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Student Perceptions of School Climate: A Validity and Data Use Study of a District-Developed Survey

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STUDENT PERCEPTIONS OF SCHOOL CLIMATE: A VALIDITY AND DATA USE STUDY OF A DISTRICT-DEVELOPED SURVEY

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Abstract

Over the past 25 years, researchers have consistently reported that students' perceptions of their school's climate can have a measurable impact on their level of engagement in school, motivation to learn, social development, and, ultimately, their academic achievement. In light of the continued emphasis on education reform and school accountability, the ability to accurately measure the learning environment, interpret the results from that measure, and then determine the appropriate course of action in addressing areas of concern has become increasingly important for school leaders. This dissertation used an embedded mixed methods design to examine one district's self-developed measure of their students' perceptions of school climate in order to determine if there was sufficient validity and reliability evidence for results to be used by school leadership (i.e., principals) to make data-driven decisions regarding implementing initiatives and interventions for improving or enhancing the school climate. Additionally, the measure was examined for variations in results for specific groups of students based on their grade level, gender, and ethnicity. Both exploratory and confirmatory factor analyses were conducted, along with reliability analysis and invariance testing. Because the purpose of the survey was to obtain data on school climate that could then be examined and used to make decisions, interviews with school leadership team members were conducted to provide insight into how they had used

previous data reports and how a new reporting structure (i.e., by factor) would impact their use of the data.

Overall, results from the quantitative analyses found the EFA results indicated over half of the survey items were not functioning the way in which they were intended. With these items removed, a three factor CFA model was conducted to determine if there was appropriate model fit as well as invariance across gender, grade level, and ethnicity. The CFA model fit statistics were acceptable and the invariance tests held across each group however, further revisions of the instrument are recommended in order to develop a measure that will address the needs expressed during the school leadership interviews and will also accurately reflect students' experiences in their school. Interviews revealed limited use of the data reports from the survey due to lack of time, length of the reports, and absence of district guidance on how to use student results to make program decisions. Recommendations for survey and reporting structure revisions are included.

Acknowledgements

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There are so many others who have been involved in this process that to try to thank all of them by name in this section would only prove to make the acknowledgement section longer than the entire dissertation. Suffice to say I am blessed to have such magnificent friends and family in my life!

Table of Contents

List of Tables

Chapter One: Introduction and Literature Review

The ability of a country to create and disseminate new knowledge and utilize existing knowledge and intellectual resources will determine the economic and social wellbeing of a country. A nation's ability to enhance its education systems and schools will be the pathway to this wellbeing. Knowing how this place called school enables or inhibits the learning process is an important factor in the success of any educational organization and the future success of a country. (Freiberg, 1999; p. 2).

For over 100 years, district and school-level personnel have been asking questions about how school climate impacts students' lives (Freiberg, 1999). However, it was only within the last 50 years that researchers began to systematically study the impact of school climate and report on their results (National School Climate Council, 2007). In a 1982 review of the research on school climate, Anderson determined that many of the instruments, theories, and methods, for examining school climate were created by combining research on organizational climate and research on school effects. Knowing the areas in which a school either facilitates or hinders the academic and social learning of its students can be valuable information when determining which programs to implement when evaluating the effectiveness of those programs. Based on the belief that a healthy school climate is essential to improving education, Howard, Howell, and Brainard (1987) coauthored a handbook to provide educators with guidelines for measuring school climate, implementing interventions to improve any areas that were below satisfactory, and evaluating the success of the intervention. They stressed the importance of addressing school climate by stating that they "believe that nothing of substance improves until the school's climate does" (p. 50). Schools they worked with

saw declines in discipline problems, vandalism, and the number of dropouts and an increase in student attendance rates and student achievement scores.

The Center for Social and Emotional Education[1] (2010) cited multiple research studies that have demonstrated school climate to be a key factor in successfully implementing any school reform program. While teachers' and staff members' perceptions of school climate are important, this dissertation focused on the measurement of *students'* perceptions of school climate, since ultimately, it is the student outcomes that determine school effectiveness. In order to ascertain students' perceptions of school climate, many districts have used school climate surveys (Anderson, 1982; Cohen, McCable, Michelli, & Pickeral, 2009). As Cohen, McCabe, Michelli, and Pickeral (2009) note, "Measuring school climate can set in motion a schoolwide democratic process of understanding and decision-making as well as promote a climate for learning" (p. 207). Additionally, differences in minority students' perceptions of their school environment can impact their perceptions of discrimination (American School Counselor Association, 2003, Stone & Han, 2005). Finally, student perceptions of equity and their engagement in school can ultimately have an impact on their academic achievement (Bandyopadhyay, Cornell, & Konold, 2009; Weinstein, 2002).

MMS Education (2006) conducted interviews with 40 education leaders across the United States to determine their "perceptions or experiences with school climate and school climate surveys" (p. 3). They found inconsistent levels of emphasis on school climate and, for those who were using a measure of school climate, a notable trend

[1] The Center for Social and Emotional Education (CSEE) recently changed its name to the National School Climate Center (http://www.schoolclimate.org).

toward administering “build it yourself” surveys with little or no evidence of the psychometric soundness of the measures. Yet, the interviewers noted that a majority of those interviewed (79%) indicated that the survey results prompted changes within their school or district. In a similar study, Cohen, McCabe, Michelli, and Pickeral (2009) examined states’ climate-related policy status by conducting document review and analysis. One of the criteria used in their review was measurement: specifically, whether or not the type of measure being used had documentation of scientific soundness. Of the 29 states that referenced climate assessments in their legislative policies, the researchers found that only one, the Rhode Island State Department of Education, formally endorsed a climate measure that had been empirically tested and had evidence of appropriate reliability and validity.

Recent federal and state-level incentive programs advocate the use of some form of measure of principal and teacher effectiveness in overall school and district effectiveness ratings. Stakeholder perceptions of school climate have been suggested as one possible indicator of both school and district effectiveness (Clifford, Menon, Gangi, Condon, & Hornung, 2012; Harris & Banks, 2010). With the continued national emphasis on accountability, many state departments of education now require the inclusion of a component measuring student perception of school climate for school-level report cards (Cohen et al., 2009).

The State of Colorado’s reform agenda included applying for the Race to the Top Phase 3 Grant Program (http://www.cde.state.co.us/rttt/index.asp); the $17.9 million grant awarded to Colorado in December 2011 includes funding to create and implement

an educator evaluation system. One part of this system includes the measurement of school culture and climate (p. 34 of the submitted grant application, located at http://www.cde.state.co.us/rttt/documents/ColoradoRTTTPhase3application.pdf). Districts in Colorado are allowed to determine how they will measure this area.

When examining the area of school climate, most researchers and school district personnel opt to use a survey (Anderson, 1982; Bear, Gaskins, Blank, & Chen, 2011; Cohen et al., 2009). While Anderson and Bourke (2000) encourage using an existing instrument rather than designing a new one, they caution that the existing instrument must provide appropriate information about how it was developed and details on its technical quality (i.e., reliability, validity, etc.). They do concede that if no appropriate instrument can be found, one may need to be developed, but they do not provide guidelines on how that instrument development should occur. Preble and Gordon (2011) strongly caution districts to avoid homemade surveys, saying, "survey development is a rather tricky and technical business; the validity and reliability of homemade survey items is likely to be problematic" (p. 60). However, while there are many nationally developed school climate surveys that demonstrate sufficient reliability and validity information, districts may determine their use to be too costly to administer. Basic fees for paper or web-based surveys range from $0.30 per student to $1.50 per student, and often require additional fees, depending on which reports were requested.[2] In a district

[2] Most national surveys did not provide fee schedules but require sollicitors to submit a request that includes the number of surveys being administered and contact information. The California Health Kids survey – administered by WestEd http://cscs.wested.org/resources/CalSCHLS-infoandfees.pdf and the Classroom Environment Scale http://www.mindgarden.com/products/cescs.htm include some estimates that were used to provide examples.

with close to 18,000 students in grades 6-12, this is not feasible even in fiscally sound times, much less during recent budget cuts at the national and state level. Additionally, the district leadership may decide that commercially available surveys do not encompass the aspects of school climate that the district has determined to be important. Whatever the reason, many districts opt to forgo a commercially developed survey and work internally to create their own.

In a keynote address to the New York State Educational Conference Board on December 22, 2009, Kevin Jennings, Assistant Secretary of Education, U.S. Department of Education, stressed the importance of building data systems that would "measure school climate with the same rigor we measure academic progress."[3] Cohen (2007) noted that there are multiple ways in which schools can measure school climate. These measures include focus groups, interviews, observations, and surveys. However, he strongly advocates for the use of surveys to collect these data:

> Ideally, school climate assessment is carried out with a reliable and valid instrument that has been developed in a scientifically sound manner and is comprehensive in two ways: (1) recognizing student, parent, and school perspectives; and (2) assessing all four major dimensions that color and shape school climate: safety, relationships, teaching and learning, and the environment. (p. 22)

Researchers recognize that data collected by using surveys, as with any other measure, is subject to error, thereby reducing the precision of the data and the potential conclusions and recommendations made through its interpretation. Therefore, it is important to conduct research that examines the accuracy of survey data, specifically,

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[3] http://www.nysut.org/files/ecb_jennings_federalpriorities.pdf

"how well the answers to the questions collected in the survey serve as measures of what they are intended to measure" (Fowler, 2009; p. 12). If we believe, as research suggests, that school climate is important to both the academic and social development of students, we need to closely examine any instrument used to measure this construct to determine whether or not the resulting information is reliable and valid for shaping school improvement strategies. When working to provide validity and reliability evidence for the California School Climate and Safety Survey (CSCSS), Furlong, Grief, Bates, Whipple and Jimenez (2005) suggested "that it is necessary to closely examine the psychometric properties of all widely used school safety instruments, particularly those contributing to policy decisions" (p. 148).

In addition to having psychometrically sound measures, clear and precise reporting of survey results is vital if school leadership is to be able to make use of the data resulting from the survey. Cohen's (2010) review of the research literature on school reform states "school climate improvement efforts need to be fully supported and led by the principal" (p. 29), but in order to support and lead these efforts, principals need usable reports from the survey results. Additionally, several national leadership groups, such as the National Institute of School Leadership in Washington, D.C. and the New Leaders group in New York, have started working with principals and assistant principals to help them receive more training in identifying issues in the school climate and understanding how to address them in order to cultivate a positive school climate (Sparks, 2013).

Statement of the Problem

While there is general agreement that school climate is an important factor in student outcomes, evidence for the psychometric soundness of instruments used to measure this area is lacking (Cohen & Geier, 2010). In an attempt to conduct a systematic review of school climate measures for teachers, Gangi (2010) found that out of 102 instruments only three met her inclusion criteria, one of which being "published technical characteristics (reliability and validity)" (p. 27). No such review has been conducted for school climate measures for students but as the interviews conducted by MMS education (2006) indicated, many school districts develop their own instruments to measure student perceptions of school climate. These instruments have very little, if any, reliability or validity evidence to support the use of the results to make inferences about the quality of school life for students (Brand, Felner, Shim, Seitsiner, & Dumas, 2003; Burkhouse, 2009; Cohen, Pickeral, & McCloskey, 2008). Additionally, in many instances it is unknown if the instrument consistently measures the construct of school climate for both male and female students or for students of different ethnicities. Of further concern is the lack of data-reporting guidelines to assist in use of the survey data when making decisions about interventions related to improving school climate. Because schools are held accountable for making data-driven decisions, sound measures and concise reporting of results is imperative for school leadership.

Purpose of the Study

This study used an embedded mixed methods design to investigate an "in-house" survey that was designed to assess students' perceptions of school climate in a district in the

state of Colorado. According to Creswell and Plano Clark (2011), an embedded mixed methods design is appropriate to use when "a single data set is not sufficient [and there are] different questions [that] need to be answered, and that each type of question requires different types of data" (p. 91). An embedded design was used in which qualitative data (interviews) were embedded within an instrument validation study design (student surveys) to examine the usability of data gathered from this instrument. Specifically, this study investigated the psychometric properties of the Student Perceptions of School Climate instrument, including examining the equivalence across grade level, gender, and ethnicity. Then, using the qualitative interview data, the researcher was able to determine how school leaders use information from this instrument to determine appropriate school-level or district-level interventions. Implications for survey revisions and subsequent reporting of survey data to facilitate this decision-making process are discussed in Chapter 4.

Research Questions

The analysis for this dissertation consisted of two phases: (1) the psychometric phase, which evaluated the adequacy of the measure; and (2) the usability phase, which examined how the data are currently used by school leadership and what changes in their use may occur based on new reporting procedures. During the course of the psychometric phase the following three research questions were addressed:

1) What is the factor structure of the school climate survey that was developed "in-house" to measure students' perceptions?

2) Do the items on the school climate survey reliably measure the constructs found in the factor analysis?

3) Is there sufficient factorial invariance of the School Climate Survey across grade level, gender, and ethnic groups?

For the usability phase of the analysis the following two research questions were addressed:

4) How do principals and other members of the school leadership team use the resulting data to inform their decisions?

5) How can the reporting structure be improved to provide more information for principals and school leadership?

Assumptions and Limitations

Student perceptions of school climate provide only one perspective on the actual climate in a school. Principals, teachers and other school staff, and parents may have very different perceptions of the various dimensions that make up school climate. Indeed, when examining surveys from teachers and students, MacIntosh (1991) found a "lack of congruency between student-perceived and teacher-perceived school social climate" (p. 17) similar to a study by Jobe and Parrish (1995) comparing student, teacher and parent responses suggesting these stakeholder groups have different views of the school environment.

A more comprehensive look at the correlations among these groups of stakeholders would certainly provide a richer and more complete picture of school climate. Nusser and Haller (1995) examined the relationship between student, teacher,

and principal ratings of the severity of 11 disciplinary issues in their school on a four-point scale ("serious problem" to "not a problem") and found "that people's conception of a school's disciplinary climate is not unitary across the three groups" (p. 11). While disciplinary climate is only one aspect of school climate, it is possible that the differences could be equivalent or possibly greater when more aspects of school climate are examined. This is an area in which further research could provide more information on possible differences between the various stakeholder groups' perceptions.

Another limitation is that the student climate survey is a self-report measure. As Haeffel and Howard (2010) noted, although self-report may be a widely used measurement tool, "it is also among the most criticized" (p. 181). However, in this case it would be difficult to understand students' perceptions of school climate without a self-report. Haeffel and Howard do agree that, "although humans may not be capable of accurately reporting on inner processes, they are able to validly answer questions about a variety of constructs including their moods, attributions, plans, attitudes, and beliefs" (p. 185). The authors also state that self-report limitations can be minimized, by omitting items requiring high levels of insight on the respondent's part. The student climate survey analyzed in this research study focuses on student plans, attitudes, and beliefs as well as their general perceptions of the various aspects of school climate, which follow Haeffel and Howard's recommendations for minimizing limitations. This study provides evidence to help evaluate this self-report instrument's measurement fidelity.

A third limitation is the lack of an agreed-upon definition of school climate in the research community. As Thapa, Cohen, Guffey, and Higgins-D'Alessandro (2013)

pointed out in their review of school climate research "the lack of consensus about what always needs to be measured hampers the contributions that research regarding school climate can make to school practices and school improvement processes" (p. 15). This lack of a common definition makes creating and evaluating reliable and valid instruments challenging for those who are skilled at instrument development, and even more so for personnel in schools who are not trained in measurement.

As someone who has worked in the district within the Division of Accountability and Research for several years, the researcher has been closely involved with the analysis and reporting of the survey data since the 2010 survey administration. Because of this positionality in relation to the research participants there was the potential risk that some interviewees could have given socially desired responses in regards to how they used the survey data reports. However, the researcher did not feel this was the case as each interviewee was assured complete confidentiality and their responses not indicate they had any concerns about negative repercussions for indicating they were not using the data reports. In fact, it may have been *because* of their prior relationship with the researcher that they felt they could be completely honest because the researcher worked in the department that was responsible for creating and revising both the survey and the reporting structure.

Operational Definitions

The following definitions provide a common understanding of terms as they appear in the dissertation.

At-risk students: Generally defined as students from families that qualify for free or reduced-price lunch and are also in an ethnic minority.

Embedded mixed methods design: "a mixed methods approach where the researcher combines the collection and analysis of both quantitative and qualitative data within a traditional quantitative research design" (Creswell & Plano Clark, 2011).

Measurement invariance: the same factor must relate to the same set of observations in the same way in each group (i.e., gender, ethnic, grade level, etc.).

Student achievement: academic achievement as measured by standardized test scores.

School climate: "The relatively enduring quality of the total environment that (a) is experienced by the occupants, (b) influences their behavior, and (c) can be described in terms of the values of a particular set of characteristics (or attributes) of the environment" (Tagiuri, 1968, p. 25).

School culture: The deeper level of basic assumptions and beliefs that are shared by members of an organization that operate unconsciously, and that define in a basic 'taken-for granted' fashion an organization's view of itself and its environment (Schein, 1992).

Significance of the Study

Because of the vast amount of research linking students' perceptions of school climate with academic achievement, behavior, social and emotional development and growth, and motivation to learn, it is important for school leaders to be able to measure the climate within their schools and to use the resulting data to make decisions about choosing appropriate programs for improving or enhancing their schools' climate. In order to provide school leaders with data that will enable them to make accurate

inferences, it is vital for the instrument to have validity and reliability evidence. Since district-developed quantitative survey instruments are frequently used to measure students' perceptions of school climate care must be taken to conduct validity and reliability analyses at the district level (Lunenburg, 2011; Marshall, 2004; MMS education, 2006). Even when items are adopted from instruments with strong validity and reliability data, the data may have been obtained on a sample vastly different from the district's population. In this study, the district has a high percentage of students eligible for free/reduced-price lunch (69%) and a large Hispanic population (54%), but there are few surveys for which validity and reliability studies have been conducted with similar populations.

This mixed methods dissertation provides initial validity and reliability information in order to improve future versions of the survey. Additionally, qualitative interviews with school leaders provide insight into how they are using these data to facilitate their understanding of the specific dimensions of school climate and how they determine appropriate interventions that will specifically address any areas in which there is an opportunity for improvement.

Review of the Literature

This dissertation focused on analyzing data from an instrument that is intended to measure an affective domain in education in contrast with a cognitive domain, which focuses on student academic achievement or intellectual ability, or the psychomotor domain, which focuses on how well students' small and large muscle groups work to demonstrate skill or aptitude. Educators use affective measures to help them understand

student attitudes, interests, and values and make important instructional and organizational decisions based on these areas (Anderson & Bourke, 2000; Rowe, Kim, Baker, Kamphaus, & Horne, 2010). The American School Counselor Association advocates for school counselors to "address the comprehensive needs of their students" (Briggs, Gilligan, Staton, & Barron, 2010, p.8), and one area to examine is how students perceive the climate in their schools in addition to life satisfaction, overall wellness, and motivation. In the affective domain we can measure such things as students' motivation, anxiety levels, locus of control, self-efficacy, and perceptions of their environments. As Gable and Wolf (1993) pointed out, "the accurate assessment of affective characteristics is dependent upon instruments that are both theoretically based and psychometrically sound" (p. 4). Although many different levels of stakeholders can provide information about their perceptions of school climate, this dissertation focused on student perceptions. The following section examines the literature on the measurement of school climate using student surveys.

Theoretical Framework: School Climate

> *…the most effective schools – whether measured by academic outcomes, the promotion of democratic and civic skills, or the personal and psychological development of students – are those schools that have a safe, respectful, and personalized school climate. These are schools where students are engaged as learners, personally connected with peers and teachers, and empowered to actively apply their learning. (Preble & Gordon, 2011, p. 15)*

A study by Halpin and Croft (1963) was one of the earliest systematic research endeavors using the concept of organizational climate in a school setting. Based on teachers' responses to the Organizational Climate Description Questionnaire (OCDQ),

the authors were able to determine the category of school climate for a particular building along a continuum of closed, paternal, familiar, controlled, autonomous, and open. According to Anderson (1982) and Kalis (1980), the OCDQ was the most commonly used measure in subsequent school climate studies over the next 10-15 years, although there were modifications made to create a student version for elementary and secondary grade levels. While validation studies found similar factor structure, studies by some researchers (Flagg, 1964; Guy, 1969; Rice 1968 as cited in Anderson 1982) did not find a relationship between the instrument and the school characteristics that theoretically should be related (achievement, motivation, attendance, etc.). Further, the school climate categories have been called into question (Kalis, 1980), as the lower-rated schools have had high levels of student achievement and vice versa.

Other school climate research cites the work of Rudolf H. Moos (1973), which examined how people react in certain social environments. Moos theorized that, "behavior is a joint function of both the person and the environment" (1973, p. 652) and advocated for the study of both person variables and environmental variables in studies of human behavior. Trickett and Moos (1973) developed the Classroom Environment Scale (CES) for use with junior high and high school students to assess nine dimensions of classroom climate (involvement, affiliation, support, task orientation, competition, order and organization, rule clarity, teacher control, and innovation). They suggested that using such an instrument would allow researchers to determine "the effects of students of being in a particular classroom for a period of time" (p. 100), which could lead to determining best classroom practices for maximizing student learning.

Some researchers argue that attending school is one of the few remaining shared experiences among people in the United States, not to mention other countries (Freiberg, 1999).

> With all its problems and challenges, school remains the most universal connector in the rites of passage between childhood and adulthood. With only slight variations, schools around the world are remarkably similar. The organizational structures of schooling vary only slightly from one country to the next. (Freiberg, 1999; p. 3)

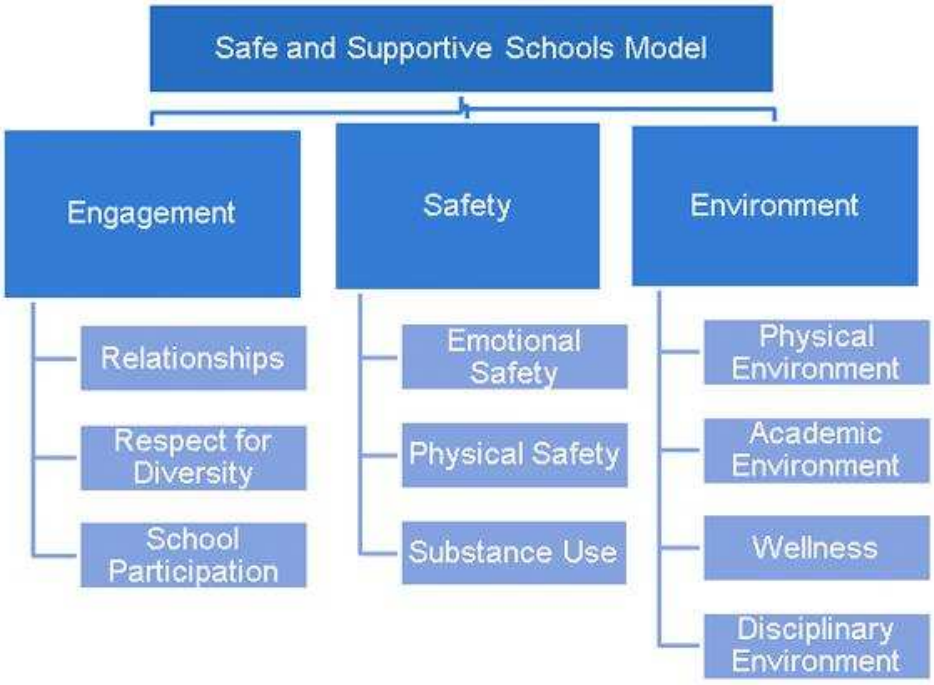
Although most people define school by the academics that are taught, the social norms enforced by the school climate and the interactions that take place in the classroom have an impact on both the educational and the interpersonal development of the students (Trickett & Moos, 1973). A study by Hopson and Lee (2011) found that while climate did not appear to "moderate the association between poverty and grades" (p. 2226) there was an impact on student behavior. Their results indicated that the more positive student perceptions of school climate were, the more likely they were to avoid problem behaviors such as "truancy, missing homework, arguments with teachers, fights with other students, and suspensions" (p. 2224). A study by DiStefano, Monrad, May, McGuinness, and Dickenson (2007) found schools with more favorable climates as measured by teacher, parent and student climate surveys had higher achievement and met more Adequate Yearly Progress (AYP) indicators than those schools with more negative climate ratings. Additional work with the same data by Gareau et al (2009) found strong relationships between school climate and achievement outcomes.

School climate factors

School climate research differs in the factors that researchers define and measure, as climate is a multi-faceted dimension in organizations and schools (Gable & Wolf, 1993; Mok, 1992; Mok & Flynn; 2002, Monrad et al., 2008). Although there is no single "list" of commonly agreed-upon dimensions that make up school culture, Stockard and Mayberry (1992) describe four broad areas in which many of these dimensions could be classified: "(a) academic expectations and excellence; (b) strong, collaborative school leadership; (c) orderly environments and school coherence; and (d) high student and teacher morale" (p. 24). An instrument designed to measure all possible dimensions of school climate would be very lengthy and require a great deal of time to complete. Therefore, many school leaders who want to examine school climate choose to focus on two or three specific dimensions and their sub-constructs. For example, Stockard and Mayberry (1992) provided a theoretical framework of school climate that included two dimensions: *social action*, which includes the interactions among students, staff, teachers, and their peers; and *social order*, which encompasses behavioral issues and safety. Loukas (2007) advocated for adding a dimension to the framework to include the physical aspects of the school, although some might suggest that physical characteristics are more objective (i.e., school size, organization of classroom furniture, etc.) and better assessed by observational measures than by asking students questions on a survey of perceptions.

The national concern for school climate has prompted the Department of Education's Office of Safe and Healthy Students to establish a technical assistance center to help schools and communities address school climate factors that have been found to impact student learning (see Figure 1[4]).

Figure 1. Proposed Federal model for measuring school climate (2009)



The Safe and Supportive Schools (2011) Technical Assistance Center (http://safesupportiveschools.ed.gov) maintains a website with resources for all levels of school personnel and provides training and support to grantees funded under the Safe and Supportive Schools Program. The Center uses a "researcher-proposed" federal model for measuring school climate that consists of three main factors (Engagement, Safety, and Environment) with three to four sub-constructs under each factor.

[4] http://safesupportiveschools.ed.gov/index.php?id=33

In a recent review of school climate research, Thapa et al. (2013)

> recommend that school climate measurement initially be conducted with the use of reliable and valid surveys and observational measures that assess how students, parents/guardians, school personnel, and community members perceive school life in four major areas: safety, relationships, teaching and learning, and the institutional environment. (p. 15)

This is similar to the previous Safe and Supportive Schools model but provides for a separate category specifically for teaching and learning. Using the aforementioned four areas of school climate the table in Appendix A presents a sample of research studies that have used student surveys to examine school climate and how the areas identified by those researchers align (or not) with Thapa et al.'s areas. Although some researchers have a holistic definition of school climate, others focus on specific aspects, such as safe and orderly climate, but claim to be examining "school climate" (Cohen, 2007). The Columbine High School shootings in April 1999 raised the level of awareness about the importance of measuring school climate, specifically incidences of bullying, and many school climate surveys focus on this aspect (Bohanon et al., 2006; Center on Innovation & Improvement, 2011; Community Matters, 2009; Eliot, Cornell, Gregory, & Fan, 2010; Lopez, Agrawal, & Calderon, 2010).

Faster and Lopez (2013) provide a list of factors school districts should be taken into account when deciding on the measure to use when assessing school climate:

1. The instrument should have a strong research base, including, well established reliability and validity,

2. There should be evidence of vigorous field-testing across multiple school settings,

3. All stakeholder groups should be measured to provide a comprehensive profile of school climate across the core population,

4. It should be easy to administer and require only 15-20 minutes to complete,

5. The district should determine what additional features might be needed based on school context (i.e., translated into predominate languages of school population, what types of reports are provided and how quickly they are generated, etc.), and

6. Does the district need additional resources for school leaders to guide them in making interpretations and decisions based on the data?

Data use for School Improvement

Ultimately the purpose of any school improvement effort is to increase student learning, and using data is essential to the success of those efforts (Learning Point, 2004). In a study involving Colorado principals, researchers at McREL found that while principals encourage the use of data in the schools, they need help with "summarizing the data in a meaningful way and identifying appropriate teaching strategies which address [their] weaknesses" (Englert, Goodwin, Martin-Glenn, & Michael, 2004; p. 15). While McREL's report was primarily focused around using student assessment data, it is safe to assume that student climate survey data would also need to be summarized in a meaningful way in order for principals to use it to make recommendations for improvement.

Current reporting practice for student climate survey data in this district is for the school leaders to receive a report with percentages of students' agreeing/disagreeing with each of the 40 items and a historical comparison of the agreement/disagreement for the

same items from the previous year. It is the responsibility of the school leadership to determine areas for improvement (see Appendix C for the previous system of reporting). As suggested by Englert et al.'s (2004) study, simply providing all the data from the student climate surveys to school leaders is not the most effective way to encourage them to use the data for school improvement efforts. A useful way to present the data so that they see and understand patterns and relationships in the data might be through reports that are focused on data reduction methods, such as scale scores, allowing the leadership team to determine improvement goals and develop strategies for meeting those goals (Learning Point, 2004).

The second part of this dissertation focused on methods of reporting the data that will increase ease of interpretation by the school leadership teams to facilitate the process of using data for school improvement. Instead of trying to make sense of 40 different questions, school leaders might focus on the specific factors (e.g., Engagement, Safety, and Environment, etc.) that have low overall scale scores and then drill down into the specific questions to inform programmatic decisions. For example, if one of the domains with a low scale score is safe and orderly climate, principals could look at the individual questions in that domain and discover that many students indicated that they have been victims of bullying. This would allow the principal to choose interventions that focus on bullying prevention, such as Positive Behavior Interventions and Support (PBiS). Conversely, if scores were good in the safe and orderly climate domain but low in the teacher support domain, principals could focus their school improvement efforts on

teacher professional development that provides teachers with the resources for determining how to assess and deliver individual student supports.

In a blog post on Ed Week's website (May 8, 2013) Nirvi Shah concludes that school climate matters as she outlines the results of new research reports by the National School Climate Center and WestEd. It impacts student achievement, social development, levels of drug use, and other risk prevention measures. Because of the continued demonstration of the impact school climate has on students, Preble and Gordon (2011) concluded in their book *Transforming School Climate and Learning*:

> There is no longer any doubt that school climate can either promote or inhibit a student's ability to learn effectively. There is also no doubt that our schools must make fundamental changes to remain relevant in the twenty-first century. These transformed schools we must develop will promote *both* personal development and rigorous, engaging academic learning as a balanced package; means and ends will both be priorities. (pp. 149-50)

Chapter Two: Method

Design

This study used an embedded mixed methods design to examine existing quantitative data from the school climate survey gathered by the Aurora Public School District during the 2011-2012 school year and qualitative interview data gathered by the researcher from school leadership team members. The first goal of this dissertation research was to collect evidence for assessing the validity and reliability of this measure of student perceptions of school climate and to examine the feasibility of creating factor scores based on the domains measured. According to DiStefano, Zhu, and Mindrila, "factor scores are composite variables which provide information about an individual's placement on the factor(s)" (2009, p. 1). Creating these scores enables future researchers to conduct subsequent analyses to answer more complex questions. Based on these results, recommendations have been made in Chapter 4 for possible revisions to the survey instrument in order to strengthen the data that are collected. The study used exploratory and confirmatory factor analysis, reliability measures, and invariance testing to analyze the survey data.

The second goal of the study was to ascertain school administrators' use of the report of survey data in its present form in order to create a new, more user-friendly reporting structure. This goal was accomplished by conducting interviews with key

school leadership staff. The use of qualitative data provided what Leech and Onwuegbuzie (2007) refer to as a "significance enhancement," which helps to "maximize researchers' interpretations of quantitative data" (p. 561).

Participants

Student Survey

The dissertation researcher analyzed data that were collected by the school district from students in grades 6-12. All students in these grades were given the opportunity to complete either the Middle School (grades 6-8) or High School (grades 9-12) or Student Climate Survey in January 2012. The completed surveys were included in the analysis (see Tables 1, 2, and 3 for response rates by K-8; middle, and high school students). These surveys are identical except for the last question, which asks students to indicate their grade (6-8 for K-8 and Middle School; 9-12 for High school).

The 2011-2012 survey administration resulted in 6,117 completed middle school surveys (students in grades 6-8) and 5,948 completed high school surveys (students in grades 9-12). During initial data analysis, the total number of usable surveys changed, depending on excessive amounts of missing data. In the past, no analysis was conducted of missing data of the student climate surveys, so this was done by the researcher to determine if there were any patterns, and if the data were missing at random or not (Rubin, 1976). Although the surveys are anonymous, they do include demographic questions (grade, gender, and ethnicity). School-level demographics are provided in Table 4 and survey demographics in Table 5. Additional information about the survey is provided in the "instruments/measures" section.

Table 1. K-8 School Survey Response Rates for students in grades 6-8

School	Total surveys (n)	Response rate (%)[5]
Aurora Frontier K-8	171	97.7%
Aurora Quest K-8	256	94.5%
Boston K-8	127	95.5%
Clyde Miller K-8	93	95.9%
Murphy Creek K-8	154	85.6%
Vista Peak P-8 Exploratory	244	91.7%

Table 2. Middle School Survey Response Rates

School	Total surveys (n)	Response rate (%)[6]
Aurora Hills MS	783	83.9%
Aurora West College Prep (grades 6-8)	660	84.5%
Columbia MS	718	92.2%
East MS	870	88.4%
Fletcher Int. Sci and Tech	81	86.2%
Mrachek MS	696	73.6%
North MS	660	88.9%
South MS	604	88.0%

[5] Response rate calculated with enrollment counts from the 2011-12 October count files.

[6] Response rate calculated with enrollment counts from the 2011-12 October count files.

Table 3. High School Survey Response Rates

School	Total surveys (n)	Response rate (%)
Aurora Central HS	1383	61.9%
Aurora West College Prep (grades 9-10)	186	90.7%
Gateway HS	1023	61.4%
Hinkley HS	1258	61.2%
Rangeview HS	1593	72.5%
Vista Peak Preparatory	277	75.7%
William Smith HS	228	80.9%

Table 4. School Demographics (2011-12 school year)

School	Total Students	% Female	Nat. Am.	Asian	Black	Hispanic	White	Nat. Haw.	Two +	% FRL	%ELL	%GT	%SPED
Aurora Hills MS	933	47.2%	0.3%	2.8%	23.9%	55.7%	13.8%	0.2%	3.2%	74.3%	28.0%	6.1%	10.7%
Boston K-8	496	49.0%	0.2%	13.3%	10.9%	70.4%	2.6%	0.4%	2.2%	78.2%	71.6%	2.0%	5.4%
Clyde Miller K-8	440	45.8%	0.9%	1.4%	13.4%	59.8%	20.2%	0.0%	4.3%	69.5%	39.5%	3.9%	8.2%
Columbia MS	779	49.6%	1.7%	3.9%	19.3%	33.4%	37.7%	0.4%	3.7%	53.0%	11.3%	9.1%	13.5%
East MS	984	48.3%	0.5%	3.4%	17.1%	68.8%	7.6%	0.7%	1.9%	81.8%	44.2%	5.9%	11.0
Fletcher (gr. 4-5)	279	45.5%	1.4%	2.9%	7.5%	82.8%	5.0%	0.0%	0.4%	92.8%	63.4%	0.7%	7.2%
A. Frontier K-8	624	47.6%	0.2%	13.5%	16.5%	24.8%	38.3%	0.2%	6.6%	29.0%	14.4%	8.8%	6.9%
Mrachek MS	946	45.1%	1.0%	4.1%	28.0%	40.9%	21.4%	0.6%	4.0%	65.1%	18.9%	4.2%	12.8%
Murphy Creek K-8	564	45.4%	0.5%	5.0%	22.2%	27.0%	38.8%	0.2%	6.4%	38.3%	11.3%	6.0%	9.2%
North MS	742	46.2%	1.1%	1.2%	17.4%	71.2%	6.3%	0.8%	2.0%	87.7%	38.4%	7.1%	14.0%
Aurora Quest K-8	604	54.6%	0.7%	10.3%	11.4%	18.0%	51.5%	1.0%	7.1%	25.8%	3.0%	60.8%	3.8%
South	686	49.4%	0.9%	2.2%	21.9%	65.6%	6.6%	0.7%	2.2%	86.2%	42.7%	3.8%	17.6%
Vista Peak P-8 Exploratory	831	47.7%	0.6%	0.6%	9.9%	42.4%	40.9%	0.6%	5.1%	53.3%	25.4%	2.5%	10.6%
Aurora West College Prep	986	47.6%	0.7%	7.3%	8.0%	77.4%	5.1%	0.2%	1.3%	94.7%	50.5%	6.2%	11.9%
Aurora Central HS	2235	46.1%	0.7%	7.6%	15.9%	66.8%	6.2%	0.6%	2.2%	72.3%	39.2%	4.6%	14.4%
Gateway HS	1665	46.7%	0.7%	3.6%	25.3%	44.9%	20.8%	0.5%	4.1%	57.7%	21.7%	7.6%	14.4%
Hinkley HS	2054	47.4%	0.4%	4.5%	15.7%	61.5%	14.3%	0.8%	2.7%	69.1%	28.9%	10.0%	11.1%
Rangeview HS	2197	49.4%	0.8%	5.9%	22.2%	30.5%	35.7%	0.4%	4.6%	42.1%	8.5%	11.9%	10.0%

School	Total Students	% Female	Nat. Am.	Asian	Black	Hispanic	White	Nat. Haw.	Two +	% FRL	%ELL	%GT	%SPED
Vista Peak Preparatory (9-12)	366	42.9%	0.8%	3.3%	19.9%	35.8%	37.7%	0.5%	1.9%	53.3%	16.1%	5.7%	9.6%
William Smith HS	282	53.2%	1.1%	3.2%	16.3%	41.8%	31.9%	0.7%	5.0%	52.8%	14.2%	12.8%	8.2%

Table 5. Survey Demographics[7] (2011-12 school year) (n = 12, 065)

School	Total Sample	% Female	Nat. Am.	Asian	Black	Hispanic	White	Two or more
Aurora Hills MS	783	50.0%	3.2%	4.0%	16.1%	45.7%	9.5%	20.9%
Boston K-8	127	55.7%	4.0%	13.7%	12.9%	59.7%	4.8%	4.8%
Clyde Miller K-8	93	43.0%	0.0%	2.2%	4.3%	38.7%	11.8%	43.0%
Columbia MS	718	53.4%	4.2%	4.2%	14.5%	25.9%	29.7%	21.6%
East MS	870	48.8%	2.6%	3.9%	12.1%	61.3%	6.3%	13.9%
Fletcher (grades 4-5)	81	51.9%	3.8%	1.3%	2.5%	87.5%	2.5%	2.5%
Aurora Frontier K-8	171	52.1%	1.2%	13.4%	14.0%	20.7%	31.7%	18.9%
Mrachek MS	696	47.6%	1.3%	5.2%	17.4%	31.1%	16.2%	28.9%
Murphy Creek K-8	154	42.7%	3.9%	8.6%	14.5%	14.5%	29.6%	28.9%
North MS	660	46.6%	2.2%	3.0%	12.3%	63.3%	7.4%	11.7%
Aurora Quest K-8	256	53.9%	13.1%	11.1%	13.1%	13.9%	34.8%	27.0%

[7] Student gender and ethnicity was self-report. There was no option for Native Hawaiian on the survey in order to remain consistent with previous years.

School	Total Sample	% Female	Nat. Am.	Asian	Black	Hispanic	White	Two or more
South MS	572	51.7%	2.4%	3.1%	17.3%	60.5%	6.0%	10.7%
Vista Peak P-8 Exploratory	244	47.9%	2.9%	2.5%	7.5%	35.3%	24.5%	27.4%
Aurora West College Prep	846	51.8%	3.3%	6.4%	7.6%	67.3%	5.1%	10.1%
Aurora Central HS	1383	48.7%	2.6%	10.4%	13.6%	59.2%	5.1%	8.9%
Gateway HS	1023	52.1%	2.5%	6.6%	18.3%	35.9%	17.0%	19.7%
Hinkley HS	1258	51.8%	2.6%	6.1%	13.3%	53.9%	12.1%	13.0%
Rangeview HS	1593	52.4%	2.4%	7.2%	16.7%	23.8%	26.7%	22.5%
Vista Peak Preparatory	277	45.9%	1.5%	4.4%	17.5%	30.3%	27.7%	18.6%
William Smith HS	228	56.7%	0.4%	3.6%	12.6%	36.8%	28.3%	18.4%

Staff Interviews

A purposeful, nonrandom sample was used to gather information about how the student climate survey results reports are used in the Aurora Public School District. Interview participants included school leaders who worked with the student climate data such as principals or assistant principals, district-level Directors of Student Achievement (DOSAs), and staff in the Division of Equity and Engagement. According to the Chief Accountability & Research Officer for the district, these are the primary staff members who are responsible for reviewing the data and determining areas needing attention in the coming school year (personal communication, November 2012).

A total of eight participants were interviewed: one principal, four assistant principals, two DOSAs, and one staff member in the Division of Equity and Engagement. The five principals or assistant principals from the 20 schools in the survey sample in addition to the three school-level participants provided an adequate number of interviews to obtain a range of responses on use of the reported student climate survey data at the school level (Baker & Edwards, 2012). Interviews were conducted during the participants' regular work-day at a time that was convenient for them. They were told that the purpose of the interviews was to gain insight into how they use the data reports from the student climate survey to make decisions about priority areas of improvement in their school (or at the district level). As is the case in many other schools districts nationwide, data use has become critical at the Aurora Public School District that uses a data-based decision-making model whereby schools collect, organize, and analyze the data; pose hypotheses; and then use the data to set goals, plan strategies, and monitor

progress.[8] The Division of Accountability and Research collects, analyzes, and reports the data for the Student Climate Survey on a yearly basis for Aurora Public School District.

Instruments

Student Survey

The first time the current Student Climate Survey instrument was administered by the Aurora Public School District was during the spring semester of the 2006-2007 school year. The initial items were created by a district team consisting of principals, students, and administrative staff from the Division of Instruction and the Division of Accountability and Research. There were 57 items designed to measure attitudes related to general climate, trust and respect, academics, safety and bullying, harassment, and self-concept. Based on the results from this survey, as well as recommendations from the Council of Urban Boards of Education (Perkins, 2006) survey results from a nationwide sample, areas for follow-up were presented to staff and the Board of Education.

In the 2007-2008 school year, the student climate survey was reduced to 48 items, which were designed to measure the same six areas. For the 2008-2009 school year, the survey was revised again, this time containing 55 items measuring the same six areas with an additional five items regarding drug use. Survey revisions were based on requests from specific divisions within the district in order to provide information for grants and other needs assessments.

[8] http://www.mcrel.org/products-and-services/services/service-listing/service-50

Student focus groups were conducted at the beginning of the 2009-2010 school year and the items were substantially revised in order to provide greater question clarity, reduce redundancy, and to support district needs. The revised survey retained 21 of the 55 items from the previous years and added 24 new items for a total of 45 items: 40 items to measure school climate plus five demographic items. In the 2010-2011 school year, the items remained the same. In the 2011-2012 school year, 11 items were added and one item was split into two items to provide a distinction between academic and extra-curricular contexts (see Appendix B for the instrument).

Staff Interviews

In order to determine how the student climate survey data are currently used and how a new format might better assist in decision-making, three district-level staff members were interviewed along with a sample of five middle and high school principals and assistant principals. All interviewees received a copy of the previous year's report of the student climate survey data. The interview questions focused on how each staff member uses these data to inform their decisions and how a revision of the data reports could facilitate more efficient use in making decisions for possible interventions aimed at improving school climate (see Appendix D for interview protocols). Interviews lasted approximately 30 minutes to 75 minutes.

Procedure

Student Surveys

Surveys were distributed to middle and high school students during the second semester of the 2011-2012 school year, during a two-week window in mid-January.

Schools administer the survey in the students' homeroom or during the same class period on the same day, and the survey takes approximately 30 minutes to complete. Students are given the entire class period (generally 50 minutes) to complete the survey. The survey question booklet and scannable bubble sheets are distributed for students to record their responses. It is important to note that although the surveys are given during a specific class they are not focused on any particular teacher or course. Instead the student is told to reflect upon the school as a whole for the current school year when responding to each question. Each response options are on a 5-point Likert scale (strongly disagree, disagree, neutral, agree, and strongly agree). Responses for 13 items were reverse coded, as agreeing with them would indicate a negative aspect of school climate. Mean scores for each question are reported to the school principal who then determines how to interpret the results and share them with school staff.

Student Climate Survey data for the 2011-12 school year were obtained from the school district's Division of Accountability and Research per district protocols for data requests (http://assessment.aurorak12.org/research-reports/). There were no identifying data about the respondents on the surveys other than self-reported gender, ethnicity, and grade level.

Staff Interviews

Permission was requested through the same data request for the researcher to contact middle and high school principals, assistant principals, and Directors of Student Achievement to determine their willingness to participate in a voluntary interview during April 2013. Individual emails were sent to each potential interviewee and appointments

were made with those who agreed to the interviewed. Interview questions can be found in Appendix D. Interviews were audio recorded (with the subject's permission) and transcribed by the researcher.

All secondary data requests and interview protocols were submitted to the Institutional Review Board at the University of Denver for approval. Approval for secondary data was granted on March 5, 2013 (Protocol number 2013-2510) and approval for interviews was granted on April 8, 2013 (Protocol number 2013-2494)

Data Analysis

Student Surveys

Thompson (2004) states that one purpose of factor analysis is "to inform evaluations of score validity" (p. 5), also known as construct validity, and thereby determine whether an instrument is measuring what it is intended to measure. Additionally, he indicates that another purpose of factor analysis is "to summarize relationships in the form of a more parsimonious sets of factor scores that can then be used in subsequent analysis" (p. 5). This dissertation research initially was constructed to encompass both of these purposes by first collecting evidence of construct validity, and then creating factor scores in order to facilitate subsequent analysis by others, at a later time, in addition to potentially using the scores in concise reports for stakeholders in the future. These factor scores "are often more reliable than scores on individual observed variables" (Tabachnick & Fidell, 2007, p. 608), or in this case more reliable than examining each individual survey item. Brown (2006) pointed out

> a complicating issue in factor score estimation is the indeterminate nature of the common factor model. With respect to the factor scores, this indeterminacy means that there is an infinite number of sets of factor scores that could be computed from any given factor analysis that would be equally consistent with the same factor loadings. (p. 37)

Whether or not factor scores were computed for this study was determined after examining the validity coefficients, univocality, and correlational accuracy from the final factors in the EFA (Brown, 2006) and is discussed in the results section.

In order to determine the factor structure of the survey, an exploratory factor analysis (EFA) was conducted on a random sample of half the 2011-12 survey data. SPSS software was used to select the random sample. While a factor analysis has not been previously conducted on the student climate survey, the items on the survey were developed to measure specific subconstructs that make up the overarching construct of students' perceptions of school climate. The EFA allowed an underlying factor model to be determined by examining three different types of variance: the common, specific, and the error variance (Bryant & Yarnold, 1995). Specifically, the "common variance refers to the portion of the total variance that correlates (is shared) with other variables in the analysis. Specific variance refers to the portion of the total variance that does not correlate with the other variables" (p. 107). The error variance is also taken into consideration as the source of unreliable and random variance. "EFA finds factors that maximize the amount of the common variance that is explained" (p. 107).

Components were extracted using principal components analysis. In much of the published research the decision to extract components is primarily based on both eigenvalues (those greater than 1.0) and an examination of the scree plot to determine

where the sharp decrease in eigenvalues occurs, however in this study the more robust method of using a parallel analysis (PA) was conducted for the final decision in the number of components to retain because some problems have been associated with the previous two methods for determining factor retention (Hayton, Allen, & Scarpello, 2004).

PA is a Monte Carlo procedure where

> …eigenvalues from a data set prior to rotation are compared with those from a matrix of random values of the same dimensionality (*p* variables and *n* samples). PCA eigenvalues from the data greater than PA eigenvalues from the corresponding random data can be retained. All components with eigenvalues below this threshold value should be considered spurious. (Franklin, Gibson, Robertson, Pohlman, & Fralish, 1995; p. 99)

According to Hayton, Allen and Scarppello (2004) this procedure can be conducted in four steps:

Step 1: Generate Random Data;

Step 2: Extract eigenvalues from the random data correlation matrix;

Step 3: Average Eigenvalues; and

Step 4: Compare Real Data with Parallel random data (p. 198).

All steps were completed in SPSS software and results are reported in the results section of this dissertation. Additionally, the percentage of the variance is reported along with a graphic presentation of the resulting scree plot (Berger, 2012; Thomspon, 2004).

Next the components were rotated; a process described by Vogt (1993) as

> any of several methods in factor analysis by which the researcher attempts to relate the calculated factors to theoretical entities. This is done

> differently depending upon whether the factors are believed to be correlated (oblique) or uncorrelated (orthogonal)" (p. 91).

DiStefano, Zhu and Mindrila (2009) point out that "orthogonal factors are often the rarity rather than the norm in education research" (p. 2) and, indeed, the factors in this study are believed to be correlated (Gorsuch, 1983; Thompson, 2004) therefore, they were rotated using the oblique rotation procedure of promax rotation which created a simple structure and helped with interpretation.

When determining which items load on which factor one rule of thumb cited by Tabach-nick and Fidell (2007) is .32 for the minimum loading of an item. If an item loads at .32 or higher on more than one factor it is considered to be a "crossloading" item. Based on the number of items for each factor and the total number of crossloading items in the data analysis, the crossloading item may be dropped from further analysis. Additionally, these items would be noted as needing revisions if they were to be included in future student climate surveys.

Based on the results from the EFA, a confirmatory factory analysis was conducted with the second half of the 2011-2012 student climate survey data. This allowed for testing of the EFA's theoretical model and was "used to simplify, refine and confirm this basic model using the other sample's data" (Bryant & Yarnold, 1995; p. 109). In the CFA a hypothesized model was used to estimate the population covariance matrix, which was then compared to the observed covariance matrix. "Technically, the researcher wants to minimize the difference between the estimated and observed matrices" (Schreiber, Nora, Stage, Barlow & King, 2006; p. 323) and this can be done by using the default estimation

method for a CFA in Mplus which is maximum likelihood (ML). Commonly used goodness-of-fit indices were used to determine how well the model fit the data (Kaplan, 2009; Kline, 2005). Based on Kline's (2005) recommendation[9] for multiple fit indices to be reported for SEM models the following fit statistics were examined and reported: model chi-square (a basic fit statistic which is the product of (N -1) F_{ML}); the Steige-Lind root mean square error of approximation (RMSEA) along with the 90% confidence interval; the Bentler comparative fit index (CFI); the Tucker-Lewis index (TLI); and the standardized root mean square residual (SRMR). The criteria for determining adequate model fit for the chi-square was a low chi-square value in relation to the degrees of freedom and a p-value greater than .05 ($p > .05$). The RMSEA criteria deems values less than .07 acceptable while the CFI criteria is values greater than .95. The criterion for the SRMR was a value less than .08. (Hooper, Coughlan & Mullen, 2008; Klein, 2005; Schreiber et al., 2006).

Descriptive statistics such as mean scores, standard deviations, skewness, and kurtosis for each item are reported by factor. A reliability analysis was conducted using Cronbach's alpha as a measure of internal consistency. Nunnally and Bernstein's (1994) standards were used to determine acceptable reliability coefficients for the overall measure, as well as for each factor. If any items were substantially below a recommended acceptable threshold they would be removed, and the CFA analysis would be rerun to determine the impact. This analysis plan is similar to the analysis that was conducted for

[9] This minimal set of fit indexes is listed on page 134.

a validity study of a teacher survey of perceptions of school climate conducted by Johnson, Stevens, and Zvoch (2007).

Because of the importance in determining differences of perceived school climate among subgroups of students based on gender, ethnicity, and grade level, the study also tested for measurement invariance to allow for accurate comparisons of means on the various factors (Byrne, Shavelson, & Muthen, 1989; Rensvold & Cheung, 1998). “The question of invariance of measurement is one of whether or not, under different conditions or observing and studying phenomena, measurement operations yield measures of the same attribute” (Horn & McArdle, 1992; p. 117). Invariance testing was conducted using the SEM model from the CFA to determine if the fitted model worked equally well for different groups based on genders, ethnicities, and grade levels. Based on the need to maintain an adequate sample size ethnicity was recoded as non-minority (i.e., white), Hispanic, and all other minorities in order to maintain adequate group sizes for analysis. Invariance testing is typically examined for configural invariance, weak invariance, strong invariance and strict invariance (Meredith, 1993); although some researchers (McArdle, 199l; Vandenberg & Lance, 2000) contend that if configural and weak or strong invariance exist that is sufficient when establishing factorial invariance. The latest edition of Mplus (version 7.11) uses the MODEL option with the settings of CONFIGURAL, METRIC, and SCALAR to test the models for measurement invariance across groups. Configural invariance is also known as equal form as it is the test of equal factor structures. This is tested by constraining the factors and patterns of free and fixed loadings to be the same across groups being analyzed. Metric invariance is sometimes

called weak factorial invariance and tests the equality of factor loadings. Scalar invariance refers to the testing of the equality of indicator intercepts and is also known as strong factorial invariance (Brown, 2006). Typically non-significant changes in χ^2 indicate invariance has been established, however, due to the large sample size for the CFA it was possible the χ^2 difference would be significant. Therefore the same goodness-of-fit indices from the initial CFA model were also used to compare model invariance among subgroups (Cheung & Rensvold, 2002).

Software to be used: SPSS was used for the majority of the analyses with MPlus used for the CFA and testing measurement invariance.

Staff Interviews

Interview data were transcribed and coded using constant comparison analysis, which Leech and Onwuegbuzie (2007) recommend as "a method of choice when the researcher wants to answer general, or overarching, questions of the data" (p. 576). In order to address reliability and the trustworthiness of the interpretation of the data, another coder who has been trained in qualitative research methods coded the interview transcripts. In order to help reduce bias the second coder was not affiliated with the district and was unfamiliar with the data. Intercoder agreement was established using subjective assessment (Guest, MacQueen, & Namey, 2012). In the process of subjective assessment a researcher meets with the second coder to review codes and each place where the coding is not in agreement "they discuss the reasons for the discrepancy, agree on a solution, recode the master coding document, and revise code definitions if necessary" (p. 89). Codes that were created using the constant comparison analysis were

analyzed using classical content analysis to determine which concepts were most frequently discussed among the school leaders. In order to "enhance descriptive validity, interpretive validity, and/or theoretical validity" (Maxwell in Leech & Onwuegbuzie, p. 576), member checking was done with the initial analysis results. Specialized qualitative data analysis software (QDAS) was not used as the study size was relatively small and the analysis goal was exploratory in nature. Guest, MacQueen, and Namey (2012) indicate that use of QDAS is not always necessary and "small and simple analyses can often be accomplished in a standard word-processing program" (p. 223).

Chapter Three: Results

The first section of this chapter presents the results from the EFA and the CFA to answer the following research questions:

1) What is the factor structure of the school climate survey that was developed "in-house" to measure students' perceptions?

2) Do the items on the school climate survey reliably measure the constructs found in the factor analysis?

3) Is there sufficient factorial invariance of the School Climate Survey across grade level, gender, and ethnic groups?

The second section presents the results from the school leadership interviews to answer the remaining two research questions:

4) How do principals and other members of the school leadership team use the resulting data to inform their decisions?

5) How can the reporting structure be improved to provide more information for principals and school leadership?

Recoded Questions

Of the 49 items that were used for the quantitative survey data analyses, 13 were reverse coded. These questions are noted with an "R" after the question number in all tables. Reverse coding was done for those questions in the survey that were worded such that high values of the school climate construct were reflected by low scores on those

particular items. For example, when students respond to the item "*At school, I have had someone try to hurt me*" a low score (strongly disagree or disagree) would be indicative of a positive school climate as opposed to the question "*I have an adult at school I trust*" where a low score would be indicative of a negative school climate. All items were coded to have high values (agree, strongly agree) to reflect a positive aspect of school climate and low values (strongly disagree, disagree) to reflect a negative aspect of school climate.

File Split

The initial data file contained 12,065 cases. This file was split into two files using the "select cases" function in SPSS and selecting "random sample of cases" equal to 50% of cases. This resulted in one file with 5,985 cases that was used to conduct the exploratory factor analysis and a second file with 6,080 cases that was used to conduct the confirmatory factor analysis. Thirteen items were reverse coded, and then each file was examined for missing data, normality assumptions, and univariate/multivariate outliers. The data sets were checked for similarities in demographic characteristics (gender, ethnicity, school); they were relatively equal on all three demographic variables (see Table 6 for descriptive statistics for both data sets).

Table 6. Descriptive statistics for both data sets before removal of missing data and outliers

	EFA Sample						CFA Sample					
	N			Std.			N			Std.		
	Valid	Missing	Mean	Deviation	Skewness	Kurtosis	Valid	Missing	Mean	Deviation	Skewness	Kurtosis
Q1	5962	23	3.64	1.275	-0.711	-0.535	6058	22	3.64	1.285	-0.698	-0.584
Q2	5961	24	3.49	1.056	-0.547	-0.076	6060	20	3.5	1.051	-0.57	-0.019
Q3R	5936	49	3.65	1.336	-0.639	-0.841	6032	48	3.65	1.358	-0.654	-0.865
Q4	5949	36	3.69	1.235	-0.77	-0.341	6057	23	3.68	1.225	-0.752	-0.367
Q5	5942	43	3.32	1.151	-0.344	-0.527	6033	47	3.32	1.162	-0.351	-0.546
Q6R	5950	35	3.76	1.309	-0.815	-0.494	6053	27	3.78	1.308	-0.798	-0.54
Q07R	5947	38	4.05	1.115	-1.157	0.609	6038	42	4.09	1.118	-1.25	0.856
Q8	5951	34	2.7	1.28	0.166	-1.029	6050	30	2.68	1.275	0.201	-0.997
Q09R	5949	36	3.79	1.14	-0.796	-0.058	6041	39	3.8	1.141	-0.809	-0.057
Q10	5951	34	3.44	1.202	-0.506	-0.591	6040	40	3.44	1.209	-0.513	-0.609
Q11R	5938	47	3	1.323	0.004	-1.182	6046	34	2.96	1.32	0.053	-1.165
Q12R	5950	35	3.87	1.252	-0.932	-0.228	6044	36	3.87	1.264	-0.942	-0.238
Q13	5941	44	3.76	1.155	-0.815	-0.025	6037	43	3.76	1.159	-0.803	-0.057
Q14	5941	44	3.57	1.154	-0.564	-0.374	6043	37	3.56	1.145	-0.549	-0.379
Q15	5945	40	4.08	1.089	-1.232	0.973	6042	38	4.05	1.127	-1.189	0.708
Q16	5950	35	3.74	1.127	-0.769	-0.063	6035	45	3.77	1.147	-0.844	0.043
Q17	5942	43	3.53	1.157	-0.56	-0.375	6040	40	3.56	1.163	-0.593	-0.362
Q18	5932	53	3.58	1.14	-0.626	-0.26	6041	39	3.59	1.157	-0.638	-0.292
Q19R	5931	54	4.03	1.215	-1.199	0.413	6043	37	4.03	1.226	-1.19	0.353
Q20	5931	54	3.15	1.325	-0.208	-1.062	6037	43	3.12	1.351	-0.171	-1.131
Q21R	5931	54	3.86	1.27	-0.93	-0.227	6020	60	3.89	1.261	-0.938	-0.226
Q22	5942	43	3.18	1.156	-0.21	-0.565	6037	43	3.17	1.153	-0.231	-0.548
Q24	5930	55	3.53	1.163	-0.588	-0.364	6029	51	3.53	1.16	-0.584	-0.37

	EFA Sample						CFA Sample					
	N			Std.			N			Std.		
	Valid	Missing	Mean	Deviation	Skewness	Kurtosis	Valid	Missing	Mean	Deviation	Skewness	Kurtosis
Q25	5935	50	3.65	1.135	-0.651	-0.207	6028	52	3.65	1.131	-0.686	-0.109
Q26	5943	42	3.49	1.19	-0.533	-0.453	6031	49	3.49	1.188	-0.535	-0.463
Q27	5937	48	3.4	1.148	-0.42	-0.458	6020	60	3.4	1.15	-0.434	-0.45
Q28	5932	53	3.34	1.107	-0.417	-0.362	6022	58	3.36	1.111	-0.429	-0.376
Q29	5932	53	3.02	1.254	-0.128	-0.977	6022	58	3	1.261	-0.124	-0.992
Q30	5937	48	3.64	1.111	-0.668	-0.183	6029	51	3.67	1.107	-0.71	-0.09
Q31	5937	48	3.7	1.094	-0.721	-0.025	6021	59	3.72	1.09	-0.73	-0.025
Q32	5930	55	3.18	1.209	-0.247	-0.801	6019	61	3.22	1.2	-0.27	-0.767
Q33	5928	57	3.6	1.114	-0.648	-0.13	6013	67	3.61	1.118	-0.652	-0.152
Q34	5925	60	4.16	1.069	-1.347	1.238	6013	67	4.19	1.067	-1.445	1.563
Q35R	5912	73	3.5	1.157	-0.344	-0.569	5999	81	3.52	1.186	-0.372	-0.642
Q36	5916	69	3.92	1.04	-0.977	0.631	6016	64	3.92	1.039	-0.971	0.613
Q37	5911	74	3.68	1.044	-0.63	0.019	6006	74	3.67	1.042	-0.648	0.062
Q38	5911	74	3.22	1.103	-0.247	-0.447	6003	77	3.22	1.117	-0.258	-0.491
Q39	5916	69	3.62	1.059	-0.649	0.008	6013	67	3.64	1.059	-0.683	0.069
Q40	5915	70	3.85	1.089	-0.805	0.081	6003	77	3.85	1.125	-0.87	0.141
Q41	5901	84	3.64	1.519	-0.624	-1.156	5987	93	3.64	1.531	-0.632	-1.161
Q42	5911	74	3.21	1.189	-0.238	-0.668	5997	83	3.24	1.193	-0.269	-0.659
Q43	5910	75	3.6	1.091	-0.685	0.008	5991	89	3.63	1.073	-0.719	0.115
Q44	5901	84	3.25	1.159	-0.299	-0.618	5988	92	3.25	1.18	-0.305	-0.672
Q45	5887	98	3.36	1.145	-0.348	-0.54	5969	111	3.38	1.142	-0.36	-0.503
Q46	5892	93	3.67	1.175	-0.703	-0.285	5972	108	3.65	1.186	-0.703	-0.308
Q47R	5884	101	4.07	1.163	-1.196	0.537	5970	110	4.09	1.174	-1.246	0.64
Q48R	5890	95	4.05	1.23	-1.174	0.272	5971	109	4.09	1.22	-1.258	0.488

	EFA Sample						CFA Sample					
	N			Std.			N			Std.		
	Valid	Missing	Mean	Deviation	Skewness	Kurtosis	Valid	Missing	Mean	Deviation	Skewness	Kurtosis
Q49R	5884	101	3.49	1.344	-0.465	-0.993	5958	122	3.49	1.368	-0.442	-1.073
Q50R	5884	101	3.79	1.308	-0.816	-0.541	5966	114	3.81	1.325	-0.834	-0.556

Standard error of skewness = .32

Standard error of kurtosis = .06

Data Screening

As with many studies that use surveys to obtain their data, missing data must be examined to determine if there is a pattern that may result in biased estimates. The Aurora Public Schools students responded to the survey using pencil and paper, specifically reading questions in a booklet and filling in the corresponding response on a Scantron form (i.e., "bubble sheet") using a #2 pencil. A question was coded as "missing" if a student did not fill in a response or if a student filled in multiple responses to the same question on the Scantron form. In the EFA data set there were 810 cases (13.5%) that did not contain complete data (responses on all 49 survey questions) and in the CFA data set there were 1,314 cases (21.6%) that did not contain complete data (responses for all 49 survey questions and the three demographic questions). Although this was a large number of cases, the sample size remained adequate for both the EFA and the CFA analysis.

Test of Assumptions: Normality

In both sets of data the distributions of the 49 variables were examined for skewness. The majority of the variables had a small negative skew (only two variables were positively skewed). Six of the variables had values outside the recommended guidelines of <|1| (greater than -1 and less than +1) (Leech, Barrett, & Morgan, 2011). Tabachnick and Fidell (2007) state that "assumptions regarding the distributions of variables are not in force" (p. 613) as long as the PCA is used descriptively to summarize relationships; however, "when statistical inference is used to determine the number of factors" (p. 613) multivariate normality is assumed. As factor determination is the basis for this and

subsequent analysis, the six variables with moderately large negative skew (ranging from -1.45 to -1.16) were transformed by squaring them (Leech, Barrett, & Morgan). All six variables were within the recommended range following transformation (see Table 7 and 8).

Table 7. EFA sample

	Mean	Std. Deviation	Skewness	Kurtosis
Q07R	18.00	7.32	-.61	-.74
Q15	18.32	7.05	-.63	-.66
Q19R	18.15	7.70	-.76	-.60
Q34	18.82	7.01	-.77	-.46
Q47R	18.34	7.57	-.73	-.68
Q48R	18.49	7.86	-.81	-.66

Note. Standard error for skew statistic was .034.

Table 8. CFA sample

	Mean	Std. Deviation	Skewness	Kurtosis
Q07R	18.29	7.53	-.75	-.56
Q15	18.00	7.56	-.67	-.69
Q19R	18.06	8.01	-.80	-.64
Q34	19.07	7.14	-.92	-.13
Q47R	18.77	7.71	-.89	-.46
Q48R	18.81	8.00	-.96	-.42

Note. Standard error for skew statistic was .035.

Test of Assumptions: Outliers

Both student climate survey data sets were screened for univariate outliers and none were found. The data were also screened for multivariate outliers that "are cases with an unusual combination of scores on two or more variables" (Tabachnick & Fidell, 2007; p. 73). Multivariate outliers were examined using SPSS linear regression analysis by using the 49 survey variables as independent variables to predict the case ID as the dependent variable. Mahalanobis distance values were calculated for each case. The Mahalanobis values were assessed with a chi-square (χ^2) distribution using the number of variables (49) for the degrees of freedom and an alpha level of $p<.001$. The Table of Critical Values for chi square with df=49 shows 85.351 as a critical value so any case with a Mahalanobis distance value equal to or greater than 85.351 was flagged as a possible multivariate outlier. In the EFA data set there were 596 cases with a Mahalanobis distance value that flagged them as a multivariate outlier and in the CFA data set there were 497 cases that exceeded the Mahalanobis distance value. All outliers were deleted; however, analyses were conducted both with outliers removed and outliers remaining to determine if there were substantial differences in the results. There was no difference in the results so the analyses conducted with outliers removed were used for reporting purposes.

Exploratory Factor Analysis

Jaeger and Bond (2004) found that educational psychologists use factor analysis as one of the more common non-experimental statistical analysis, especially when developing new measures. While there are many different decisions that must be made by

the researcher during the factor analysis there are few hard and fast rules for making those decisions. There are multiple extraction and rotation methods, as well as multiple ways to determine the number of factors to retain. Each step in conducting an exploratory factor analysis "requires judgment and is not a mechanical decision" (p. 895). Because of the reliance on human judgment, it could be said that exploratory factor analysis is more of an art than science. The more the researcher conducts these analyses and the more they are familiar with the context in which the data were obtained, the better "artist" the researcher becomes while deciding to go forward with the items that make the "best" model and overall makes the most conceptual sense.

A principal components analysis was conducted to assess how the 49 school climate variables might be grouped to allow for easier interpretation. This method was chosen because it allows the components (variables) to account for the variance as opposed to the principal axis factoring method where latent factors account for correlations (Tabachnick & Fidell, 2007). Because the student survey has never been examined for latent factors and it was not constructed with a specific theoretical structure, the Principal Components Analysis was more appropriate in this study (Fabrigar, Wegener, MacCallum & Strahan, 1999). The components from the principal component analysis are often referred to as factors although this is not technically correct. However, the terms are used interchangeably throughout this dissertation, as the software program does not make this distinction in labeling each section of the analysis.

Determining the number of components to retain is an important decision in conducting a Principal Component Analysis. If one decides to retain too few, information

in the data may be lost; however, if one decides to retain too many trivial and misleading information may be included. Many researchers examine the eigenvalues and retain all factors or components with an eigenvalue of 1.0 or higher. Additionally some researchers review the scree plot (the eigenvalues plotted on a graph) to determine where the "natural bend or break point in the data" (Costello & Osborne, 2005; p. 3) occurs. This can be problematic as there are no clear rules for determining where that break occurs and the decision is very subjective.

One of the recommended methods to use for determining the number of components to retain is the parallel analysis (Costello & Osborne, 2005; Williams, Brown, & Onsman, 2012). This is a Monte Carlo simulation that creates multiple random data sets (the number of data sets is specified by the researcher) with the same sample size and number of variables. Eigenvalues are calculated for each component in each data set and are then used to calculate means and Standard Deviations to allow 95^{th} percentile values to be determined. The eigenvalues of the original data set are then compared to the 95^{th} percentile eigenvalues from the random data sets. Each component or factor is retained if its eigenvalue is greater than the 95^{th} percentile of the simulated values. This indicates that the eigenvalue in the data set is greater than that what could have occurred at random. Although this type of analysis is not readily available in most statistical software packages, syntax has been written to perform the analysis in SPSS. Therefore, it was decided that in order to use a more robust method for determining the number of components to extract, a parallel analysis would be conducted to establish the number of

statistically significant eigenvalues that would indicate the appropriate number of components to extract (O'Connor, 2000).

Using the SPSS syntax created by O'Connor (https://people.ok.ubc.ca/brioconn/nfactors/rawpar.sps) a total of 1,000 parallel data sets were created in this study. First the PA was conducted using normally distributed random data generation and then the analysis was conducted using permutations of the raw data set. Using permutations provides a more robust method for examining multivariate non-normality to determine if it exists in the raw data. The results from both analyses were identical and led to the conclusion that there were up to six components that could be extracted in the PCA procedure (see Table 9 for PA results).

Table 9. Raw Data Eigenvalues, Mean, and Percentile Random Data Eigenvalues using normally distributed random data generation for 49 variables

Component	Raw Data Eigenvalues	Means	Percentile Random Data Eigenvalues	Decision
1	13.26	1.20	1.22	Accept
2	4.42	1.18	1.20	Accept
3	1.75	1.17	1.18	Accept
4	1.34	1.16	1.17	Accept
5	1.29	1.15	1.16	Accept
6	1.18	1.14	1.15	Accept
7	1.13	1.13	1.14	Reject

Note: The program will generate random data eigenvalues for each variable (in this case 49) but the remaining 42 will not be displayed in this paper.

When reviewing the PCA table of total variance explained, there were nine components that had eigenvalues greater than one, which would have lead to the inclusion of more factors and could be misleading in further analysis.

Based on the results from the parallel analysis, a principal components analysis for the six components was performed using SPSS on 49 items from the Student Climate Survey for a sample of 4,579 students who had complete data for all items. In order to determine the appropriateness of using a factor analysis for this data the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy test and the Bartlett's Test of Sphericity were conducted. For the KMO statistic, the closer the value is to 1 the more likely a factor analysis will "yield distinct and reliable factors" (Field, 2000, p. 455). In this case, the KMO was .96, which indicates that a factor analysis is appropriate with these data. A statistically significant Bartlett's Test of Sphericity indicates there is a relationship between the variables and factor analysis is warranted. In this study, the Bartlett's Test of Sphericity was statistically significant ($p < 0.0001$).

Survey items were examined for communalities after extraction to determine the amount of variance in common with other variables. Costello and Osborne (2005) recommend that items with a communality value of less than .4 be examined and possibly dropped from analysis. The nine student climate survey items in Table 10 were removed from the analysis as they had communalities lower than .4. It is possible these are still valid items, but do not have other similar items in the survey. Future versions of the student climate survey instrument could be revised to include more similar items to determine if those items are valid. Additionally, it is possible that these items need to be

reworded in order for students to fully understand the question's meaning thus resulting in higher correlations with other items in the survey. Both of these options were discussed in the principal interviews along with recommendations for further analyses.

Table 10. Items with communalities < .4

Item
Q10: In my classes there are rules against name calling/put downs.
Q11R: I have seen students of different cultures, racial or ethnic backgrounds bullied or harassed at school.
Q20: If I was threatened/harassed through internet or text messages I would discuss it with an adult.
Q29: I get to make choices about what I will study at school.
Q35R: Students who are not of my race generally do better in school than I do.
Q41: I have not ditched any classes this year.
Q42: I get academic/career planning help from my school counselor when I need it.
Q45: Teachers and counselors in this school stress the need for me to attend school every day.
Q49R: I have witnessed students with disabilities harassed at my school.

To facilitate interpretation by simplifying the data structure, the components were rotated using an oblique rotation procedure (promax rotation). This method was chosen because the components are believed to be correlated (Thompson, 2004). After rotation the pattern matrix was examined for factor loadings. Tabachnick and Fidell (2007)

recommend that, “only variables with loadings of .32 and above [be] interpreted” (p. 649). There were three items that had loadings lower than the recommended .32:

- Q15: My teachers expect me to graduate from high school;
- Q17: Adults help if they see someone being bullied or harassed; and
- Q25: I feel supported and respected by counselors.

These three items were removed as were the 11 items that had cross-loadings listed in Table 11 (items that loaded at .32 or higher on multiple components).

Table 11. Items with cross loadings on factors

Item
Q5: I believe our school rules are consistently enforced by teachers.
Q22: I believe our school rules are consistently enforced outside of my classroom.
Q26: I feel supported and respected by the principal and assistant/vice principal.
Q27: I feel supported and respected by the secretaries/administrative assistants.
Q28: I feel supported and respected by other students.
Q32: I feel I can go to my teachers with the things that I need to talk about.
Q36: I treat my teacher with respect.
Q37: I follow the rules at school.
Q44: I feel welcome when I return to school from an absence.
Q47R: At school, I have been harassed because of perceived sexual orientation.
Q48R: At school, I have been sexually harassed.

The PCA was conducted with the remaining 26 items that had adequate communalities and factor loadings (see Table 12). However, there were two components with only two items loading on each (component 3 and component 5):

- Q1: I have an adult at school I trust (component 3);
- Q4: I have at least one adult in this school I can go to when I need help (component 3);
- Q14: Boys and girls have the same extra-curricular opportunities at this school (component 5); and
- Q13: Boys and girls have the same academic opportunities at this school (component 5).

While these four items appear to have face validity for measuring a single component, any "factor with fewer than three items is generally weak and unstable" (Costello & Osborne, 2005). Therefore these four items were removed, a parallel analysis was conducted to determine the number of factors for the 22 variables (in this case it was three), and the PCA was conducted once more.

The second parallel analysis was conducted because the original survey had been reduced by over half of the variables and Costello and Osborne (2005) advocate for "multiple test runs for information on how many meaningful factors might be in a data set" (p. 7). They also stress the fact that exploratory factor analysis is best used for when exploring a data set, especially during instrument design, and should not be used to test hypotheses or theories. Therefore, more leeway is allowed in terms of model testing

compared with Confirmatory Factor analysis where such exploration would be unsubstantiated by theory.

Table 12. Pattern Matrix for 26 items

	Component				
	1	2	3	4	5
Q39: I learn a lot from my classes	.868	-.041	-.110	.053	-.068
Q31: I am challenged to do my best work at school	.782	.013	-.002	-.051	-.033
Q38: I am interested in the work I get to do in my classes.	.746	-.149	-.128	.182	-.164
Q40: My teachers expect me to go to college	.718	.018	.125	-.082	-.012
Q16: Classes at this school are preparing me for my future	.685	.003	-.048	.033	.073
Q30: I have many opportunities to ask teachers questions about my work.	.678	.013	-.016	.049	.055
Q34: If I work hard in school, I will be a successful adult	.646	.150	-.004	-.238	.101
Q33: My teachers care whether I am successful or not.	.638	-.004	.166	.000	-.009
Q43: I get academic help from my teachers when I need it.	.637	.010	.135	.021	.024
Q24: I feel supported and respected by teachers.	.594	.001	.132	.122	.023
Q46: The staff at my school respect students from all cultures and races	.526	.019	-.037	.132	.140
Q50R: I have been bullied at my school	.057	.811	-.120	-.051	-.054
Q21R: I am bullied during the school day at least once per month	.054	.783	-.019	-.133	-.050
Q6R: I am put down and harassed at school because I look different	-.090	.777	-.002	.030	-.004
Q12R: At school I have been bullied or harassed for racial reasons	-.010	.768	-.002	-.030	.002
Q3R: At school, I have had someone try to hurt me	-.005	.707	-.089	.113	-.113
Q19R: I have been threatened/harassed through internet or text messages by another student at my school	.247	.596	-.066	-.156	.023
Q09R: Other students don't like me because I am a good student	-.123	.590	.008	.063	.105
Q07R: At school, I feel afraid	-.103	.581	.156	.197	.028
Q1: I have an adult at school I trust	.032	-.083	.918	-.059	-.029
Q4: I have at least one adult in this school I can go to when I need help	.066	-.054	.899	-.080	-.045
Q8 My belongings are safe at school	.092	-.126	-.218	.880	-.027
Q2: At school, I feel safe	.002	.158	.268	.560	.011
Q18: I feel safe going to and from school	.055	.192	.081	.532	.077
Q14: Boys and girls have the same extra-curricular opportunities at this school	.007	-.061	-.093	.037	.910
Q13: Boys and girls have the same academic opportunities at this school	.040	-.011	.020	-.037	.865

Table 13. Parallel analysis with 22 remaining items

Component	Raw Data Eigenvalues	Means	95th Percentile Random Data Eigenvalues	Decision
1	7.09	1.12	1.14	Accept
2	3.26	1.10	1.12	Accept
3	1.15	1.09	1.10	Accept
4	.89	1.08	1.09	Reject
5	.74	1.06	1.07	Reject
6	.71	1.05	1.06	Reject
7	.70	1.04	1.05	Reject

Table 14. Final Factor loadings (Pattern Matrix) and communalities based on the principle components analysis with Promax rotation (N = 4,579)

	Component			Communalities after Extraction
	1	2	3	
Q39: I learn a lot from my classes	0.79	-0.07	0	0.60
Q40: My teachers expect me to go to college	0.78	0	-0.06	0.58
Q31: I am challenged to do my best work at school	0.78	-0.06	-0.07	0.56
Q33: My teachers care whether I am successful or not	0.72	-0.02	0.04	0.54
Q43: I get academic help from my teachers when I need it	0.72	0	0.05	0.55
Q34: If I work hard in school, I will be a successful adult	0.71	0.16	-0.24	0.47
Q30: I have many opportunities to ask teachers questions about my work.	0.70	0.01	0.04	0.53

	Component			Communalities after Extraction
	1	2	3	
Q16: Classes at this school are preparing me for my future	0.70	0	0.01	0.50
Q24: I feel supported and respected by teachers	0.67	-0.01	0.15	0.56
Q38: I am interested in the work I get to do in my classes	0.61	-0.19	0.11	0.40
Q46: The staff at my school respect students from all cultures and races	0.58	0.03	0.13	0.43
Q50R: I have been bullied at my school	-0.02	0.80	-0.08	0.60
Q21R: I am bullied during the school day at least once per month	0.03	0.77	-0.13	0.56
Q6R: I am put down and harassed at school because I look different	-0.09	0.77	0.04	0.58
Q12R: At school I have been bullied or harassed for racial reasons	-0.07	0.76	-0.02	0.57
Q3R: At school, I have had someone try to hurt me	-0.01	0.68	0.09	0.48
Q09R: Other students don't like me because I am a good student	-0.07	0.60	0.09	0.40
Q19R: I have been threatened/harassed through internet or text messages by another student at my school	0.24	0.59	-0.17	0.42
Q07R: At school, I feel afraid	-0.02	0.57	0.27	0.49
Q8: My belongings are safe at school	-0.04	-0.15	0.89	0.59
Q2: At school, I feel safe	0.12	0.14	0.65	0.60
Q18: I feel safe going to and from school	0.12	0.18	0.58	0.53
% of variance explained before rotation	**32.2**	**14.8**	**5.2**	

Table 15. Component correlation matrix

Component	1 Academic Environment	2 Safety: Bullying	3 Safety: School
1 Academic Environment	1.000	.297	.455
2 Safety: Bullying	.297	1.000	.330
3 Safety: School	.455	.330	1.000

The items in the first component that measure how students perceived their classes, and how their teachers interacted with them in those classes, are labeled "Academic Environment." The second factor was comprised of items that measure the prevalence of bullying behavior in the school and are labeled "Safety: Bullying." Finally, the three items in the third factor center around the idea of safety in general at the school and are labeled "Safety: School."

Table 15 presents the correlation between the components. Item correlations are presented in Appendix F. The correlation between Academic Environment and Safety: Bullying was somewhat low at .30 as was the correlation between Safety: Bullying and Safety: School at .33. The highest correlation among the components was between Academic Environment and Safety: School at .46. This would appear to make sense as both of those relate more directly to the school and its personnel while the bullying variable is dependent on the students in the school. Table 16 presents the descriptive statistics for the three school climate factors as well as the Cronbach's alpha which is used as a measure internal consistence (i.e., how closely related the items are in the scale) to provide evidence for the reliability of the factor. It is important to note that these values can be affected by the number of items in each scale with large numbers of items inflating the alpha and small numbers of items deflating the alpha. A general rule of thumb is to look for reliability coefficients higher than .70, however lower alphas (e.g., between .60 and .69) are frequently reported in journal articles as indicators of adequate internal consistency (Leech, Barrett, & Morgan, 2005).

Reliability Analyses

Table 16. Descriptive statistics for the six school climate factors (N = 4,579)

Factor	Number of items	Skewness	Kurtosis	Cronbach's Alpha
1. Academic Environment	11	-.61	.60	.69
2. Safety: Bullying	8	-.70	.05	.61
3. Safety: School	3	-.22	-.07	.62

Std. Error of Skewness =.04 Std. Error of Kurtosis = .07

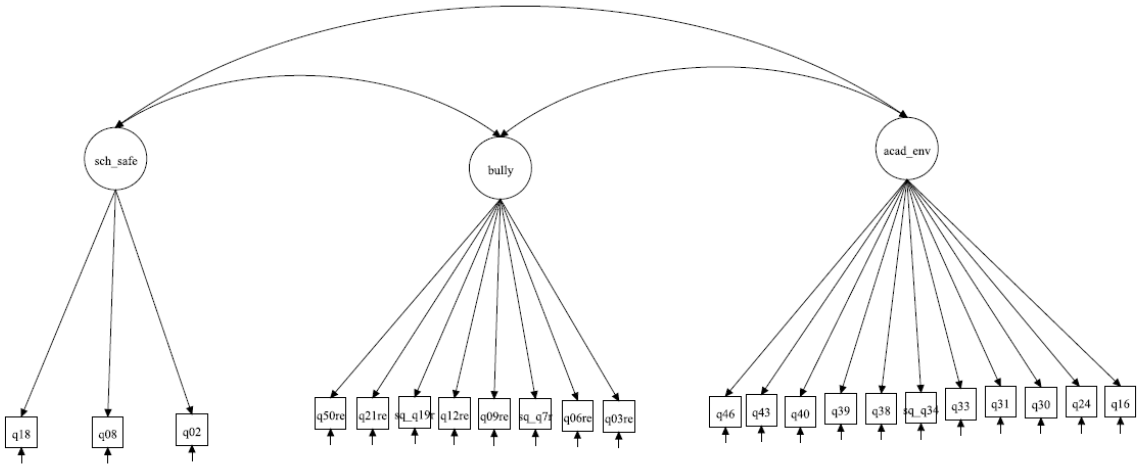
The EFA allowed a close examination of the pattern of loadings and after removal of the problematic items a simple structure was obtained. This structured allowed for the items that were common to each factor to be examined to determine if they were appropriate for measuring the factor based on the literature. After this was determined to be the case, the next step was to validate these findings by using confirmatory factor analysis to test the model with the second set of randomly selected cases.

Confirmatory Factor Analysis

Based on the results from the EFA analysis a confirmatory factor analysis was conducted with the final 22 survey item responses as dependent variables and the three factors of Academic Environment, Safety: Bullying, and Safety: School, which were used as latent variables. Survey item responses instead of computed factor scores were used

for the CFA because Brown (2006) indicated that because "there are an infinite number of sets of factors scores that could be computed that are equally consistent with the factor loadings" (p. 51) it is more accurate to use raw scores as "course factor scores may poorly represent latent factors" (p. 36). The measurement model did not contain double-loading indicators and all measurement error was assumed to be uncorrelated. Each of the latent variables was allowed to be correlated based on prior research in the area of school climate (Thapa et al., 2013). All analyses were carried out using Mplus 7.11 software (Muthen & Muthen, 1998-2012). Figure 2 provides a diagram of the three-factor model estimated in this analysis. Parameter estimates are given in Table 18.

Figure 2: Three-factor CFA model



As noted in the Method section, the sample used for the CFA analysis was the second half of the randomly selected respondents that included the middle and high school students who completed the survey during the second semester of the 2011-2012

school year. A total of 4,269 cases were used for the CFA analysis and none had missing data (for a description of the data cleaning process and sample descriptive, please, refer to the beginning of the Results section).

Model Identification

There are two necessary requirements to meet when examining model identification: 1) degrees of freedom are greater than or equal to zero (i.e., "number of free parameters is less than or equal to the number of observations"[Klein, 2005; pp. 169-70]) and 2) all latent variables (in this case there are three) must have a scale (Kline, 2005). When conducting a CFA, it is important to know that your model is not under identified which would lead to an infinite number of solutions for the estimated parameters. This means that the model should be able to produce "a unique set of parameter estimates for each parameter in the model whose values are unknown" (Brown, 2006, p. 62). The number of free parameters is determined by calculating the "total number of variances and covariances (i.e., unanalyzed associations of the exogenous variables [the factors and measurement errors] plus direct effects of the factors on the indicators [i.e., the loadings]" (Kline 2005; p. 170). Therefore in the hypothesized model, there were 44 free parameters.

The number of observations is established by calculating the number of sample moments in the model, which is found through the following formula: $v\ (v + 1)/2$. In this study, there were 22 observed variables resulting in 253 sample moments. Therefore,

since the number of observations is larger than the number of free parameters the model was over-identified.

To scale the factors in Mplus the default is set to fix one of the indicator loadings to equal 1.0. This default was allowed to stay in place for the final model analysis. Kline (2005) indicated that even if both of the above requirements are met that is not a guarantee of model identification. However, he allowed for the fact that there is a "sufficient condition for identification that concerns minimum numbers of indicators" (p. 172) on each factor; that condition states that if each factor has at least two indicators then the model is identified. This sufficient condition has been met with this model.

Model Fit

Table 17. Fit Indices for the overall model

Index	Value
Chi-square	2119.457
Degrees of freedom	206
Sig	>0.0001
Chi-square/df	10.288
Comparative fit index (CFI)	0.95
Tucker-Lewis index (TLI)	0.944
Root mean squared error (RMSEA)	0.047
Lower 90%	0.045
Upper 90%	0.048
CFit	0.999
Standardized root mean residual (SRMR)	0.041

One of the most common goodness of fit statistics used to determine model fit is the χ^2; however, it is known to be sensitive to large sample sizes with larger sample sizes resulting in rejection of the null hypothesis which indicates poor model fit (Brown, 2006, Klein, 2005). This may be the case with this particular data set (n = 4,269) as χ^2 test of model fit was significant so in this study that test was not the only one used to assess model fit. The Root Mean Square Error of Approximation (RMSEA) is another commonly used goodness of fit statistic that is not sensitive to sample size and estimates fit by "incorporating a penalty function for poor model parsimony" (Brown 2006, p. 83). With this statistic the closer the value is to zero, the better the model fit. Within this sample the RMSEA was 0.047 which is only slightly less than the recommended value of .05. Additionally the CFit test of close fit (probability RMSEA $\leq$ .05) was quite high indicating that there was good model fit based on the RMSEA. Other recommended goodness of fit statistics include the comparative fit index (CFI) which compares the user specified model to a "more restricted, nested baseline model" (Brown, p. 84) and can range from 0, which indices poor fit, to 1, which is indicative of good fit. In this case the CFI was .95 indicating a relatively good fit. The Tucker-Lewis index (TLI), which imposes "a penalty function for adding freely estimated parameters that do not markedly improve the fit of the model" (Brown, p. 85), similar to the RMSEA, and the closer the obtained statistic is to 1, the better the fit of the model (although the value for TLI can be outside of the 0.0 to 1.0 range). The Standardized root mean square residual (SRMR) "can be viewed as the average discrepancy between the correlations observed in the input matrix and the correlations predicted by the model" (Brown, p. 82). Values can range

from 0.0 to 1.0 with the smaller the SRMR statistic, the better the model fit. In this case the obtained SRMR statistic of 0.041 is at a level that would indicate good model fit and is below the value of .06 recommended by Hu and Bentler (1999). Both the correlation matrix and the covariance matrix can be found in Appendix G.

Parameter Estimates

Because the model fit was supported by the fit indices reported in Table 17, the researcher moved on to interpret and report the parameter estimates to examine the loadings of the individual items onto the latent construct. Unstandardized and completely standardized parameter estimates from the model are presented in Table 18 below. The unstandardized estimates can be "interpreted as unstandardized regression coefficients that estimate the direct effects of the factors on the indicators" (Kline, 2005; p. 176), while the standardized factor loadings can be considered to be correlations when they "are specified to measure just one factor" (pp. 176-77), which is the case with this model. Therefore, squaring the "standardized loadings equals the proportion of explained (common) indicator variance" (p. 177). All freely estimated unstandardized parameters were statistically significant ($p < .0001$).

Table 18. Model parameter estimates

	Unstandardized	Standardized	R-squared percentage
Acad_Env by			
Q16	1	0.684	46.79%
Q24	1.071	0.729	53.14%
Q30	0.982	0.699	48.86%
Q31	0.984	0.712	50.69%
Q33	1.025	0.714	50.98%
Q34	5.328	0.563	31.70%

Q38	0.892	0.615	37.82%
Q39	1.012	0.754	56.85%
Q40	1.016	0.714	50.98%
Q43	0.972	0.739	54.61%
Q46	0.992	0.655	42.90%
Bully by			
Q03R	1	0.636	40.45%
Q06R	1.109	0.742	55.06%
Q07R	5.731	0.646	41.73%
Q09R	0.715	0.546	29.81%
Q12R	1.026	0.714	50.98%
Q19R	5.256	0.555	30.80%
Q21	0.985	0.689	47.47%
Q50R	1.141	0.752	56.55%
Sch_Safe by			
Q02	1	0.727	52.85%
Q08	0.743	0.431	18.58%
Q18	1.031	0.682	46.51%

In general each of the indicators appeared to be meaningfully related to each of the factors with R^2 values close to 50% or higher. However, there were several indicators (for example, Q34, Q09R, Q19R and Q08) that had low loadings and may be revised or removed in future versions of the survey to ensure the latent variable is accurately measured.

Measurement Invariance

It is important that surveys "measure identical constructs with the same structure across different groups" (van de Schoot, Lugtig, & Hox, 2012). This allows for comparisons of results across groups as well as comparison of results across different points in time. When conducting a CFA in a single group, the analysis uses a single input

matrix, where as a CFA conducted in multiple groups uses multiple input matrices. For example, if looking at gender there would be two separate input matrices to be analyzed, one for male and one for female. Brown (2006) recommends the following sequence for testing for invariance using multiple-group CFA:

(1) Test the CFA model separately in each group;

(2) conduct the simultaneous test of equal form (identical factor structure or configural invariance);

(3) test the equality of factor loadings (metric invariance or weak factorial invariance); and

(4) test the equality of indicator intercepts (scalar invariance or strong factorial invariance). (pp. 269-70).

As indicated in the Methods section the model was examined for Configural, Metric, and Scalar invariance across grade levels, gender, and minority status (ethnicity recoded).

Across Grade Level

Often the recommended interventions for improving school climate are directed at specific grade levels (Thapa et al., 2013). Additionally, some schools in this district do not have the traditional groupings of grade levels in their buildings. For example, Aurora West College Preparatory Academy had grades 6-10 in their building (their ultimate goal is to house grades 6-12 within their building). Therefore, it is important to make sure that the survey is measuring the same construct in the same way across all grade levels. Table 19 lists the results of the measurement invariance tests.

Table 19. Grade level invariance test results

	χ2	df	χ2 diff	Δ df	RMSEA (90% CI)	CFit	SRMR	CFI	TLI
Single group solutions									
Grade 6 (n= 668)	547.521*	206	--	--	.050 (.045 to .055)	.515	.051	.929	.921
Grade 7 (n= 727)	488.080*	206	--	--	.043 (.038 to .048)	.986	.043	.951	.945
Grade 8 (n= 724)	635.032*	206	--	--	.054 (.049 to .058)	.101	.047	.939	.932
Grade 9 (n= 624)	462.743*	206	--	--	.045 (.039 to .050)	.946	.039	.955	.950
Grade 10 (n= 613)	533.601*	206	--	--	.051 (.046 to .056)	.378	.046	.948	.942
Grade 11 (n= 486)	553.887*	206	--	--	.059 (.053 to .065)	.007	.059	.923	.914
Grade 12 (n= 427)	510.407*	206	--	--	.059 (.052 to .065)	.012	.050	.927	.918
Measurement Invariance									
Equal Form (CONFIGURAL)	3731.273*	1442	--	--	.051 (.049 to .053)	.200	.048	.940	.933
Equal factor loadings (METRIC)	4027.483*	1556	296.210*	114	.051 (.049 to .053)	.188	.058	.935	.933
Equal indicator intercepts (SCALAR)	4662.181*	1670	634.698*	114	.054 (.052 to .056)	.00	.065	.922	.924

*p<.0001

All χ2 values were statistically significant as expected, most likely because of the large sample size. The other goodness of fit model fit statistics for each grade level were acceptable, although for the higher grades (10^{th}-12^{th}), they were not as robust as for

grades 6 -9, which may indicate a potential issue with how the survey is measuring perceptions of school climate for students in the higher grades. When conducting the principal interviews (as described in the next section) some principals indicated that students in the higher grade levels may not take the survey as seriously, or may have survey fatigue, since they would have taken it for the last four years, if they had been in the district. This is an issue that should be explored using student focus groups to determine possible differences between grade levels.

The invariance tests had statistically significant $\chi 2$ values and differences as well, which again was expected due to the large sample size. When looking at configural invariance it is important to note that this is considered the building block for the any further measurement invariance tests. Wu, Li, and Zumbo (2007) stated that, "failure to establish configural invariance demonstrates that different constructs were measured across groups" (p. 7). The possible issue of differences between grade levels should be taken into account as revisions are made to the survey and student focus groups at the various grade levels may help in determining if there truly is a different construct being measured with these survey items.

When examining the metric invariance the fit statistics were also marginally acceptable. Problems with the inability to establish metric invariance can arise when calculating item scores and making comparisons across groups. In other words, there may be group differences, and therefore a one-unit change, in a particular item score for one group, may result in a different level of change in that item score in another group and ultimately in the latent factor loadings, which would result in unequal fit indices.

The scalar invariance also had marginally acceptable goodness of fit statistics, which indicates that it could be problematic if comparing means of the latent factors when computing a factor score. Overall, based on the low goodness of fit statistics, it is recommended that more work be done to ensure equality of measurement across grade levels before disaggregating the survey data by grade level. Also, this may be a result of the abbreviated items that were used based on the EFA and a more robust measure that covers more factors related to school climate could demonstrate better measurement invariance. After this instrument, and possibly the overall model, is revised, and if these low goodness of fit statistics persist across grade levels, it might be wise to conduct partial measurement invariance analysis to help determine which of the parameters is invariant. (Byrne, Shavelson, & Muthen, 1989; Rensvold & Cheung, 1998).

Across Racial Ethnic Groups

Staff members in the Division of Equity and Engagement at the school district have been involved in the survey development process from the beginning and spend considerable time examining the survey results as they are disaggregated by ethnicity; specifically looking at differences between the Hispanic students, the White students and other students of color. Across the district Hispanic students comprise 54.3% of the student population while White students comprise 18.3% of the student population. Additionally 38% of the student population is non-English proficient or has limited English proficiency. These demographics were one of the reasons for which the district decided to create their own Student Climate Survey instead of using a measure that may have been developed with White middle-class populations. Knight, Roosa, and Umana-

Taylor (2009) recommend evaluating all instruments for measurement equivalence, especially when making comparisons across groups.

Ethnicities are coded into seven categories according to federal designations. Due to the varying sample sizes for each of the seven categories the ethnicity variable was recoded into White, Hispanic, and Other Minorities to facilitate the invariance testing. Table 20 lists the results of the measurement invariance tests across those ethnic categories.

Table 20. Ethnicity invariance test results

	X2	df	χ2 diff	Δ df	RMSEA (90% CI)	CFit	SRMR	CFI	TLI
Single group solutions									
White (n= 675)	709.932*	206			.060 (.055 to .065)	.000	.048	.929	.921
Hispanic (n= 1961)	1000.751*	206			.044 (.042 to .047)	1.00	.043	.953	.948
Other minorities (n= 1633)	898.028*	206			.045 (.042 to .048)	.994	.043	.952	.946
Measurement Invariance									
Equal Form (CONFIGURAL)	2608.711*	618			.048 (.046 to .049)	.982	.043	.948	.942
Equal factor loadings (METRIC)	2691.99*	656	83.088*	38	.047 (.045 to .049)	.998	.047	.947	.944
Equal indicator intercepts (SCALAR)	2909.847*	694	218.049*	38	.047 (.046 to .049)	.992	.048	.942	.942

*p<.0001

When testing each of the three groups individually the Hispanic and Other Minority groups model fit statistics were within acceptable ranges. The White group fit statistics were only marginally within acceptable ranges, which may indicate a potential issue with model fit for the White students in the district. This is another issue to address with the revision of the measure.

The invariance tests all had model fit statistics that are well within acceptable ranges (with the exception of the $\chi 2$ values which is most likely a factor of large sample sizes as previously explained).

In order to compare possible mean differences between each of the seven ethnicity categories factor scores were computed for the three factors using the regression method. An analysis of variance (ANOVA) was conducted to examine mean differences in the factor scores by ethnicity. Results presented in Table 21 indicate there were statistically significant differences in mean scores for the first two factors but not the third. In order to determine which groups had statistically significant differences in means the Tukey HSD post hoc analysis was conducted which revealed the only ethnic group differences was between the American Indian students and each of the other six ethnic groups.

Table 21. One way analysis of variance summary table for mean differences on factor scores by ethnicity

		df	Sum of Squares	Mean Square	F	*p*
Academic Environment factor score	Between Groups	5	21.593	4.319	4.335	.001
	Within Groups	4263	4246.407	.996		
	Total	4268	4268.000			
Safety: Bullying factor score	Between Groups	5	76.775	15.355	15.618	.000
	Within Groups	4263	4191.225	.983		
	Total	4268	4268.000			
Safety: School factor score	Between Groups	5	10.979	2.196	2.199	.052
	Within Groups	4263	4257.021	.999		
	Total	4268	4268.000			

Across Gender

Because many of the principals indicated they would like to see the survey results broken down by gender in order to tailor their programs accordingly, measurement invariance across gender was examined. The results of this analysis are presented in Table 22 below.

Table 22. Gender invariance test results

	χ^2	df	χ^2 diff	Δ df	RMSEA (90% CI)	CFit	SRMR	CFI	TLI
Single group solutions									
Female (n=2168)	1141.027*	206			.046 (.043 to .048)	.996	.040	.950	.944
Male (n=2101)	1287.702*	206			.050 (.047 to .053)	.496	.046	.945	.939
Measurement Invariance									
Equal Form (CONFIGURAL)	2428.73*	412			.048 (.046 - .050)	-	.043	.948	.941

Equal factor loadings (METRIC)	2475.76*	431	47.032*	19	.047 (.045 - .049)	-	.045	.947	.943
Equal indicator intercepts (SCALAR)	2624.00*	450	148.218*	19	.048 (.046- .049)	-	.047	.944	.942

*p<.0001

Overall, the model for female data had acceptable goodness of fit statistics, while the goodness of fit statistics for the model with males, were only marginally acceptable. All measurement invariance tests had acceptable goodness of fit statistics so it would be reasonable to provide a disaggregation of results by gender to provide more information to principals and other decision-makers on future reports about differences between perceptions of school climate in order to help them make appropriate decisions about interventions to improve school climate.

School Leadership Interviews

The school leadership interviews were conducted in order to answer the following research questions:

1) How do principals and other members of the school leadership team use the resulting data to inform their decisions? and

2) How can the reporting structure be improved to provide more information for principals and school leadership?

A total of eight interviews were conducted with principals, assistant principals, and district leadership staff[†††]. The average number of years the interviewees had spent in a school leadership role was nine. Five males and three females were interviewed, and the interviews lasted anywhere from 30 minutes to 75 minutes.

Initially, the focus of the interviews was review of a recent student climate survey data report, but after examining the EFA analysis results it became clear that many of the survey questions needed to be dropped for the CFA analysis. This change in analyses would necessitate creating a report that would not include many of the questions that had been used for the previous five years and that the staff members were used to seeing in the reports. Therefore, the interview protocol was revised to allow for an examination of what principals and school leaders think about student climate in their schools, how they think the survey helps measure climate, what kinds of decisions they have made based on the student climate survey data, and how the data reports might be structured to help them interpret that data in order to make those decisions (Interview questions can be found in Appendix D).

All interviews were audio-recorded, and then transcribed and initially coded by the researcher immediately following the interview. This allowed for Lichtman's ideal "circular model of gathering and analyzing data" (2013; p. 247). Using the constant-comparative method each transcript was read and open coding was conducted to develop categories. Coding was done by both the researcher and an additional external coder in the following manner:

[†††] In order to maintain the confidentiality of those interviewed an exact breakdown of which positions consented to interviews is not provided.

1. Researcher conducted the first interview.

2. Researcher transcribed the first interview.

3. Researcher completed initial coding for categories.

This process was repeated with each of the remaining seven interviews with the additional step of comparing the first set of codes to the new data. After this process was completed, an initial codebook was developed with categories and their related codes. The second coder received the coded transcripts and initial codebook via email. Using the codebook the second coder read through each transcript and marked any areas where they disagreed with the first coder's categories or codes. The second coder also indicated any new categories or codes that were not described by the first coder. The second coder's work was sent back to the first coder via email and then the first coder reviewed the areas of discrepancy and discussed those discrepancies via telephone with the second coder. Overall, the main source of discrepancies was categories or codes that did not address the two research questions regarding how interviewees used data to inform decisions and how the reporting structure could be improved. Both coders followed the recommended procedures outlined by Guest, MacQueen, and Namey (2012) whereby "each time the coders reach a point where their coding does not agree, they discuss the reasons for the discrepancy, agree on a solution, recode the master coding document, and revise code definitions if necessary" (p. 89). While no specific metrics were generated in terms of agreement percentages, all discrepancies were resolved for the final data set which indicated 100% agreement.

These categories were revisited and refined after each additional interview was coded, and the initial codes were related to each other during axial coding. Finally, selective coding was conducted by determining the most salient codes for this study to answer the research questions. These final codes were chosen to represent key categories from the original transcript data. Table 23 provides some examples of raw data from the interview transcripts, the preliminary codes, and the final category and code that were used in analysis. Additionally, a codebook can be found in Appendix H that provides the categories, codes, and subcodes that were used for analysis.

Table 23. Coding process

Interview passage	Preliminary codes	Final category and code
…and I think that goes back to having 50 questions, what do you focus on with 50 questions? You know? And looking at this now as we're talking there's a lot of questions about support and respect and discipline and bullying and to look at all that and to pour through 50 questions, I think it's hard.	Too many questions Trying to focus	Category: Report analysis Code: Number of questions Subcategory: focus
…first I try to get a general	General perception	Category: Report

Interview passage	Preliminary codes	Final category and code
perception of what it's telling me, I do a comparison between year to year just so I can determine whether or not we're going in the right direction or not.	year to year comparisons Ethnicity comparisons Direction headed	analysis Code: general overview Code: comparisons Subcode: year to year Subcode: ethnicity Code: conclusions drawn

General Themes

When school leaders were asked to define what "school climate" meant to them they seemed to agree with what Preble and Gordon said; "school climate is one of those vital but seemingly indefinable qualities that you can actually 'feel' within the first few minutes you walk into a school" (2011; p. 16).

"I think you can judge a school climate very, very quickly interacting with front staff, interacting with the students, I think within 5 or 10 minutes you can know, is this a positive climate, is this a negative climate" – Interviewee #2.

"I think it's kind of an intangible thing that when you walk into a building you can sense that there's a… you can sense what the feeling of this building is… kind of… in the emotional realm of is it positive, is it negative? Are people happy, are people mad? Is there order and organization or is there disorder and chaos? And so I think simply by

walking through a building you can get a pretty good sense of how the students are feeling, how the staff is feeling, and how the parents who are in the building are feeling" – Interviewee #7

While all leaders indicated they believed it was important for a school to have a positive climate it became apparent after the first few interviews that school leaders give much more attention to the *staff* climate survey results than the *student* climate survey results. In part this is because of the direction from the higher-level district leaders and ultimately, the superintendent.

"I know for the staff climate survey we had to send back a plan to our director saying this is how we did it with the staff but it doesn't seem to me that we do that with the student [climate survey]" – Interviewee #3

"I don't look at it anywhere close to the time I spend on the staff survey" – Interviewee #5

"we have staff meetings about the staff one but not the student" – Interviewee #8

Additionally, the amount of data that principals are required to use for decision-making consists mainly of student test scores and is specifically related to achievement results. Some of the interviewees admitted to only conducting a cursory review of the student climate survey results, while others talked about reviewing the data question by question, for themselves first, and then taking talking points to teachers and staff, as well as student advisory groups.

"It's usually loaded into my V drive and at that point I dig into analysis. Usually I start just with myself to analyze and do that work but, then, I give it to my instructional leadership team, they do some analysis of the work, and then we bring it to the whole staff and determine what are the pieces that we need to focus on for student climate." – Interviewee #1.

Using Data to Inform Decisions

When describing how the student climate data reports were used to inform decisions, most principals stated they first looked at specific questions around safety and having a trusted adult in the school. If there was a drop in the number of students who felt safe, or the number of students who said they had a trusted adult in the school, then that was cause for action.

"I usually look at the perception of safety and do they feel safe in this place, do they have an adult they trust? All those are big ticket items I look at right off the bat to make sure that number one there's a relationships there for a child and that they're safe in this place" – Interviewee #1

"We look at it and I think the big ones we target are the bullying and you know that the kids feel safe, I feel safe at school. If a lot of kids disagree with that obviously you want to address those big discrepancies" – Interviewee #3

"I focus on a couple of different things. I'm mostly focusing on looking at bullying, harassment, feeling like you can trust an adult in this building. I look at whether or not they feel like the APs and the principals support them" – Interviewee #7

When conducting the EFA the specific questions related to trust (Q1 and Q4) were removed from the model because they were the only two items that loaded on component 3 (see page 63). Since trust was considered a "big ticket" item by many of the principals future revisions to the survey should include more trust-related items and subsequent analysis could determine if that factor would be appropriate to add to the overall model.

When asked about how they determined specific actions that had been taken as a result of the student climate survey, several interviewees indicated that they usually needed more information about the specific areas before taking action.

"I feel the need for follow-up anytime we get the survey I think …it's a good start but it's in general terms so we then isolate where are some areas of growth, some successes, some celebrations, and then where are some areas that we need further information. I don't think, I mean based on the climate survey, we can't immediately say 'okay, now let's set a new policy and procedure' I think we need more information about where is it that they don't feel safe or whatever that may entail…" – Interviewee # 2

"I guess having some understanding on like what does that mean is kind of the next step and so really that's one of the reasons we started our focus groups is like talking to kids about if they feel safe or what does it mean when you say you see people harassed for racial reasons, what are you talking about" – Interviewee #7

Preble and Gordon (2011) advocate for the collection of qualitative data "in order to gain a broader and more generalized understanding of school climate" (p. 67).

Interviewees also indicated their desire to gain a deeper understanding of what situations students encounter at school that lead them to respond on the survey the way they do. Interviewees noted that they, as school leaders, work with their student leadership teams to review the student climate survey results and make suggestions for improvement.

"My first thing is with any of this data, numbers only tell me so much. I've got to have the qualitative component that goes with this." – Interviewee #4

One interviewee talked specifically about student focus groups that had been previously conducted in his/her school to investigate more deeply what students were experiencing in the school that influenced their answers on the student climate survey.

"a number of kids say they feel safe at school because of the cameras and practicing lockdown procedures and stuff like that…but then many students shared their experiences with teachers being mean, making fun of them, pulling students arms, yelling and banging on desks to get students attention.. and, so, to hear that from kids, that's why some of them then report I don't feel safe in this school" – Interviewee #6

The amount of data available to school leaders on any given day is overwhelming. Principals and Assistant Principals are told to focus on instructional leadership, but in many buildings things like overflowing toilets, cleaning graffiti, and revising bus schedules can derail the plans of the day and keep the principal from working with teachers as much as they would wish. Because of these distractions, it is imperative that district and school level data are presented in reports that are easy to read at a glance. While most principals and assistant principals are well versed in examining a variety of

data reports, they lack the time required to do so. In the interviews, it became apparent that while they do value the data from the student climate survey there are many other areas that demand their attention and leave little time for the focus required to take full advantage of the data reports in their current form.

Reporting Structure Preferences

All interviewees said the student climate survey data report was too long in its current form to be of much use, especially given the amount of time principals spend reviewing other district and school data as well as attending to organizational management issues. The middle school and high school survey have 51 questions that are currently reported out individually by frequency of response (Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree), which becomes tedious to review question by question. Interviewees repeatedly said the current reporting structure had too many questions and it took too long for them to sort through it to make sense of the data.

"I think 50 questions is hard to differentiate the needs and pick out trends" – interviewee #3

"*We can really narrow our focus. There's just way too much. I mean, it's great information but there's a lot. None of them are bad prompts or questions but, it's just, oh my Lord…*" – interviewee #4

"*we can't have 51 questions all be important, we just can't at any given time*" – Interviewee #6

"And 51 questions is too many. Not only that but the amount of time it takes in the class. Fifteen questions that are focused and targeted might be more significant" - interviewee #8

Based on the amount of other demands on school leaders' time discussed by the interviewees, in order for school leaders to be able to use the data from the student climate survey reports, the data sets need to be presented in a quick, easy to read format that would provide an overview of the results, along with suggestions for places to "dig deeper" or to identify why students were responding the way they were. One example of a way to present the data was to group the questions by the construct they were measuring. In that way any given principal could quickly determine if there was a particular area with low results in his/her school instead of individual questions where mean scores (or percentages) had dropped from year to year.

"We need more meaningful data but outside of getting specific answers from kids like 'I don't feel safe', respond to how don't you feel safe" – Interviewee #3

In addition to the breakdown of student climate survey results by student ethnicity, school leaders would like to see data disaggregated by grade level to identify grade level specific interventions and by gender to understand specifically if there are issues that are relevant to a particular gender group.

Another common theme discussed by the interviewees was the desire to see an alignment between the staff climate survey, the student climate survey, and the parent

climate survey to allow for comparisons of perceptions to determine the prevalence of any particular issues across the three stakeholder groups.

"It would be nice to have the three responses from each group in a report so when we talk about safety we can say 'here's what kids are saying at the school, here's what the teachers are saying at the school, and here's how the parents feel about the school'. That would be beautiful" – interviewee #6

"…that would be awesome because then we could at least compare if our perceptions are radically different and if so why. And ultimately most everybody in the building should be kind of on the same page really" – interviewee #7

"And every one of them, teacher, student, and parent should be aligned, right? And then that creates conversation" – interviewee #8

Preble and Gordon (2011) maintain that school climate is the key to school safety, student motivation, and academic achievement. Indeed, they state that, "the only way to sustain improvement in academic achievement is to improve school climate and culture for faculty and students in the school" (p. 4). However, among those school leaders interviewed, there was a general lack of understanding about the connection between school climate, instructional practices, and academic achievement at the school. Although many of the principals agreed that school climate was important, they emphasized that students' academic achievement would always be the number one priority, perhaps not recognizing how improving school climate could potentially impact student motivation and ultimately student achievement.

"Do you want me to focus on these things or do you want me to bring up student achievement" – Interviewee #5

"When you go back to that word climate so that they think of climate as the whole learning environment so there's a good feel around learning when you come into this building that kids view this as a learning place, teachers view it as a learning place, and parents view it as a learning place" – Interviewee #5

Summary

Principals and assistant principals described their perceived roles as being an instructional leader first and organizational manager second. The amount of data they are expected to report, review and use to make decisions can be overwhelming at times. This is why, they explained, the student climate survey results are not examined and used as much as they could be over the year. The interviewees were very candid about their use of the current student climate survey data report and provided suggestions for changes that would enable them to use it to a greater extent in the future. For principals and other schools leaders to make the best use of the student climate survey recommended changes include to determine a limited number of priority areas of school climate as a district to focus on, to shorten the length of the survey specifically focusing on those priority areas, and to align the three stakeholder surveys (staff, student, and parent) in reporting results.

Based on how the principals described the administration of the survey it became apparent there are differences in survey administration that may result in varying results between schools. For example, some teachers in the schools read the questions to the

students but other schools only distributed the survey during class and then collected it at the end of class. At least one school split the survey administration into two days; spending half an hour reading the first half of the questions, one day, and then the finishing the remainder of the questions, the next day. This could explain some instances of missing data as it was not clear what happened if a student was present for the first day but not the second and vice versa.

Chapter Four: Discussion and Summary

> *Although there are hundreds of school climate measures, school leaders are not using scientifically sound assessment tools that are comprehensive in two ways: valuating most or all of the dimensions that researchers believe color and shape school climate, and recognizing the three major groups in school communities: students, parents, and school personnel (Cohen, 2006; Freiberg, 1999). In fact, most school climate measures have not been developed in a scientifically sound manner. In our center's recent national survey (MMS Education, 2006), we found that 59% (19 of 32) district- and building-level administrators interviewed had participated in school climate surveys. Of those, 37% had developed the instrument in-house. They were not scientifically sound assessment tools.* (Cohen, McCabe, Michelli, & Pickeral, 2009, p. 196)

> *School climate is a malleable factor that schools or districts are able to manipulate. Expansion of programs designed to improve school climate could result in increased success for a broader number of schools. School climate may be part of the solution to helping schools beat the odds.* (Voight, Austin, & Hanson, 2013, p. vi)

Introduction

In order to support the reader, this final chapter of the dissertation reviews the research problem and the major methods used in the study. The chapter also provides the study's results and discusses their implications. The main purpose of this study was to gather reliability and validity evidence for a district-developed survey intended to measure students' perceptions of school climate. As previously stated, research has repeatedly demonstrated the importance of school climate's relationship with student learning outcomes including academic achievement (Borman & Rachuba, 2001; Ekholm, & Kull, 1996; Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Jankens, 2011;

Thapa et al., 2013). Because of the demonstrated impact school climate has on students, it is essential to accurately measure and report students' perceptions of school climate in order for school leaders to make informed decisions on developing strategies for school improvement.

Statement of the Problem

While there is general agreement that school climate is an important factor in student learning outcomes, evidence for the psychometric soundness of instruments used to measure this factor is frequently lacking, especially in the case of district-developed measures. In an attempt to conduct a systematic review of school climate measures for teachers, Gangi (2010) found that out of 102 instruments only three met her inclusion criteria, one of which being "published technical characteristics (reliability and validity)" (p. 27). No such review has been conducted for school climate measures for students, but as the interviews conducted by MMS education (2006) indicated, many school districts develop their own instruments to measure student perceptions of school climate. These instruments have very little, if any, reliability or validity evidence to support the use of the results to make inferences about the quality of school life for students. Additionally, in many instances, it is unknown if the instrument consistently measures the construct of school climate for both male and female students or for students of different ethnicities. Of further concern is the lack of data-reporting guidelines to assist in the use of survey data when making decisions about interventions related to improving school climate. Because schools are held accountable for making data-driven decisions, sound measures and concise reporting of results is imperative for school leadership.

Review of the Methodology

As explained in Chapter 2, the study used an embedded, mixed methods design to, first, use quantitative data to examine a district-created instrument intended to measure students' perceptions of school climate for reliability and validity evidence; and, second, to gather and analyze qualitative data in the form of interview transcripts to gain an understanding of how school leaders, such as principals or assistant principals, use the data reports from the student climate survey instrument to inform their decisions about improving school climate and student achievement.

Data used in the quantitative portion of the study were collected by the district, in January 2012, using the district-developed Students' Perceptions of School Climate Survey. There were a total of 12,065 completed surveys from students in grades 6-12. After initial data cleaning and removal of surveys with unacceptable amounts of missing data, the data file was split into two files using the "select cases" function in SPSS and selecting "random sample of cases" equal to 50% of cases. This resulted in one file with 5,985 cases that was used to conduct the exploratory factor analysis, and a second file with 6,080 cases that was used to conduct the confirmatory factor analysis.

In order to determine the factor structure of the survey, an exploratory factor analysis (EFA) was conducted on a random sample of half the 2011-2012 survey data. Components were extracted using principal components analysis and a parallel analysis (PA) was conducted for the final decision in the number of components to retain. Next, the components were rotated using the oblique rotation procedure of promax rotation,

which is the appropriate procedure for components that are believed to be correlated (Gorsuch, 1983; Thompson, 2004).

Based on the number of components retained and their associated items, a reliability analysis was conducted using Cronbach's alpha as a measure of internal consistency. This analysis indicated there was adequate reliability evidence for each of the three components, although correlations between the three components was smaller than might have been anticipated, as each of the three constructs was assumed to be related.

Using the results from the EFA, a confirmatory factory analysis (CFA) was conducted using Mplus software with the second half of the 2011-2012 student climate survey data. Commonly accepted goodness-of-fit indices were examined to determine how well the model fit the data (Kaplan, 2009; Kline, 2005). Because of the importance in determining differences of perceived school climate among subgroups of students based on gender, ethnicity, and grade level, the study also tested for measurement invariance to allow for accurate comparisons of means and frequency distributions on the various components in the reports (Byrne, Shavelson, & Muthen, 1989; Rensvold & Cheung, 1998). Measures of configural, metric, and scalar invariance were tested.

In the qualitative portion of the study eight interviews were conducted with principals, assistant principals, and other district leaders who worked with individuals at the schools to help make data-based decisions. Interviews lasted from 30 to 75 minutes, and the interview data were transcribed and coded using constant comparison analysis, which Leech and Onwuegbuzie (2007) recommend as "a method of choice when the

researcher wants to answer general, or overarching, questions of the data" (p. 576). In order to address reliability, one other person in addition to the researcher coded the interviews; intercoder agreement was established using subjective assessment (Guest, MacQueen, & Namey, 2012). Member checking was done with the initial analysis results and all agreed upon the major themes extracted.

Summary of the Results

Three questions were addressed in the psychometric phase of the analysis that evaluated the adequacy of the measure:

1) What is the factor structure of the school climate survey that was developed "in-house" to measure students' perceptions?

2) Do the items on the school climate survey reliably measure the constructs found in the factor analysis?

3) Is there sufficient factorial invariance of the School Climate Survey across grade level, gender, and ethnic groups?

Overall results from the quantitative analysis found results in the EFA that indicated over half of the survey items were not functioning the way in which they were intended. With these items removed, a CFA was then conducted with a three-factor model to determine if there was appropriate model fit and if there was invariance across gender, grade level, and ethnicity. As Brown (2006) noted "CFA is more appropriate than EFA in the later stages of construct validation and test construction when prior evidence and theory support 'more risky' a priori predictions regarding latent structure" (p. 49). The EFA conducted as the first part of this study was the first attempt at examining the

constructs of the survey. Because there was a severe reduction of items from the initial survey due to poor communalities and cross-loadings a logical next step would have been to conduct an extensive revision of the survey with more data collection to help provide a stronger theoretical model for a final CFA analysis. However, due to time constraints for this study a revision was not feasible and the CFA was conducted with a limited number of survey items. The CFA model fit statistics were acceptable and invariance tests held across each group indicating the items and factors in the model adequately measure the factors of academic environment, safety as it relates to bullying issues, and overall school safety. While removal of these items resulted in a much shorter instrument with acceptable reliability and validity evidence, further revisions are recommended in order to develop a measure that will address the needs expressed during the school leadership interviews and will also accurately reflect students' experiences in their school.

The second phase of the analysis, the usability phase, examined how the data are currently used by school leadership and what changes in their use may occur based on new reporting procedures. For the usability phase of the analysis the following two research questions were addressed:

1) How do principals and other members of the school leadership team use the resulting data to inform their decisions?

2) How can the reporting structure be improved to provide more information for principals and school leadership?

Qualitative data analysis of the interview transcripts from principals, assistant principals, and district leaders revealed that while it was general knowledge that student

perceptions of school climate could impact student achievement, there was no focus on using the survey data to make such decisions. Principals indicated the data reports were not in a "user friendly" format; there were too many questions to sort through and the principals lacked guidance on how to review the data. Additionally many of the principals expressed a desire to "drill down" with some of the questions (i.e., disaggregate responses) so as to understand why students were responding the way they did.

Also, during their interviews school leaders indicated they would like to do more with the student climate survey data than just look at a few "key questions" and determine if there was a problem. However, due to the difficulty in the reviewing the current reporting structure it required too much time for them to determine areas of focus, especially when considering the competing demands on their time. School leaders may also benefit from training on how they can examine the connection between improving school climate and seeing improvement in students' academic achievement. This connection can be essential in order for the issue of school climate to be efficiently addressed by all staff in a school and in the district. Sparks (2013) indicated that while principals frequently receive training on how to review and use *academic* data, they may need more specific training related to how to use school climate data in examining and building relationships between students and staff in order to create an environment more conducive to learning. The present study found that principals expressed a desire for more guidance on how to use the data effectively to enhance school climate, supporting Spark's conclusion.

Interpretation of the Findings

The results from the EFA and CFA analysis is illustrative of the problems that are common in district-developed surveys – even when "good" items are taken from various surveys with established reliability and validity evidence, the end result can be a problematic instrument with little to no reliability and validity evidence (Colorado Legacy Foundation & Colorado Department of Education, 2012; MMS Education, 2006; Mo, Yang, & Hu, 2011). Cohen, McCabe, Michelli and Pickeral (2009) asserted that "educational practice is driven by what we measure" (p. 196) and although many schools, districts and states measure school climate, the assessment tools they use are frequently lacking reliability and validity evidence, especially for "homegrown" school climate surveys. Faster and Lopez (2013) agree that school climate measurement tools should have reliability and validity evidence and be vigorously field-tested before policy decisions are made.

While all of the school and district leaders interviewed indicated they would like a shorter survey, the items they indicated were the most important to them were some of the items that did not function well in the EFA and were removed from subsequent analysis. Specifically of concern was the repeated mention of Questions 1 and 4, which principals believe to be measuring students' perceptions of trust:

- Q1: I have an adult at school I trust; and
- Q4: I have at least one adult in this school I can go to when I need help.

These items were removed in the EFA process as they were the only two items on a particular construct. Given the emphasis on the need to measure students' perceived

levels of trust, it may be beneficial to find additional trust-related questions in other surveys, or to create new items, and add these related questions to the survey to build a more solid construct.

Because all of those interviewed indicated a strong desire to see items grouped by construct in order to facilitate interpretation and decisions, it is imperative that the items measuring each construct be statistically sound. In a recent review of school climate research, Thapa et al. (2013) recommended four major areas that should be assessed when determining school climate: safety, relationships, teaching and learning, and the institutional environment. After conducting the EFA it would appear the remaining items on the district's survey are only measuring two of Thapa et al.'s constructs: safety (as an overall construct and as it specifically relates to bullying), and teaching and learning. In order to have a more comprehensive measure of school climate future version of the survey should include items related to measuring relationships and the institutional environment.

In the initial EFA, it was somewhat surprising that there were such low correlations between the final three constructs. One would have expected higher correlations between many of the variables to describe the relationships between factors; however, it is possible the survey is too long. During the interviews, some of the principals indicated that the survey might be too long for students to fully give their attention to the full set of questions.

The Colorado Legacy Foundation's Measuring School Climate: A Toolkit for Districts and Schools (2012) provides a list of "best practice guidelines" when schools

decide to measure school climate. This study's findings relate to a number of those guidelines.

1. *Focus on school-wide climate not just bullying.*

The APS Student School Climate Survey does provide a focus on school-wide climate although the CFA only measured two other constructs besides bullying.

2. *Use multiple measures when possible.*

Among the school leaders who indicated that they reviewed the student survey results, they also conducted focus groups and used other data gathering methods to incorporate student voice at their schools to "drill down" on some of the survey questions in order to gain a better understanding of why students felt the way they did. Other school leaders supplemented the survey by looking at the discipline data, incidences of graffiti in and around the school, and attendance rates as indicators of school climate.

3. *Select or structure surveys to ensure an ability to monitor disparate impacts on vulnerable groups of students.*

As noted earlier, the current survey reporting structure in the district does break down student responses by ethnicity. Principals indicated this was helpful in determining potential subgroups that may have difficulties in a given area. They also said it would be beneficial to see the results broken down by grade level and gender which would help them monitor how perceptions of school climate may differ between groups. In the current version of the survey, Questions 13 and 14 ask students about their perceptions of gender differences at the school. These are the only two questions that specifically ask students to consider gender and could benefit from additional gender-related questions if

this is an area of concern at the school. These questions were removed from the CFA due to the fact they were the only two items measuring a specific construct.

4. *Select or structure surveys in a way that measures different types of bullying.*

On the current survey there are questions that measure bullying in the school, as well as cyber bullying. Also, in addition to some questions using the term bullying, other questions use the term "harassed" or ask students if they have had someone try to hurt them (e.g., hit, shoved, kicked).

5. *Administer surveys on an ongoing basis to monitor trends over time.*

Currently the survey is administered every year in January. While some principals indicated this may not be the best time of year to measure students' perceptions of school climate, they all indicated a desire to monitor the results across the years, preferably reviewing trends over the last three to five years to identify any patterns.)

Recommendations for Educators

Research has repeatedly demonstrated how student perceptions of school climate can be an important data source for improving overall achievement (Thapa et al., 2013). Therefore, if improving school climate can result in improving student learning outcomes, both academic, social and emotional, then ensuring the use of accurate measures of school climate is "a necessary first step in systematic school climate improvement" (p. 14). Purchasing existing measures can be costly and may not provide context-specific results for every school district. Because of these limitations many school districts have developed their own measures of school climate. This development

process should consist of a cycle of analysis, revision, and re-analysis until the reliability and validity evidence are satisfactory for using the instrument to understand the climate and to make decisions for ways to improve it.

This initial examination of the student climate survey from a psychometric perspective has provided the catalyst for deeper review by principals and other school leaders to determine ways in which the survey data could be used to contribute to the data story each school uses to shape school improvement. During many of the interviews the school leaders acknowledged their lack of attention to the student climate survey results and their realization that this could be powerful data to inform many of their decisions. Collaboration between the Division of Accountability & Research group and school leaders would be beneficial in growing this culture of data use in the district.

If the district leadership believes that collecting students' perceptions of school climate is a valuable activity (and warrants using one class period to administer the survey that would otherwise be used for instruction) then the survey instrument must be valid and the reporting of results must be accessible and relevant.

Suggestions for Additional Research

Based on the results of the EFA and the interviews, there appears to be a need to clarify what constructs the district wants the school climate instrument to measure and then to revise the survey to reflect those priorities. This revision process should include focus groups with students and staff members, in the district, who look would at student climate data (equity and engagement, board of education, etc.) to gain a fuller understanding of stakeholders' definitions of school climate constructs and areas of

priority, potential uses of survey findings among stakeholder groups, and strategies for enhancing use of survey data to inform school and district decision processes.

The National School Climate Council (2007) found that issues with school climate measurement leads to gap between research and policy. Once a measure has been developed that is scientifically sound, a next step in the research would be combining results from student climate survey with other indicators such as "incident data like attendance, referrals, suspensions" (Shah, 2013; p. 12), state test results, drop-out and graduation rates, etc. (similar to recommendations from National Center on Safe Supportive Learning Environments). Eleven states have done just that and combined measures to create new state score-cards for their high schools in an effort to help identify issues with school climate (Shah, 2013). The executive director of the National Institute of School Leadership, Bob Hughes, believes that low graduation rates and teacher absenteeism are symptoms of poor school climate so, instead of focusing on the symptoms, it would be more effective to focus on the cause; in this case school climate (Sparks, 2013). Hughes stated that a lack of principal training in shaping school climate leads principals to focus solely on academic factors because they appear easier to quantify with things like test scores and numbers of absences.

"Adding valid and reliable school climate data to the assessment mix offers a whole new set of valuable data to consider for shaping a school's policies, programs, and practices" (Preble & Gordon, 2011; p. 61)

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Appendix A

Table of previous studies

Table of School climate factors measured in the research and mapped to Thapa et al.'s (2013) areas

Study Author	Year	Survey Name	Survey population (and n)	School climate factors measured	Safety	Relationships	Teaching & Learning	Inst'l Envir.
Aldridge & Ala'l	2013	What's Happening in This School (WHITS)	Grades 8-12, n=4067 8 high schools	1. Teacher support			X	
				2. Peer connectedness		X		
				3. School connectedness		X		
				4. Affirming diversity				X
				5. Rule clarity	X			
				6. Reporting and seeking help		X		
Fan, Williams and Corkin	2011	Educational Longitudinal Study of 2012 (ELS: 2002)	16, 168 10th grade students in 757 high schools (nationwide)	1. Order, safety, and discipline	X			
				2. Clarity and fairness of school rules	X			X
				3. Teacher-student relationship		X		
Monrad, et al. DiStefano, et al	2007 2007	43-item district-developed survey	Students in grades 4, 5, or 6 in 26 schools 44, 055 student surveys (South Carolina)	1. Learning environment			X	X
				2. Expectations of others		X		
				3. Social-Physical environment		X		
				4. Safety	X			
Gareau, et al.	2009	State student climate survey	Analysis of survey given in 2007 to students in grades 5, 8 and 11 (South Carolina)	1. Instruction			X	
				2. Social and physical environment		X		X
				3. Home-school partnership				X
				4. Safety	X			

Study Author	Year	Survey Name	Survey population (and n)	School climate factors measured	Safety	Relationships	Teaching & Learning	Inst'l Envir.
Briggs, et al.	2010	The Elementary and Middle School Climate Survey – Student Version (revised) by Emmons, Haynes, & Comer, 2002)	159 middle school students in a public school in central Virginia	1. Fairness		X		
				2. Order and discipline	X			
				3. Parent involvement				X
				4. Sharing resources				X
				5. Student interpersonal relations		X		
				6. Student-teacher relations		X		
Furlong, et al.	2005	California School Climate and Safety Survey – short form	7, 524 students in grades 6-12 from 61 schools in central and southern California	1. Perceptions of school danger	X			
				2. Perceptions of school climate	X		X	
				a. support from teachers		X	X	
				b. school rules	X			
				c. school safety	X			
				3. Reports of victimization	X			
Search Institute	2006	Creating a Great Place to Learn – student learning climate measures	Field testing in Spring 2005 with 2,140 6-12th graders in three middle schools and 1 high school in Alhambra, CA. Asian = 68% Hispanic – 20%	1. Relationships		X		
				a. caring and fair staff		X		
				b. parental support and achievement values		X		
				2. Organizational attributes				X
				a. student voice				X
				b. safety	X			
				c. classroom order	X			
				d. academic expectations			X	

Study Author	Year	Survey Name	Survey population (and n)	School climate factors measured	Safety	Relationships	Teaching & Learning	Inst'l Envir.
				e. peer academic influence		X		
				f. active learning			X	
				3. Personal development				X
				a. sense of belonging				X
				b. motivation				X
				c. academic self-efficacy				X
Mok & McDonald	1994	Quality of School Life Scale	5,932 12th grade students in 50 Australian parochial schools	1. The satisfaction of the student with school work			X	
				2. The feeling of alienation against school				X
				3. The awareness of supportiveness of teachers		X	X	
				4. The status accorded to the student by others in the school		X		
				5. The sense of identity of the student				X
				6. The opportunity for future life created by school work				X
				7. The sense of achievement in school work			X	
Zullig, et al.	2010	Developed by authors with items from ESS, NELS, CSCSS, CASE and SDP, resulting in 184 items that were cut to 153 items after student review. After PCA narrowed to 95 items, then used further analysis to cut to 37	2,049 students grades 6-12 (from 3 Midwestern school districts) 84% white or non-Hispanic	1. Positive student-teacher relationships		X		
				2. School connectedness		X		
				3. Academic support			X	
				4. Order and Discipline	X			
				5. School physical environment				X
				6. School social environment		X		

Study Author	Year	Survey Name	Survey population (and n)	School climate factors measured	Safety	Relationships	Teaching & Learning	Inst'l Envir.
		items for final survey.		7. Perceived exclusion/privilege				
				8. Academic Satisfaction			X	
Holmes,et al. Holmes, et al.	1998 2004a ,b	39 items paper and pencil questionnaire – focused on measuring student's value of activities and events at school	2,828 middle school students from 12 schools in US; 342 middle school students in Northern Italy	1. Social and recreational networking		X		
				2. Anticipation of school				X
				3. Extracurricular activities/affiliation				X
				4. Academic evaluation			X	
				5. Discussing school with significant others		X		
				6. Working at school			X	
				7. Daily trip to school				X
MacIntosh, J.	1991	School Social Climate Instrument	Four types of schools with 7, 8, and 9th grade students; 88 schools in Canada	1. Physical features				X
				2. Organizational factors				X
				3. Aggregate teacher characteristics			X	
				4. Aggregate student characteristics		X		
				a. student sense of academic support			X	
				b. student satisfaction				X
Jobe & Parrish	1995	School Climate Survey published by NASSP	212 students from two high schools in Texas	1. Teacher-student relationships		X		
				2. Security and maintenance	X			X
				3. Administration				X
				4. Student academic orientation			X	
				5. Student behavioral values		X		

Study Author	Year	Survey Name	Survey population (and n)	School climate factors measured	Safety	Relationships	Teaching & Learning	Inst'l Envir.
				6. Guidance			X	
				7. Student-peer relationships		X		
				8. Parent and community-school relationships		X		
				9. Instructional management			X	
				10. Student activities				X
Bear, et al.	2011	29-item, Delaware School Climate Survey – Student (DSCS-S)	11,780 students in 85 schools in Delaware	1. Caring relationships (teacher-student, student-student)		X		
				2. Fairness of rules	X			
				3. School Safety	X			
				4. liking of school		X		
Hopson & Lee	2011	7-item survey	485 students in middle and high school in New York	1. Quality of school				X
				2. Feelings of connectedness		X		
				3. Relationships with adults		X		
Schneider & Duran	2010	Character in Action Survey (CiAS) 64-items	2,500 randomly selected middle school students	1. Prosocial attitudes		X		
				2. School Social Climate (feeling safe)	X			
				3. Social Capital (support by adults)		X		
				4. Acceptance of diversity and attachment to community (caring relationships among students and teachers, diversity acceptance among students)		X		
				5. Personal and collective responsibility				X

Study Author	Year	Survey Name	Survey population (and n)	School climate factors measured	Safety	Relationships	Teaching & Learning	Inst'l Envir.
				6. Prosocial behavior				X
				7. Experiences of character development		X		

Appendix B

Student Climate Survey – High School Student

(2011-2012 Version)

High School Student

School Climate Survey
Aurora Public School District
January 2012

DIRECTIONS TO STUDENTS

DO NOT PUT YOUR NAME ON THE ANSWER SHEET.

Today you have an opportunity to give your opinions about your school THIS YEAR. Your answers to these questions should reflect how you really feel about the topic, so there are no right or wrong answers. Please try to think about THIS SCHOOL YEAR only when you answer. The most important thing is to give your real feelings, rather than what you think others want you to say. Your feelings about these statements are very important, so please answer honestly.

When I say "Begin," read each sentence and choose the answer that best tells how you feel about that sentence. Please read each statement very carefully because some students think some of the statements sound the same, but really each statement is very different. You should mark the first answer that comes to your mind. Do not spend a lot of time thinking about an answer.

Do not make any marks on this survey. Instead, mark all of your answers on the answer sheet you were given. Use only a number 2 pencil to mark your answers. Make your marks firm, neat, and clear. Be sure you mark only one answer for each sentence. If you make a mistake or want to change an answer, erase your first answer completely. Please be careful to mark each answer next to the correct number on the answer sheet.

Below is an example that is very close to the statements on the survey.

Example: I like to play sports.

If Your Answer Is MARK LETTER	Strongly Disagree A	Disagree B	Neutral C	Agree D	Strongly Agree E

If most of the time you like to play sports, you should answer Agree (D) or Strongly Agree (E).

If you are not sure whether or not you like to play sports, or if you neither like nor dislike playing sports, choose Neutral (C).

If most of the time you don't like to play sports, you should answer Disagree (B) or Strongly Disagree (A).

You must mark your answer on your answer sheet. Look at the line of bubbles below. Use only the letters A, B, C, D, and E. If you like to play sports and you chose answer D, you would fill in the circle for D with your pencil as shown below.

REMEMBER! SURVEY QUESTIONS ARE FOR THIS SCHOOL, THIS SCHOOL YEAR ONLY.

Choose the answer that is closest to your feelings about the statement for **THIS SCHOOL YEAR ONLY**.

If Your Answer Is MARK LETTER	Strongly Disagree A	Disagree B	Neutral C	Agree D	Strongly Agree E

Item	
1	I have an adult at school I trust.
2	At school, I feel safe.
3	At school, I have had someone try to hurt me (e.g., hit, shoved, kicked).
4	I have at least one adult in this school I can go to when I need help.
5	I believe our school rules are consistently enforced by teachers.
6	I am put down and harassed (e.g., called names, rumors, teased) at school because I look different (clothes, body size or shape, glasses, etc.).
7	At school, I feel afraid.
8	My belongings are safe at school.
9	Other students don't like me because I am a good student.
10	In my classes there are rules against name calling/put downs.
11	I have seen students of different cultural, racial or ethnic backgrounds bullied or harassed at school.
12	At school, I have been bullied or harassed (e.g., tripped, pushed, called names, excluded from a group, etc.) for racial reasons.
13	Boys and girls have the same *academic* opportunities at this school.
14	Boys and girls have the same *extra-curricular* opportunities at this school.
15	My teachers expect me to graduate from high school.
16	Classes at this school are preparing me for my future.
17	Adults help if they see someone being bullied or harassed.
18	I feel safe going to and from school.
19	I have been threatened/harassed through internet or text messages by another student at my school.
20	If I was threatened/harassed through internet or text messages, I would discuss it with an adult.
21	I am bullied during the school day at least once per month.
22	I believe our school rules are consistently enforced outside of my classroom.

Choose the answer that is closest to your feelings about the statement for **THIS SCHOOL YEAR ONLY.**

If Your Answer Is MARK LETTER	Strongly Disagree A	Disagree B	Neutral C	Agree D	Strongly Agree E

Item	
23	How far do you think you will go in school? A) Will not finish high school B) GED C) High school diploma D) Bachelor's degree E) Master's degree, Ph.D. or other advanced professional degree (law, medicine, etc.)
24	I feel supported and respected by *teachers*.
25	I feel supported and respected by *counselors*.
26	I feel supported and respected by the *principal* and *assistant/vice principal*.
27	I feel supported and respected by *secretaries/administrative assistants*.
28	I feel supported and respected by *other students*.
29	I get to make choices about what I will study at school.
30	I have many opportunities to ask teachers questions about my work.
31	I am challenged to do my best work at school.
32	I feel I can go to my teachers with the things that I need to talk about.
33	My teachers care whether I am successful or not.
34	If I work hard in school, I will be a successful adult.
35	Students who are not of my race generally do better in school than I do.
36	I treat my teacher with respect.
37	I follow the rules at school.
38	I am interested in the work I get to do in my classes.
39	I learn a lot from my classes.
40	My teachers expect me to go to college.
41	I have not ditched any classes this year.
42	I get academic/career planning help from my school counselor when I need it.

OVER

Choose the answer that is closest to your feelings about the statement for **THIS SCHOOL YEAR ONLY.**

If Your Answer Is MARK LETTER	Strongly Disagree A	Disagree B	Neutral C	Agree D	Strongly Agree E

Item	
43	I get academic help from my teachers when I need it.
44	I feel welcomed when I return to school from an absence.
45	Teachers and counselors in this school stress the need for me to attend school every day.
46	The staff at my school respect students from all cultures and races.
47	At school, I have been harassed because of perceived sexual orientation.
48	At school, I have been sexually harassed.
49	I have witnessed students with disabilities harassed at my school.
50	I have been bullied at my school.
51	Do you participate in sports, clubs or other extra-curricular activities here at school? A = Yes B = No
52	Do you participate in sports, clubs or other extra-curricular activities in your community? A = Yes B = No
53	Are you enrolled in a Pathway or an Institute? *(for example: Health Sciences/LIGHTS, STEM/Engineering, Business/Marketing, Arts and Communication/Visual and Design Arts, Performing Arts, Film, etc.)* A = Yes B = No C = I don't know
54	Do you ride a school bus? A=Yes B=No
55	My gender: A = Female B = Male
56	My racial/ethnic group(s) **(mark all that fit you):** A = American Indian B = African American/Black C = Latino/Hispanic D = Asian E = White
57	Grade: A = 9 B = 10 C = 11 D = 12

Thank You

Appendix C

Example of previous report style

Student Climate Survey (2010-2011): District Results (Overall)

	Question	Str. Dis.	Dis.	Neutral	Agree	Str. Agr.	%Dis/SD	%Ag/SA	Total
Q01	I have an adult at school I trust.	891	1061	1934	3325	3138	18.9%	62.5%	10349
Q02	At school, I feel safe.	663	1040	3318	3709	1613	16.5%	51.5%	10343
Q03	At school, I have had someone try to hurt me (e.g., hit, shoved, kicked).	3646	2721	1434	1470	1067	61.6%	24.5%	10338
Q04	I have at least one adult in school I can go to when I need help.	807	1011	1968	3475	3079	17.6%	63.4%	10340
Q05	I believe our school rules are consistently enforced by teachers	824	1209	3435	3004	1848	19.7%	47.0%	10320
Q06	I am put down and harassed at school because I look different*	4038	2692	1601	1094	910	65.1%	19.4%	10335
Q07	At school, I feel afraid.	4850	2959	1418	622	485	75.6%	10.7%	10334
Q08	My belongings are safe at school.	2465	2077	2849	1916	1017	44.0%	28.4%	10324
Q09	Other students don't like me because I am a good student.	3452	3378	2203	794	500	66.1%	12.5%	10327
Q10	In my classes there are rules against name calling/put downs.	850	1066	2429	3670	2324	18.5%	58.0%	10339
Q11	I have seen students of different cultural, racial or ethnic backgrounds harassed*	1692	2323	2217	2438	1663	38.9%	39.7%	10333
Q12	At school, I have been bullied or harassed for racial reasons	4382	2848	1310	1009	794	69.9%	17.4%	10343
Q13	Boys and girls have the same opportunities at this school.	779	881	2337	3358	2981	16.1%	61.3%	10336
Q14	My teachers expect me to graduate from high school.	400	435	1662	3264	4583	8.1%	75.9%	10344
Q15	Classes at this school are preparing me for my future.	505	706	2117	3966	3057	11.7%	67.8%	10351
Q16	Adults help if they see someone being bullied or harassed	735	936	2730	3593	2340	16.2%	57.4%	10334
Q17	I feel safe going to and from school.	707	990	2756	3586	2278	16.4%	56.8%	10317
Q18	I have been threatened/harassed through internet or text messages*	5594	2724	857	675	487	80.5%	11.2%	10337
Q19	If threatened by internet/text messages I would discuss it with an adult.*	1669	1606	2598	2449	2001	31.7%	43.1%	10323
Q20	I am bullied during the school day at least once per month.	4580	2674	1367	922	765	70.4%	16.4%	10308
Q21	I believe our school rules are consistently enforced outside of my classroom.	1108	1380	4018	2525	1297	24.1%	37.0%	10328
Q23	I feel supported and respected by my teachers.	710	1030	2607	3728	2270	16.8%	58.0%	10345
Q24	I feel supported and respected by counselors.	610	720	2773	3544	2687	12.9%	60.3%	10334
Q25	I feel supported and respected by the principal and assistant/vice principal.	834	975	2978	3220	2331	17.5%	53.7%	10338

	Question	Str. Dis.	Dis.	Neutral	Agree	Str. Agr.	%Dis/SD	%Ag/SA	Total
Q26	I feel supported and respected by secretaries/administrative assistants.	889	1049	3414	3116	1862	18.8%	48.2%	10330
Q27	I feel supported and respected by other students.	795	1231	3505	3357	1451	19.6%	46.5%	10339
Q28	I get to make choices about what I will study at school.	1608	1923	2976	2598	1231	34.2%	37.0%	10336
Q29	I have many opportunities to ask teachers questions about my work.	542	971	2359	4026	2444	14.6%	62.6%	10342
Q30	I am challenged to do my best work at school.	467	806	2393	3988	2684	12.3%	64.5%	10338
Q31	I feel I can go to my teachers with the things that I need to talk about.	1276	1668	3162	2755	1470	28.5%	40.9%	10331
Q32	My teachers care whether I am successful or not.	603	855	2902	3654	2307	14.1%	57.8%	10321
Q33	If I work hard in school, I will be a successful adult.	334	414	1240	3237	5104	7.2%	80.8%	10329
Q34	Students who are not of my race generally do better in school than I do.	2880	2517	3366	924	615	52.4%	14.9%	10302
Q35	I treat my teacher with respect.	385	445	1860	4037	3574	8.1%	73.9%	10301
Q36	I follow the rules at school.	451	749	2924	3826	2361	11.6%	60.0%	10311
Q37	I am interested in the work I get to do in my classes.	851	1401	4022	2816	1226	21.8%	39.2%	10316
Q38	I learn a lot from my classes.	462	772	2784	4157	2140	12.0%	61.0%	10315
Q39	My teachers expect me to go to college.	489	591	2269	3399	3573	10.5%	67.6%	10321
Q40	I have not ditched any classes this year.	1524	1171	1099	1543	4970	26.1%	63.2%	10307
Q41	I get academic/career planning help from my school counselor when I need it.	1089	1287	3589	2587	1654	23.3%	41.6%	10206

Note. Total respondents = 10,482 (excluding Pickens). *: question abbreviated for report. This report excludes responses from Pickens Technical College students.

Appendix D

School staff interview protocol

School Leadership Interview Protocol (Principals and Assistant Principals)

Opening Protocol

1. Give the participant unsigned version of the Consent Form to keep.
2. Read Preamble.

Preamble

I'm Mya Martin-Glenn. Today is [fill in date] and I am at [fill in location] talking with [fill in name]. Thanks so much for talking with me today! The reason why I asked you to participate in this interview is to hear what you think about the district's Student Climate Survey and the data reports associated with it.

I am going to spend the next hour asking you some questions about the general environment at your school, as well as questions about the survey and the data reports. My research is focusing on the use of the Student Climate Survey data by principals and other school leaders to shape school improvement. I am hoping to gain an understanding of how people are using these reports and what could be done to make the reporting structure more user friendly.

The permission form that you signed means that I can record our discussion so that I can listen to it later and use it to write up the overall results in my dissertation. I will ask the questions and be taking notes of the conversation. No one but me and a transcriptionist will hear the tape or read the transcript of this interview. However, I will share general findings in my dissertation and district. I will not put your name in the report so it's OK for you to tell me what's on your mind.

Any questions? Great! Let's get on with the interview.

I'm going to start with some general questions (Demographic):

Q1. How long have you been a principal/assistant principal?

Probe: how long at this school? How long in district?

Q2. Can you briefly tell me what the role of the principal/assistant principal is in this school?

Q3. What other leadership roles have you had in the schools or the district?

Q4. What does "school climate" mean to you in terms of students?

Probe. What are some of the successes that are happening in your school this year? What are some of the challenges?

Thinking about the Student Climate Survey…

Q5. To what extent do you feel the survey captures some of these issues? How does the student climate survey fit with addressing challenges?

Probe: Do you think there is any need to add questions? What areas?

Probe: Would you want to add questions about alcohol, drug, cigarette use? What about health like exercise, health eating? Suicidal thoughts?

Q6: How familiar were you/are you with the student climate survey report? *(verify they have seen previous report)* How do you use this report?

Probe: How do you usually receive this report? (email, printed copy, etc.)

Probe: how is timeliness of report? Too late in year to early?

Q7: Does your DOSA work with you around this data?

Probe: Talk to me about how they do that.

Q8: How do you use the results from the student climate survey? Walk me through what you look at to determine what actions are needed so I can get an idea of how you are using the current report.

Q9. How do you communicate the results of the climate survey?

Probe: Results on website?

Probe: staff meetings, parents?

Q9: What actions have you implemented based on your analysis of the report in the past?

Q10: What do you like about the **current** report? What don't you like about the current report?

Q11: What would you like in a **new** report? (follow up with likes and dislikes)

Q12: What is important to include in a new report?

Wrap up:

At the beginning of the interview I asked you about xxxx some of the things I heard include…..

And I asked you about xxxx… some of the thing I heard include…..

Out of all the things we've talked about today -- of maybe some topics we've missed -- what should I pay most attention to? What else would do you think I should know about the student climate survey and its results?

Probe: What should I think about when I read your interview in terms of the student climate report?

You may be wondering about what we'll be doing with all the information you've shared today. Well, I'll be transcribing this interview in the next few weeks. Would you be interested in receiving a copy of the transcript?

Yes_____ No _____

District Leadership Interview Protocol (DOSAs)

Opening Protocol

1. Give the participant unsigned version of the Consent Form to keep.
2. Read Preamble.

Preamble
I'm Mya Martin-Glenn. Today is [fill in date] and we are at [fill in location] talking with [fill in name]. Thanks so much for talking with me today! The reason why I asked you to participate in this interview is to hear what you think about the district's Student Climate Survey and the data reports associated with it.

I am going to spend the next hour asking you some questions about the general environment at your school, as well as questions about the survey and the data reports. My research is focusing on the use of the Student Climate Survey data by principals and other school leaders to shape school improvement. I am hoping to gain an understanding of how people are using these reports and what could be done to make the reporting structure more user friendly. I will be asking you questions about both the practice and the perceptions school leadership has around this area.

The permission form that you signed means that I can record our discussion so that I can listen to it later and use it to write up the overall results in my dissertation. I will ask the questions and be taking notes of the conversation. No one but me and a transcriptionist will hear the tape or read the transcript of this interview. However, I will share general findings in my dissertation and district. I will not put your name in the report so it's OK for you to tell me what's on your mind.

Any questions? Great! Let's get on with the interview.

I'm going to start with some general questions (Demographic):
Q1. How long have you been a DOSA?

Q2. What other leadership roles have you had in the schools or the district?

Q3. Can you briefly tell me what the role of the DOSA is in this district?

Q4. What are some of the successes that are happening in the schools you are working with this year? What are some of the challenges?

Thinking about the Student Climate Survey…

Q5. To what extent do you feel the survey captures some of these issues? How does the student climate survey fit with addressing challenges?

Q6: How familiar were you/are you with the student climate survey report? *(verify they have seen previous report)*

Q7: How have you used this report when working with school principals?

Q8: What do you like about the **current** report? What don't you like about the current report?

Q9: What would you like to see in a **new** report?
Probe: split by grade level, gender
Probe: grouped by theme

Q10: How do you think principals use the results from the student climate survey?

Q12: What actions do you think have been implemented at the school-level based on your discussion of the data from the report with the principals?

Wrap up:
At the beginning of the interview I asked you about xxxx some of the things I heard include…..
And I asked you about xxxx… some of the thing I heard include…..

Out of all the things we've talked about today -- of maybe some topics we've missed -- what should I pay most attention to? What else would do you think I should know about the student climate survey and its results?
Probe: What should I think about when I read your interview in terms of the student climate report?

You may be wondering about what we'll be doing with all the information you've shared today. Well, I'll be transcribing this interview in the next few weeks. Would you be interested in receiving a copy of the transcript?

Yes_____ No _____

Appendix E

Interview consent form

INFORMED CONSENT FORM

Student Perceptions of school climate: A validity and data use study of a district-developed survey

You are invited to participate in a study that will investigate how data from a district developed student climate survey is used by school leadership. This study is being conducted by Mya Martin-Glenn to fulfill the requirements of a Ph.D. in the Quantitative Research Methods Program at the University of Denver. Results will be used to provide a summary of the survey data use and to revise data report formatting for future use. Mya Martin-Glenn can be reached at 720-982-4083 or mmarting@du.edu. This project is supervised by Dissertation Advisor, Dr. Antonio Olmos-Gallo, Department of Research Methods and Statistics, Morgridge College of Education, University of Denver, Denver, CO 80208, (303-871-6681, polmos@du.edu).

Participation in this study should take about 60 minutes of your time. Participation will involve participating in an interview with questions about activities in your school, overall school climate, and use of student climate survey data. Participation in this project is strictly voluntary. The risks associated with this project are minimal. If, however, you experience discomfort you may discontinue the interview at any time. We respect your right to choose not to answer any questions that may make you feel uncomfortable. Refusal to participate or withdrawal from participation will involve no penalty or loss of benefits to which you are otherwise entitled.

The interview will be audio taped and transcribed for analysis. Your responses will be identified by code number only and will be kept separate from information that could identify you. This is done to protect the confidentiality of your responses. Only the researcher will have access to your individual data and any reports generated as a result of this study may use direct quotes or paraphrased wording to provide examples of general themes but no names will be used. However, should any information contained in this study be the subject of a court order or lawful subpoena, the University of Denver might not be able to avoid compliance with the order or subpoena. Although no questions in this interview address it, we are required by law to tell you that if information is revealed concerning suicide, homicide, or child abuse and neglect, it is required by law that this be reported to the proper authorities.

If you have any concerns or complaints about how you were treated during the interview, please contact Paul Olk, Chair, Institutional Review Board for the Protection of Human Subjects, at 303-871-4531, or you may email du-irb@du.edu, Office of Research and Sponsored Program,; call 303-871-4050, or write to either at the University of Denver, Office of Research and Sponsored Programs, 2199 S. University Blvd., Denver, CO 80208-2121.

You may keep this page for your records. Please sign the next page if you understand and agree to the above. If you do not understand any part of the above statement, please ask the researcher any questions that you have.

INFORMED CONSENT FORM

Signature

I have read and understood the foregoing descriptions of the study called Student Perceptions of school climate: A validity and data use study of a district-developed survey. I have asked for and received a satisfactory explanation of any language that I did not fully understand. I agree to participate in this study, and I understand that I may withdraw my consent at any time. I have received a copy of this consent form.

___ I agree to be audiotaped.
___ I do not agree to be audiotaped.

Printed name: _____

Signature _____ Date _____

_____ I would like a summary of the results of this study to be mailed to me at the following postal or e-mail address:

Appendix F

EFA Individual item correlations

	Q2	Q3	Q6	Q7	Q8	Q9	Q12	Q16	Q18	Q19	Q21	Q24	Q30	Q31	Q33	Q34	Q38	Q39	Q40	Q43	Q46	Q50
Q2	1.00																					
Q3	0.26	1.00																				
Q6	0.28	0.46	1.00																			
Q7	0.40	0.37	0.46	1.00																		
Q8	0.33	0.14	0.09	0.14	1.00																	
Q9	0.22	0.32	0.41	0.40	0.10	1.00																
Q12	0.26	0.45	0.52	0.43	0.09	0.40	1.00															
Q16	0.33	0.11	0.13	0.21	0.23	0.12	0.15	1.00														
Q18	0.49	0.22	0.27	0.39	0.29	0.24	0.28	0.32	1.00													
Q19	0.22	0.33	0.35	0.35	0.09	0.31	0.40	0.23	0.28	1.00												
Q21	0.23	0.43	0.49	0.37	0.07	0.35	0.49	0.13	0.23	0.38	1.00											
Q24	0.39	0.14	0.15	0.21	0.28	0.12	0.16	0.47	0.34	0.24	0.17	1.00										
Q30	0.33	0.12	0.13	0.20	0.23	0.14	0.17	0.45	0.32	0.22	0.15	0.51	1.00									
Q31	0.30	0.09	0.12	0.18	0.21	0.12	0.15	0.49	0.31	0.22	0.13	0.49	0.52	1.00								
Q33	0.33	0.11	0.12	0.20	0.23	0.12	0.16	0.46	0.31	0.21	0.13	0.55	0.48	0.48	1.00							
Q34	0.27	0.13	0.14	0.25	0.11	0.14	0.17	0.46	0.26	0.27	0.18	0.37	0.39	0.45	0.40	1.00						
Q38	0.26	0.06	0.03	0.07	0.23	0.00	0.05	0.39	0.19	0.08	0.04	0.41	0.37	0.38	0.36	0.28	1.00					
Q39	0.33	0.09	0.09	0.18	0.23	0.08	0.13	0.53	0.30	0.21	0.12	0.51	0.50	0.55	0.48	0.43	0.55	1.00				
Q40	0.32	0.11	0.12	0.21	0.19	0.10	0.15	0.49	0.32	0.23	0.13	0.51	0.46	0.52	0.57	0.46	0.38	0.51	1.00			
Q43	0.37	0.12	0.12	0.23	0.20	0.14	0.17	0.44	0.34	0.23	0.15	0.52	0.55	0.48	0.51	0.39	0.40	0.52	0.52	1.00		
Q46	0.33	0.14	0.14	0.19	0.24	0.16	0.19	0.39	0.31	0.23	0.14	0.47	0.44	0.40	0.44	0.35	0.34	0.44	0.43	0.46	1.00	
Q50	0.23	0.50	0.53	0.39	0.09	0.35	0.52	0.13	0.25	0.38	0.56	0.16	0.15	0.12	0.12	0.17	0.04	0.11	0.13	0.14	0.15	1.00

*All correlations are statistically significant at the p<.0001 level

Appendix G

CFA Matrices

Table 1. Correlation Matrix

	Q02	Q03	Q06	Q07	Q08	Q09	Q12	Q16	Q18	Q19	Q21	Q24	Q30	Q31	Q33	Q34	Q38	Q39	Q40	Q43	Q46	Q50
Q02	1.00																					
Q03	0.27	1.00																				
Q06	0.28	0.48	1.00																			
Q07	0.41	0.39	0.49	1.00																		
Q08	0.34	0.12	0.10	0.15	1.00																	
Q09	0.21	0.34	0.42	0.41	0.11	1.00																
Q12	0.25	0.45	0.55	0.44	0.08	0.40	1.00															
Q16	0.37	0.11	0.14	0.21	0.26	0.15	0.15	1.00														
Q18	0.49	0.26	0.29	0.41	0.29	0.27	0.29	0.35	1.00													
Q19	0.25	0.35	0.37	0.37	0.13	0.30	0.41	0.22	0.29	1.00												
Q21	0.23	0.43	0.51	0.40	0.06	0.36	0.50	0.14	0.26	0.38	1.00											
Q24	0.42	0.16	0.16	0.22	0.31	0.11	0.17	0.48	0.35	0.22	0.17	1.00										
Q30	0.36	0.13	0.15	0.20	0.23	0.14	0.17	0.46	0.33	0.23	0.16	0.52	1.00									
Q31	0.35	0.10	0.12	0.18	0.24	0.12	0.13	0.51	0.33	0.21	0.13	0.49	0.54	1.00								
Q33	0.36	0.09	0.13	0.19	0.22	0.11	0.13	0.48	0.33	0.12	0.13	0.54	0.48	0.50	1.00							
Q34	0.27	0.11	0.14	0.21	0.12	0.14	0.18	0.44	0.27	0.26	0.16	0.37	0.38	0.42	0.40	1.00						
Q38	0.29	0.07	0.06	0.09	0.25	0.01	0.06	0.43	0.22	0.15	0.05	0.47	0.42	0.42	0.40	0.32	1.00					
Q39	0.36	0.09	0.10	0.19	0.25	0.10	0.11	0.54	0.31	0.21	0.12	0.53	0.52	0.54	0.50	0.45	0.59	1.00				
Q40	0.34	0.11	0.12	0.18	0.19	0.12	0.15	0.50	0.29	0.22	0.15	0.51	0.46	0.52	0.58	0.44	0.40	0.53	1.00			
Q43	0.39	0.13	0.14	0.21	0.22	0.12	0.17	0.46	0.32	0.21	0.15	0.55	0.55	0.52	0.55	0.39	0.45	0.56	0.53	1.00		
Q46	0.37	0.15	0.16	0.24	0.26	0.18	0.19	0.45	0.34	0.24	0.17	0.52	0.46	0.45	0.47	0.35	0.36	0.47	0.47	0.49	1.00	
Q50	0.29	0.50	0.56	0.46	0.10	0.38	0.53	0.15	0.31	0.42	0.57	0.17	0.15	3.13	0.13	0.18	0.07	0.13	0.15	0.15	0.17	1.00

Table 2. Covariance Matrix

	Q02	Q03	Q06	Q07	Q08	Q09	Q12	Q16	Q18	Q19	Q21	Q24	Q30	Q31	Q33	Q34	Q38	Q39	Q40	Q43	Q46	Q50
Q02	0.93																					
Q03	0.33	1.64																				
Q06	0.32	0.75	1.48																			
Q07	2.85	3.61	4.28	52.13																		
Q08	0.39	0.19	0.15	1.33	1.46																	
Q09	0.22	0.46	0.54	3.13	0.14	1.14																
Q12	0.28	0.68	0.79	3.71	0.11	0.49	1.37															
Q16	0.37	0.14	0.18	1.59	0.33	0.17	0.18	1.09														
Q18	0.50	0.35	0.37	3.13	0.37	0.31	0.36	0.38	1.12													
Q19	1.83	3.46	3.46	20.75	1.25	2.49	3.67	1.77	2.37	59.36												
Q21	0.26	0.64	0.73	3.36	0.08	0.04	0.68	0.17	0.32	3.42	1.35											
Q24	0.42	0.21	0.20	1.70	0.39	0.13	0.21	0.53	0.39	1.81	0.21	1.10										
Q30	0.34	0.16	0.18	1.47	0.28	0.15	0.19	0.48	0.35	1.77	0.19	0.55	1.01									
Q31	0.34	0.13	0.15	1.27	0.29	0.13	0.15	0.52	0.34	1.62	0.15	0.50	0.54	0.98								
Q33	0.36	0.12	0.16	1.42	0.28	0.12	0.16	0.51	0.35	1.67	0.16	0.58	0.50	0.51	1.05							
Q34	1.73	0.99	1.17	10.02	0.94	1.04	1.39	3.09	1.96	13.64	1.29	2.60	2.61	2.82	2.77	45.89						
Q38	0.29	0.10	0.08	0.67	0.31	0.01	0.07	0.46	0.24	1.17	0.06	0.51	0.44	0.43	0.43	2.25	1.08					
Q39	0.33	0.12	0.11	1.34	0.29	0.10	0.13	0.54	0.32	1.58	0.13	0.53	0.50	0.52	0.49	2.90	0.59	0.92				
Q40	0.33	0.14	0.14	1.35	0.23	0.12	0.18	0.53	0.32	1.71	0.17	0.55	0.47	0.52	0.60	3.06	0.42	0.52	1.04			
Q43	0.35	0.15	0.17	1.45	0.25	0.12	0.18	0.45	0.32	1.55	0.17	0.55	0.52	0.48	0.53	2.46	0.44	0.51	0.51	0.88		
Q46	0.39	0.20	0.21	1.88	0.34	0.20	0.24	0.51	0.40	2.02	0.21	0.59	0.50	0.48	0.53	2.57	0.41	0.49	0.52	0.50	1.18	
Q50	0.34	0.78	0.83	4.09	0.14	0.49	0.76	0.20	0.41	4.02	0.82	0.22	0.19	0.16	0.17	1.49	0.09	0.16	0.19	0.17	0.23	1.52

Appendix H

Interview Codebook

Category: Report Analysis

- Code: Number of questions
  - Subcode: hard to focus
- Code: General overview
- Code: Comparisons
  - Subcode: year-to-year
  - Subcode: ethnicity
  - Subcode: gender
  - Subcode: grade-level
  - Subcode: other schools
  - Subcode: Staff and Parent survey results
- Code: Look for patterns
- Code: Conclusions drawn

Category: Other time demands

- Code: Instructional leader
  - Subcode: Achievement data
- Code: Building maintenance
- Code: Meetings
- Code: Staff survey
- Code: student discipline issues
- Code: personnel issues

Category: Beyond the survey

- Code: drill down/dig deeper
  - Subcode: What exactly do they mean
  - Subcode: Possible solutions
- Code: Trends over time
- Code: Provide support
- Code: Student Voice
  - Subcode: focus groups
  - Subcode: Student advisory groups
- Code: other data points
  - Subcode: attendance data
  - Subcode: discipline data

Category: New report needs

- Code: by gender
- Code: by grade level
- Code: grouping/categories for questions
  - Subcode: safety
  - Subcode: relationships
  - Subcode: support

Subcode: Facility
Subcode: academics
Subcode: feel connected
Subcode: community
Subcode: equity
Code: 5 year comparison

Category: Sharing data
Code: Leadership teams in school
Code: Teachers
Code: Website
Code: Parents
Code: Students

Category: Decisions made
Code: new programs
Subcode: Anti-bullying
Subcode: Code of conduct
Subcode: Prevention
Code: new policies
Code: principal/teacher evaluations
Subcode: growth goals