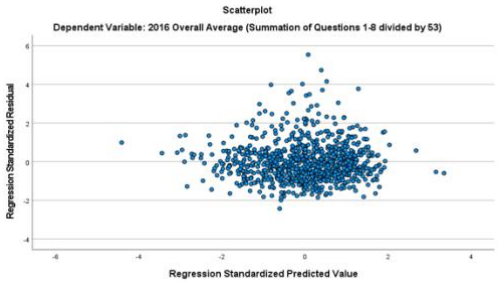
2014-2015



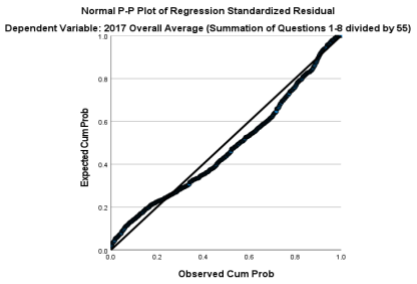


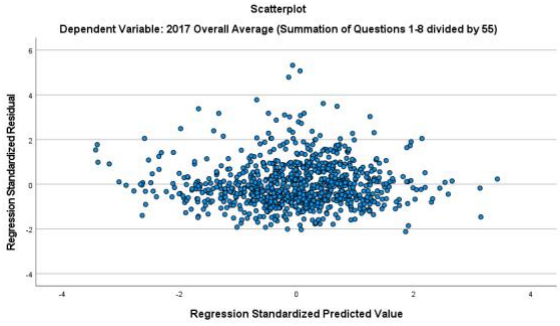
2015-2016



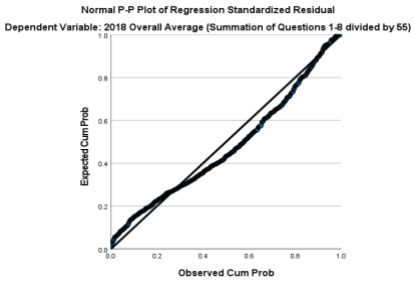


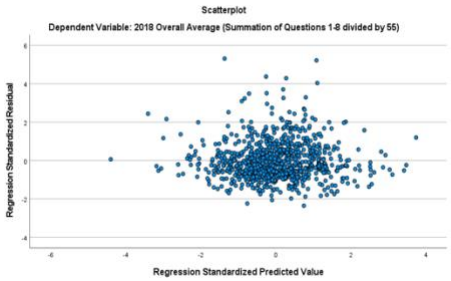
2016-2017



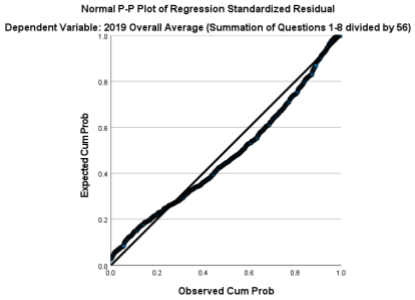


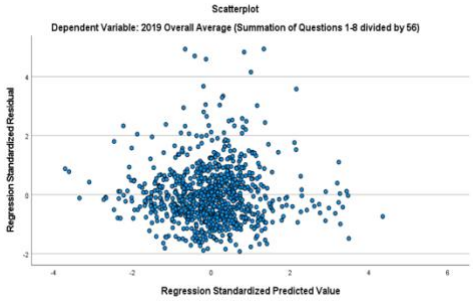
2017-2018





2018-2019





Appendix C: Review of Dimensions

The two dimensions of school climate of interest in this study are student-teacher relationships and safety, order, and discipline. These two dimensions, as mentioned previously, are often included in school climate studies. Below is a review how these dimensions are defined, including the types of survey questions included in these dimensions or factors, in the school climate literature.

Measuring Student-Teacher Relationships

As mentioned in Chapter 3, Kohl and Steffgen (2013) in their review of seven commonly used school climate surveys found relationships was a commonly measured dimension. Although questions vary between surveys, there is substantial overlap in the types of questions students are asked about student-teacher relationships, although the name and composition of the factor varies from study to study. For instance, several studies, using several different surveys, contain questions asking students if teachers listen to them,[23] care about them,[24] and/or respect them.[25] More specifically, using the M-DSCS-S, Bear et al. (2011) include all three of these questions in a factor they call Teacher-Student Relations; Gage et al. (2016) also include all three questions from the MSCS-SV in their Adult Support at School

[23] For example, Bear et al, 2011; Bradshaw et al., 2014; Gage et al., 2016; Hamlin, 2020; Jain et al., 2015; Zullig et al., 2014 include them from the M-DSCS-S, MDS3, MSCS, NYC School Survey, California School Climate Survey, and SCM.
[24] For example, Bear et al, 2011; Bradshaw et al., 2014; Gage et al., 2016; Jain et al., 2015; Zullig et al., 2014 include them from the M-DSCS-S, MDS3, MSCS, California School Climate Survey, and SCM.
[25] For example, Bear et al. 2011; Bradshaw et al., 2014; Gage et al., 2016; Hamlin, 2020 include them from the M-DSCS-S, MDS3, MSCS, and the NYC School Survey.

factor. Zullig et al. (2014) include questions about listening and care from the SCM in their Positive Student-Teacher Relationship factor.

However, some studies use questions that ask students about their relationships with teachers in other dimensions or factors. For example, in their analysis of the California School Climate Survey, Jain et al. (2015) include questions about teachers' listening to and care for students in a Staff and Student Safety factor. Hamlin (2020), using the NYC School Survey from 2011 and 2012, has questions about student-teacher relationships in multiple factors; he includes questions about respect in the Relational Environment factor and questions about listening, including listening to problems, in the Personal Connectedness factor. Bradshaw et al. (2014), using the Maryland Safe and Supportive Schools survey, include all three (listening, care, respect) in a subfactor called Connection to Teachers, but also include questions about the student-teacher relationships such as asking if students are treated equally regardless of race, gender, or cultural identity in a subfactor called Culture of Equity. The subfactor called Culture of Equity is not limited to how teachers treat students but also asks about how students feel they are treated at school in general; both Culture of Equity and the Connection to Teacher subfactors are included in the larger Engagement factor (Bradshaw et al., 2014).

Another aspect of how students and teachers interact at school focuses on whether students feel they get support in solving academic or personal problems they are facing. Zullig et al. (2014) include questions about teachers understanding and helping students with their problems in the Positive Student-Teacher Relationships factor, whereas Bradshaw et al. (2014) include these questions in a subfactor called

Support. Several surveys also include questions about teachers' academic support of students, but again factors vary from study to study. Some studies include an Academic Support or Academic Engagement factor that includes questions to students about teacher expectations or encouragement[26]. In constructing an Academic Engagement factor using the NYC School Survey, Hamlin et al. (2020) include questions about the variety of classes and activities available to students at the school, teachers providing additional academic support to students, and clarity of promotion or graduation requirements. In constructing an Adult Support at School factor, Gage et al. (2016), include questions about teachers motivating students to learn and teachers handling of student behavior issues in addition to questions generally included in Student-Teacher Relationship factors.

One of the reviewed surveys (see Table 2) approaches the student-teacher relationship quite differently from the rest. Unlike the other surveys, the student abbreviated version of the School Climate Survey, does not ask about care, respect, or listening when asking students about their teachers. Instead, it asks students if teachers grant students autonomy in the classroom and enforce school rules fairly (Ding et al., 2011). This focus on student autonomy is unique to this survey among those reviewed here. Several other surveys ask about the enforcement of school rules although the factor it is included in varies, as is discussed in detail in the section for safety, order, and discipline dimension.

[26] For example, Bradshaw et al., 2014; Hamlin, 2020; Zullig et al., 2014 include them using MDS3, the NYC School Survey, and SCM.

Measuring School Safety, Order, and Discipline

In their reviews of school climate surveys, Kohl and Steffgen (2013) and Olsen et al. (2018) found a measure of some part of school safety or discipline was prevalent. Some school climate surveys, such as the California School Climate and Safety Survey and Meridien School Climate Survey- Student Version (MSCS-SV) were designed to provide actionable feedback to school safety teams or school psychologists (Furlong et al., 2005; Gage et al., 2016). As an example, using data from the MSCS-SV school officials identified previously unreported bullying on their buses, talked with the affected students, and made changes to stop the bullying (Gage et al., 2016). However, linking survey responses to individual students to enable individualized interventions is not typical of school climate surveys. Instead, surveys are more often anonymous and used by schools to examine safety, order, or discipline at the school-level and to compare results for subgroups of students within a school. For example, of the surveys in Table 2, MSCS-SV is the only survey also designed for screening individual students for perpetuating or being victimized by problem behaviors while the other surveys are designed to be administered anonymously.

The definition of school safety is wide-ranging in the school climate literature. Cohen, McCabe et al. (2009) argue school safety includes both physical safety and socio-emotional safety. In a review of the literature, Robinson et al. (2016) assert safety factors included measures of a respectful school climate (which includes both socio-emotional safety and school property maintenance), physical safety, and personal safety (which includes things such as teacher training and student-teacher ratio). At the question level, I found several similarities between surveys despite some

differences in definitions or theory behind the surveys. The Safety, Order, and Discipline factor(s) ask students about their school's rules[27], violence, fighting or threats of violence[28], use of drugs or alcohol[29], and overall feelings of safety in and/or around the schools[30]. Although these types of questions are common on student surveys, the composition of factors varies greatly from study to study. Some studies include one larger Safety, Order, and Discipline factor while other studies separate these into multiple factors. For example, in their analysis of the California School Climate and Safety Survey Furlong et al. (2005) found three factors in the subscale they named School Danger: Campus Disruptions, Substance Use & Weapon-Carrying, and Total Danger.

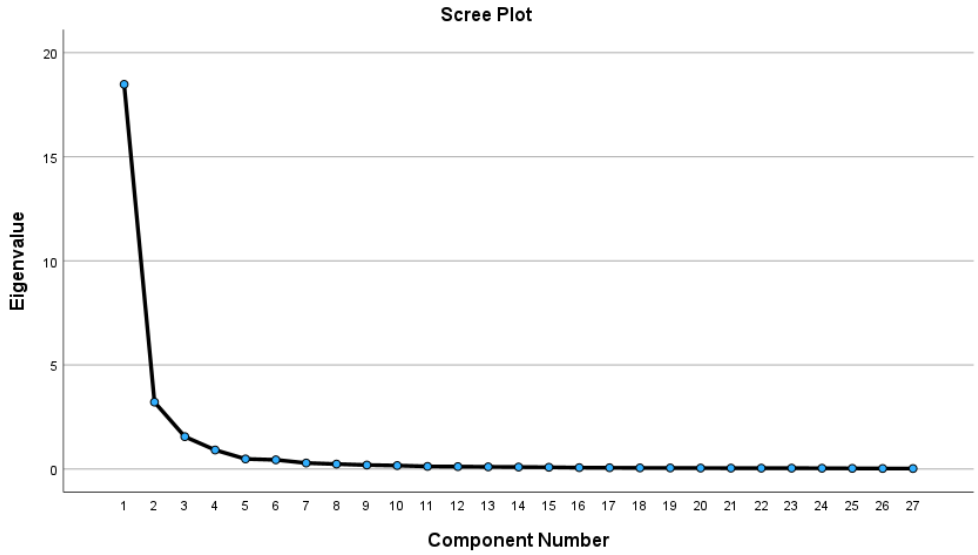
The consistent application of school rules is included in the School Safety, Order, and Discipline factor in some studies (e.g., Zullig et al., 2014) while other include these questions in a factor related to student-teacher relationship such as Relational Environment (Hamlin, 2020) or Adult Support at School (Gage et al., 2016). Bear et al. (2011) include Fairness of Rules as a separate factor from their School Safety factor, but include questions about teachers treating students fairly, including when they are breaking rules, as a part of their Teacher-Student Relations factor. Jain et al. (2015) also includes teachers treating students fairly in their

[27] For example, Bradshaw et al., 2014; Ding et al., 2011; Zullig et al., 2014 include them from the MDS3, Developmental Study Center's School Climate Survey, and SCM.
[28] For example, Bradshaw et al., 2014; Gage et al., 2016; Hamlin, 2020; Jain et al., 2015 include them from the MDS3, MSCS, NYC School Survey, and California School Climate Survey.
[29] For example, Bradshaw et al., 2014; Hamlin, 2020 include them from the MDS3 and the NYC School Survey.
[30] For example, Bear et al, 2011; Bradshaw et al., 2014; Ding et al., 2011; Gage et al., 2016; Hamlin, 2020; Jain et al., 2015 include them from the M-DSCS-S, MDS3, Developmental Study Center's School Climate Survey, MSCS, NYC School Survey, and California School Climate Survey.

Staff/Student Relationships factor. Ding et al. (2011) has separate factors for Safety at School and School Norms and Rules; School Norms and Rules includes questions to students about the types of rules and the application of those rules. Similarly, Bradshaw et al. (2014) has a Perceived Safety factor, but includes questions about the rules and their consequences in two subfactors (Rules & Consequences and Disorder) of the Environment factor.

Appendix D: Factor Analysis

The factor analysis for school years 2015-2016 through 2018-2019 resulted in three factors (scree plot and factor loadings below). Reliability testing resulted in Cronbach's Alpha of 0.974 for Factor 1, 0.980 for Factor 2, and 0.957 for Factor 3.



Rotated Component Matrix[a]

	Component		
	1	2	3
AW	.829	.393	.087
AY	.821	.437	.166
AV	.814	.437	.138
BB	.796	.233	.213
AL	.793	.130	.366
AT	.771	.470	.182
CD	.722	.188	.535
BG	.716	.567	.174
BJ	.703	.371	.424
AZ	.702	.531	.146
BF	.701	.512	.283
BD	.657	.630	.227
BV	.253	.869	.337
BT	.437	.799	.332
BS	.402	.793	.373

BR	.445	.786	.321
BE	.504	.769	.146
BU	.529	.718	.323
BI	.570	.617	.416
CF	.197	.185	.903
CG	.254	.189	.898
CJ	.183	.274	.890
CH	.056	.377	.878
CE	.072	.430	.850
CL	.438	-.048	.786
CC	.612	.266	.631
CA	.531	.337	.552

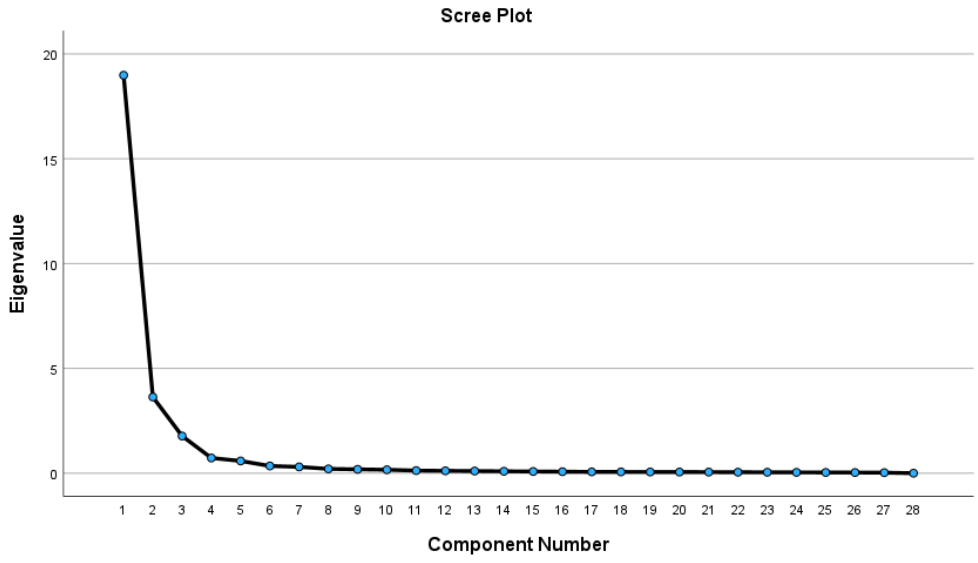
Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

2014-2015 School Year Snapshot

Reliability testing resulted in Cronbach's Alpha of 0.985 for Factor 1, 0.974 for Factor 2, and 0.953 for Factor 3.



Rotated Component Matrix[a]

	Component		
	1	2	3
AW	.923	.197	.157
AV	.916	.219	.190
AY	.915	.226	.189
AX	.895	.208	.178
AT	.884	.275	.189
AZ	.863	.265	.085
AJ	.845	.122	.325
AL	.845	.122	.325
BG	.831	.377	.218
AU	.827	.228	.318
BB	.818	.166	.328
BD	.776	.445	.290
BF	.761	.445	.319
BC	.738	.335	.491
BE	.662	.546	.227
BV	.168	.908	.241
BR	.337	.873	.237
BT	.327	.873	.264
CM	.249	.862	.295
BS	.259	.835	.402
BU	.404	.753	.343
CJ	.185	.379	.847
CL	.307	.158	.839
CC	.485	.266	.772
CF	.163	.515	.748
CE	.157	.541	.740
CA	.342	.367	.717
CD	.583	.198	.681

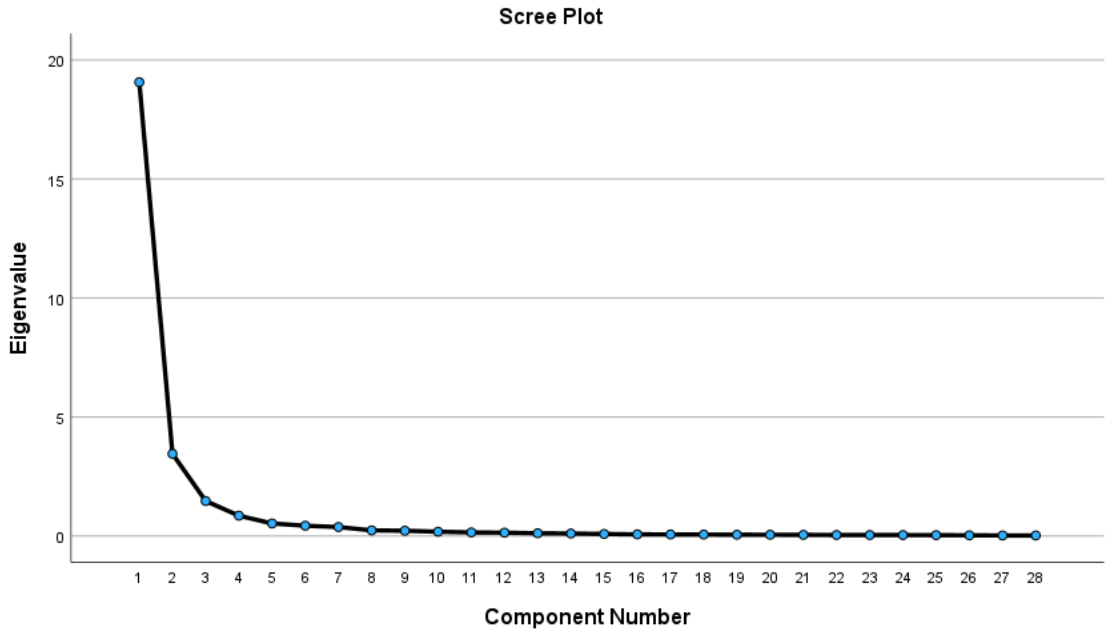
Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

2015-2016

Reliability testing resulted in Cronbach's Alpha of 0.976 for Factor 1, 0.959 for Factor 2, and 0.979 for Factor 3.



Rotated Component Matrix[a]

	Component		
	1	2	3
AY	.891	.165	.311
AV	.886	.170	.308
AW	.885	.085	.297
AT	.817	.195	.373
AZ	.805	.066	.313
BG	.800	.169	.437
BB	.776	.316	.140
AL	.776	.453	.043
BD	.743	.271	.514
BF	.731	.340	.440
BJ	.677	.521	.285
CD	.676	.624	.144
BI	.627	.467	.509
CG	.178	.895	.257
CF	.100	.886	.246

CJ	.156	.875	.317
CH	.047	.850	.420
CE	.076	.832	.464
CL	.351	.806	.062
CC	.549	.730	.215
AI	.499	.669	-.054
CA	.484	.651	.293
BV	.357	.377	.813
BR	.514	.345	.731
BT	.516	.374	.727
BS	.472	.431	.717
BE	.600	.265	.651
BU	.595	.365	.639

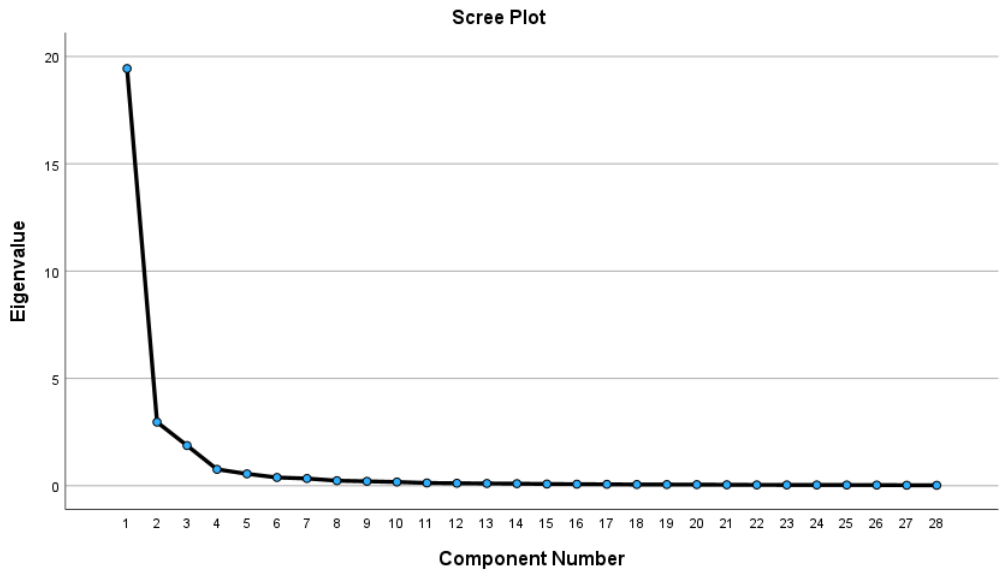
Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

2016-2017

Reliability testing resulted in Cronbach's Alpha of 0.979 for Factor 1, 0.962 for Factor 2, and 0.959 for Factor 3.



Rotated Component Matrix[a]

	Component		
	1	2	3
BV	.847	.054	.472
BT	.838	.277	.391
BR	.837	.293	.354
BE	.825	.319	.309
BS	.811	.245	.449
BU	.784	.392	.363
BD	.724	.521	.277
AZ	.708	.539	.210
BG	.669	.609	.195
AT	.663	.638	.124
BI	.654	.459	.489
AL	.238	.818	.337
AH	.220	.762	.425
CD	.243	.739	.517
BB	.373	.735	.208
AY	.631	.716	.092
AW	.617	.707	-.009
AV	.647	.684	.058
BJ	.457	.624	.479
BF	.594	.608	.334
CJ	.244	.209	.885
CH	.365	.029	.883
CE	.420	.043	.863
CF	.236	.268	.859
CG	.235	.358	.836
CC	.287	.584	.677
CL	.022	.571	.672
CA	.339	.489	.639

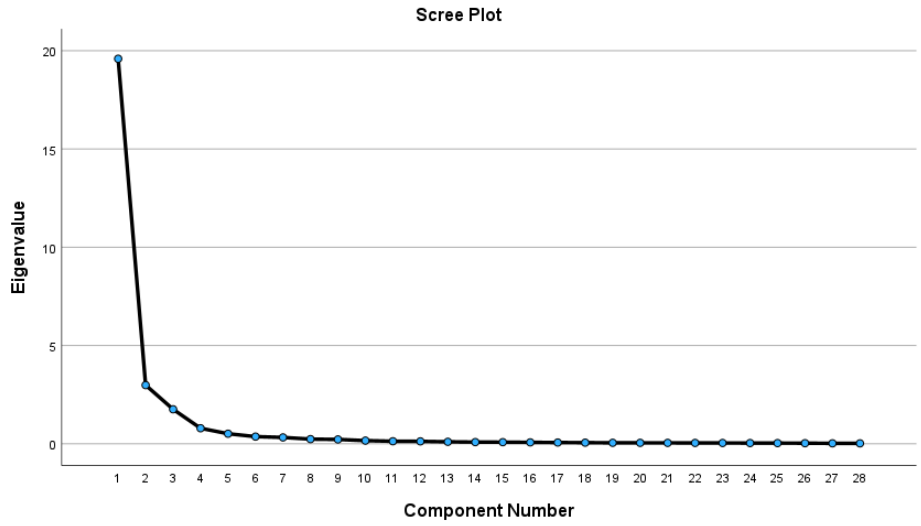
Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 25 iterations.

2017-2018

Reliability testing resulted in Cronbach's Alpha of 0.982 for Factor 1, 0.956 for Factor 2, and 0.960 for Factor 3.



Rotated Component Matrix[a]

	Component		
	1	2	3
BV	.875	.070	.414
BE	.865	.299	.228
BT	.848	.276	.374
BR	.848	.295	.336
BS	.828	.253	.415
BU	.796	.379	.347
BD	.753	.514	.222
BG	.714	.572	.189
AZ	.708	.528	.205
BI	.701	.442	.448
AT	.662	.637	.155
BF	.619	.590	.323
AL	.242	.804	.365
AH	.203	.746	.443
BB	.419	.711	.209
CD	.304	.703	.523

AW	.616	.699	.046
AY	.657	.678	.134
AV	.654	.666	.096
BJ	.496	.624	.425
CJ	.261	.186	.888
CH	.385	.054	.875
CF	.212	.267	.875
CG	.224	.319	.869
CE	.465	.056	.839
CL	-.016	.506	.731
CC	.353	.577	.654
CA	.403	.476	.615

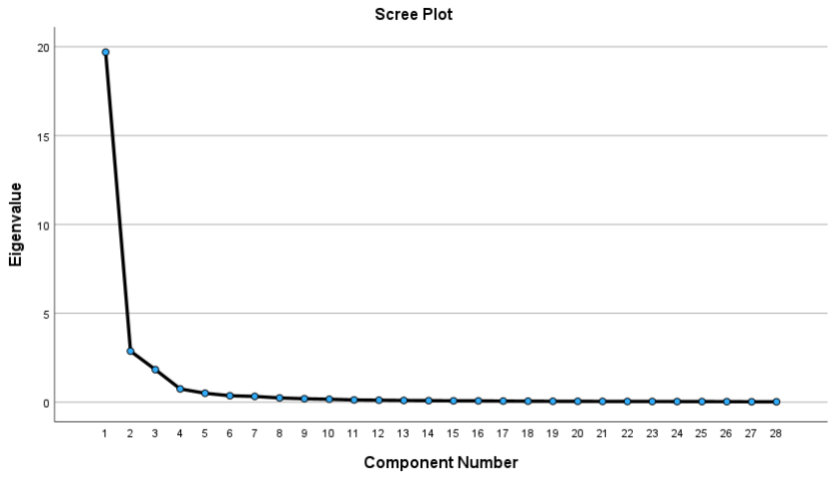
Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 16 iterations.

2018-2019

Reliability testing resulted in Cronbach's Alpha of 0.981 for Factor 1, 0.967 for Factor 2, and 0.959 for Factor 3.



Rotated Component Matrix[a]

Component		
1	2	3

BV	.883	.136	.374
BT	.837	.339	.341
BE	.835	.397	.217
BR	.832	.357	.319
BS	.822	.300	.401
BU	.761	.432	.349
BI	.700	.472	.414
BD	.697	.577	.241
BG	.668	.631	.217
AZ	.656	.600	.210
AL	.141	.795	.433
AW	.523	.774	.076
AY	.565	.752	.164
BB	.347	.747	.221
AH	.138	.741	.491
AV	.568	.739	.123
AT	.587	.708	.172
CD	.225	.686	.592
BF	.539	.661	.349
BJ	.453	.642	.450
CF	.236	.253	.873
CJ	.332	.146	.872
CG	.279	.272	.862
CH	.442	.066	.849
CE	.530	.071	.792
CL	-.037	.412	.785
CC	.324	.559	.680
CA	.362	.455	.654

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 10 iterations.

Appendix E: Individual Years Factor Composition

For each individual school year, the exploratory factor analysis resulted in three factors. However, the composition of the factors varies from year to year. It also varies from year to year if teacher retention is a significant predictor for the factors. Below are the questions for each factor and an asterisk indicates that teacher retention is a significant predictor when that factor is the dependent variable.

2014-2015

Factor 1 Teacher Support
AW 8d. The teachers at this school give me specific suggestions about how I can improve my work in class.
AY 8f. The teachers at this school explain things a different way if I don't understand something in class.
AV 8c. The teachers at this school notice if I have trouble learning something.
AX 8e. The teachers at this school compliment me if I do good work.
AT 8a. The teachers at this school help me catch up if I am behind.
AZ 8g. The teachers at this school notice when I am upset or having emotional difficulty.
AJ 10c. My teachers connect to students of different cultures/backgrounds.
AL 10e. My teachers appreciate my culture/background.
BG 9g. When my teachers tell me not to do something, I know they have a good reason.
AU 8b. The teachers at this school are willing to give extra help on schoolwork if I need it.
BB 9c. There is at least one adult in the school that I can confide in.
BD 9d. My teachers will always listen to students' ideas.
BF 9f. My teachers treat me with respect.
BC 9b. How much do you agree with the following statements? I feel safe and comfortable with my teachers at this school.
BE 9e. My teachers always keep their promises.

Factor 2* Classroom Behavior
BV 3f. Think about the class that you attend first on Mondays. In that class, to what extent do students behave well even when the teacher isn't watching?
BR 3b. Think about the class that you attend first on Mondays. In that class, to what extent do students listen carefully when the teacher gives directions?
BT 3d. Think about the class that you attend first on Mondays. In that class, to what extent do students pay attention when they are supposed to?
CM 3a. Think about the class that you attend first on Mondays. In that class, to what extent do students work quietly and calmly?

BS 3c. Think about the class that you attend first on Mondays. In that class, to what extent do students follow the rules in class?
BU 3e. Think about the class that you attend first on Mondays. In that class, to what extent do students work when they are supposed to?

Factor 3 School Safety
CJ 11c. At this school students get into physical fights.
CL 11e. At this school there is gang activity.
CC 6c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.
CF 11b. How much do you agree with the following statements? At this school students harass or bully each other based on differences (such as race, color, ethnicity, national origin, citizenship/immigration status, religion, gender, gender identity, gender expression, sexual orientation, disability or weight).
CE 11a. At this school students harass or bully other students.
CA 6a. I feel safe outside around this school.
CD 6d. I feel safe in my classes at this school.

2015-2016

Factor 1* Teacher Support
AW 3c. My teachers give me specific suggestions about how I can improve my work in class
AY 3d. My teachers explain things a different way if I don't understand something in class.
AV 3b. My teachers notice if I have trouble learning something.
AT 3a. My teachers help me catch up if I am behind.
AZ 3e. My teachers support me when I am upset.
BG 5f. When my teachers tell me not to do something, I know they have a good reason.
BB 5b. There is at least one adult in the school that I can confide in.
AL 1i. I feel that my teachers respect my culture/background.
BD 5c. My teachers will always listen to students' ideas.
BF 5e. My teachers treat me with respect.
BJ 5i. School Safety Agents promote a safe and respectful environment at this school.
CD 7d. I feel safe in my classes at this school.
BI 5h. Discipline is applied fairly in my school.

Factor 2 School Safety
CG 8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or sexual orientation.
CF 8b. At this school students harass, bully, or intimidate each other because of their race or ethnicity.
CJ 8f. At this school students get into physical fights.

CH 8d. At this school students harass, bully, or intimidate each other because of other differences, like national origin, citizenship/immigration status, religion, disability, or weight.
CE 8a. At this school students harass, bully or intimidate other students.
CL 8g. At this school there is gang activity.
CC 7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.
AI 1h. My teachers call on students of different races, ethnicities, cultures, and backgrounds.
CA 7a. I feel safe outside around this school.

Factor 3* Classroom Behavior
BV 6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?
BR 6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?
BT 6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?
BS 6b. In how many of your classes at this school do YOU feel most students follow the rules in class?
BE 5d. My teachers always keep their promises.
BU 6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?

2016-2017

Factor 1* Classroom Behavior
BV 6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?
BT 6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?
BS 6b. In how many of your classes at this school do YOU feel most students follow the rules in class?
BR 6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?
BE 4d. My teachers always do what they say they will do.
BU 6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?
BI 4h. Discipline is applied fairly in my school.
BG 4f. When my teachers tell me not to do something, I know they have a good reason.
BD 4c. My teachers will always listen to students' ideas.
AZ 3e. My teachers notice when I am upset.
AT 3a. My teachers help me catch up if I am behind.

Factor 2* Teacher Support

AW 3c. My teachers give me specific suggestions about how I can improve my work in class
AY 3d. My teachers explain things a different way if I don't understand something in class.
AV 3b. My teachers notice if I have trouble learning something.
BB 4b. There is at least one adult in the school that I can confide in.
AL 1i. I feel that my teachers respect my culture/background.
CD 7d. I feel safe in my classes at this school.
BJ 4i. School Safety Agents promote a safe and respectful environment at this school.
AH 1h. In general, my teachers treat students from different cultures or backgrounds equally.
BF 4e. My teachers treat me with respect.

Factor 3 School Safety
CF 8b. At this school students harass, bully, or intimidate each other because of their race, religion, ethnicity, national origin, or citizenship/immigration status.
CG 8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or sexual orientation.
CJ 8e. At this school students get into physical fights.
CH 8d. At this school students harass, bully, or intimidate each other because of other differences, like disability or weight.
CE 8a. At this school students harass, bully or intimidate other students.
CL 8g. At this school there is gang activity.
CC 7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.
CA 7a. I feel safe outside around this school.

2017-2018

Factor 1* Classroom Behavior
BV 6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?
BT 6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?
BS 6b. In how many of your classes at this school do YOU feel most students follow the rules in class?
BR 6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?
BE 4d. My teachers always do what they say they will do.
BU 6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?
BI 4h. Discipline is applied fairly in my school.
BG 4f. When my teachers tell me not to do something, I know they have a good reason.
BD 4c. My teachers will always listen to students' ideas.
AZ3e. My teachers support me when I am upset.

AT 3a. My teachers help me catch up if I am behind.
BF 4e. My teachers treat me with respect.

Factor 2 Teacher Support
AW 3c. My teachers give me specific suggestions about how I can improve my work in class
AY 3d. My teachers explain things a different way if I don't understand something in class.
AV 3b. My teachers notice if I have trouble learning something.
BB 4b. There is at least one adult in the school that I can confide in.
AL 1i. I feel that my teachers respect my culture/background.
CD 7d. I feel safe in my classes at this school.
BJ 4i. School Safety Agents promote a safe and respectful environment at this school.
AH 1h. In general, my teachers treat students from different cultures or backgrounds equally.

Factor 3 School Safety
CF 8b. At this school students harass, bully, or intimidate each other because of their race, religion, ethnicity, national origin, or citizenship/immigration status.
CG 8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or sexual orientation.
CJ 8e. At this school students get into physical fights.
CH 8d. At this school students harass, bully, or intimidate each other because of other differences, like disability or weight.
CE 8a. At this school students harass, bully or intimidate other students.
CL 8g. At this school there is gang activity.
CC 7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.
CA 7a. I feel safe outside around this school.

2018-2019

Factor 1* Classroom Behavior
BV 6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?
BT 6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?
BS 6b. In how many of your classes at this school do YOU feel most students follow the rules in class?
BR 6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?
BE 4d. My teachers always do what they say they will do.
BU 6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?
BI 4h. Discipline is applied fairly in my school.

BG 4f. When my teachers tell me not to do something, I know they have a good reason.
BD 4c. My teachers will always listen to students' ideas.
AZ 3e. My teachers support me when I am upset.

Factor 2* Teacher Support
AW 3c. My teachers give me specific suggestions about how I can improve my work in class
AY 3d. My teachers explain things a different way if I don't understand something in class.
AV 3b. My teachers notice if I have trouble learning something.
BB 4b. There is at least one adult in the school that I can confide in.
AL 1i. I feel that my teachers respect my culture/background.
AT 3a. My teachers help me catch up if I am behind.
CD 7d. I feel safe in my classes at this school.
BJ 4i. School Safety Agents promote a safe and respectful environment at this school.
BF 4e. My teachers treat me with respect.
AH 1h. In general, my teachers treat students from different cultures or backgrounds equally.

Factor 3 School Safety
CF 8b. At this school students harass, bully, or intimidate each other because of their race, religion, ethnicity, national origin, or citizenship/immigration status.
CG 8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or sexual orientation.
CJ 8f. At this school students get into physical fights.
CH 8d. At this school students harass, bully, or intimidate each other because of other differences, like disability or weight.
CE 8a. At this school students harass, bully or intimidate other students.
CL 8h. At this school there is gang activity.
CC 7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.
CA 7a. I feel safe outside around this school.

Appendix F: Panel Analysis Factor Composition

Running exploratory factor analysis for the survey questions about student-teacher relationships and safety, order, and discipline that were in each version of the surveys for school years 2015-2016 through 2018-2019. This resulted in three factors and the questions for each factor are below. Teacher retention was only a significant predictor of Factor 1.

Factor 1* Teacher Support
AW 3c. My teachers give me specific suggestions about how I can improve my work in class
AY 3d. My teachers explain things a different way if I don't understand something in class.
AV 3b. My teachers notice if I have trouble learning something.
BB 4b. There is at least one adult in the school that I can confide in.
AL 1i. I feel that my teachers respect my culture/background.
AT 3a. My teachers help me catch up if I am behind.
CD 7d. I feel safe in my classes at this school.
BG 4f. When my teachers tell me not to do something, I know they have a good reason.
BJ 4i. School Safety Agents promote a safe and respectful environment at this school.
AZ 3e. My teachers support me when I am upset.
BF 4e. My teachers treat me with respect.
BD 4c. My teachers will always listen to students' ideas.

Factor 2 Classroom Behavior
BV 6e. In how many of your classes at this school do YOU feel most students behave well even when the teacher isn't watching?
BT 6c. In how many of your classes at this school do YOU feel most students pay attention when they are supposed to?
BS 6b. In how many of your classes at this school do YOU feel most students follow the rules in class?
BR 6a. In how many of your classes at this school do YOU feel most students listen carefully when the teacher gives directions?
BE 4d. My teachers always do what they say they will do.
BU 6d. In how many of your classes at this school do YOU feel most students work when they are supposed to?
BI 4h. Discipline is applied fairly in my school.

Factor 3 School Safety
CF 8b. At this school students harass, bully, or intimidate each other because of their race, religion, ethnicity, national origin, or citizenship/immigration status.

CG 8c. At this school students harass, bully, or intimidate each other because of their gender, gender identity, gender expression, or sexual orientation.
CJ 8f. At this school students get into physical fights.
CH 8d. At this school students harass, bully, or intimidate each other because of other differences, like disability or weight.
CE 8a. At this school students harass, bully or intimidate other students.
CL 8h. At this school there is gang activity.
CC 7c. I feel safe in the hallways, bathrooms, locker rooms, and cafeteria of this school.
CA 7a. I feel safe outside around this school.

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