THE SCHOOL ENVIRONMENT PROJECT: MEASURING KEY ELEMENTS OF SCHOOL CLIMATE AND CULTURE IN CHARLOTTE-MECKLENBURG SCHOOLS

by

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ABSTRACT

ERIN M. GODLY-REYNOLDS. The School Environment Project: Measuring Key Elements of School Climate and Culture in Charlotte-Mecklenburg Schools. (Under the direction of DR. RYAN P. KILMER and DR. JAMES R. COOK)

Previous research has investigated the school context using conceptualizations of two constructs, school culture and school climate, that appear to overlap and contain measurement flaws, limiting their utility in applied research settings. To improve learning conditions and promote more equitable academic opportunities and outcomes for students in grades 3-8, the Charlotte, NC, community would benefit from a standard system of measurement that captures the essential elements of school climate and culture that local stakeholders believe matter most for all students to succeed in Charlotte-Mecklenburg Schools (CMS). CMS does not currently administer a comprehensive school culture or climate survey. The present study aimed to address that need. Through a multiphase, participatory community research project, a coherent, parsimonious, and clear conceptualization of school environment emerged, setting the stage for the development and initial validation of the School Environment Survey. This study and the subsequent use of the measure would yield data that could guide the exploration of how to modify school environments to promote equitable outcomes for students while also improving student achievement overall.

This collaborative effort involved the exchange of knowledge, expertise, and resources via a partnership involving the Community Psychology Research Lab at the University of North Carolina at Charlotte and two community partners: CMS and a nonprofit organization, Communities In Schools of Charlotte-Mecklenburg. During the first phase of this project, essential elements of school climate and culture were reviewed, analyzed, and discussed during

interviews and focus groups with 126 local stakeholders until the broader construct of school environment had been defined as a *category of concepts* that reflect the surroundings or conditions in which people operate in school. With this broad definition of school environment as the underlying, multidimensional construct, five applicable concepts (i.e., domains; see Kohl et al., 2013; Wang & Degol, 2016) were hypothesized to make up school environment: academics, safety, shared vision, community, and physical environment. Multiple participatory steps led to the development of 131 items hypothesized and designed to reflect 16 identified dimensions of school environment, organized into these five domains.

The resulting measure was piloted online with 186 teacher participants during the 2020-2021 school year. Exploratory factor analysis results suggest that within the boundary conditions of this effort (i.e., a focus on two CMS learning communities, the inclusion of teachers from grades 3-8, data collected during school year 2020-2021), a 25-item School Environment Survey that captures three domains (academics, safety, and shared vision) may be a useful indicator of teachers' perceptions of school environment. That model explained 55% of the total variance and, notably, items that performed well on the resulting version of the measure cover nearly the entire hypothesized breadth of the concept as it was defined and operationalized by stakeholders; reliability estimates met or exceeded acceptable thresholds; and school environment results were found to positively relate to student learning outcomes (specifically, standardized tests in reading and math for students in grades 3-8).

However, this study had a relatively small sample size that prevented researchers from conducting a confirmatory factor analysis, and COVID-19 presented additional challenges and limitations. Therefore, in addition to an overview of specific advantages and the empirical and theoretical support for the current version of the School Environment Survey, recommendations

for ongoing validation are provided as well as considerations of the implications for local practice.

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DEDICATION

To every child, adolescent, or emerging adult who suffers from anxiety and depression and doesn't feel like they belong, fit in, or are enough, I know this is your truth right now but please believe me, life will get easier and better for you with time. Don't give up. I hope you will study psychology, find like-minded people and communities, and be the change that you so desperately wish to see. The world needs you, just as you are. If you know better, then you can do better; at the same time, your self-worth should not be tied to any achievement or failure. You are worthy of life, of self-love and love from others, just as you are now. Please continue to be perfectly imperfect and try your best, every day, to be patient and kind to yourself. You could not possibly know all of the wonderful opportunities and possibilities that the future will bring.

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LIST OF ABBREVIATIONS

CMS	Charlotte-Mecklenburg Schools
CIS	Communities In Schools
CIS-CM	Communities In Schools of Charlotte-Mecklenburg
CPRL	Community Psychology Research Lab at UNC Charlotte
EOG	End-of-Grade academic assessments
EVAAS	Education Value-Added Assessment System
MTSS	Multi-Tiered Systems of Support
PBIS	Positive Behavior Interventions and Supports
UNCC	The University of North Carolina at Charlotte

CHAPTER 1: INTRODUCTION

Within every school, students' interactions with their school environment facilitate or impede academic success (Deal & Peterson, 2016; Seidman & Cappella, 2017; Thapa et al., 2013). Students' behaviors are influenced by a system of expectations, traditions, beliefs, policies, and norms in their school and broader community (Jimerson et al., 2016). Researchers have investigated this phenomenon by studying two constructs: school culture and school climate (see Anderman et al., 2013; Berkemeyer et al., 2015; Bland, 2012; Deal & Peterson, 2016; Kohl et al., 2013; Thapa et al., 2013; Wang & Degol, 2016). However, these two constructs appear to overlap in multiple ways and contain flaws in how they are defined and measured, limiting their utility in applied research (Bland, 2012; Denison, 1996; Sailor, 2009).

The present study addressed these concerns by merging the overlapping constructs of school climate and school culture into the broader concept of school environment, defined here as a *category of concepts* that reflect the surroundings or conditions in which people operate in school. By reconceptualizing these key elements of the school environment as a coherent category of constructs rather than a single construct (as school culture and climate attempt to do), we sought to rectify the conceptual and measurement limitations associated with current attempts to define and measure school culture and climate. A coherent, parsimonious, and clear conceptualization set the stage for the development of a standard system of measurement of school environment that can be used to inform and enhance school improvement efforts in Charlotte, NC.

The present project is one component of an ongoing, multi-year initiative (see Tamilin et al., 2019, p. 42) conducted through community-university partnerships (see Kilmer & Cook, 2021). Since 2017, this collaborative effort has involved the exchange of knowledge, expertise,

and resources in a context of partnership between the Community Psychology Research Lab (CPRL) at the University of North Carolina at Charlotte (UNCC) and two community partners: Charlotte-Mecklenburg Schools (CMS) and Communities In Schools of Charlotte-Mecklenburg (CIS-CM). These partnerships were not new at the onset of this project; the CPRL has a long, positive track record of faculty and graduate students regularly working in partnership with both CMS and CIS-CM (e.g., experiential learning through course projects and practica placements designed to yield mutual benefit; CPRL graduate students hired as external research assistants; externally-funded research and evaluation projects and capacity building efforts). In fact, each partner organization had years of experience working in collaboration with the other organizations when this project began in 2017.

For this project, specifically, two common goals brought us together: improving educational equity and the quality of local public schools. Because all three partners have been included in important decision-making since the very beginning of this effort, the project's objectives and methods align well with CMS' strategic goals, CIS-CM's mission, and community psychology values (e.g., social justice). The present study aimed to develop and refine a standard system of measurement that can enhance school improvement efforts in CMS. Ultimately, the goal of this project is to be a catalyst that can guide meaningful school change.

While CMS collects data to assess some factors related to school environment (e.g., instructional culture), the school system does not currently administer a comprehensive school culture or climate survey. This study addressed that need by developing the School Environment Survey (e.g., through a multi-year, participatory community research project in partnership with CMS and CIS-CM), piloting the measure, and rigorously testing the accuracy of our inferences

(i.e., validity) and reliability of the measure within the boundary conditions of this study (e.g., school year 2020-2021, CMS, teacher participants, grades 3-8).

1.1 Community Issue, Opportunity, and Partners

Chetty and colleagues (2014) examined place-based trends of intergenerational economic mobility (i.e., a child's chance of moving up in the income distribution relative to their parents) and investigated the relationship between economic mobility and school quality. After comparing rates of upward economic mobility for residents of the 50 largest cities and 100 largest counties in the U.S., according to their population in the 2000 census, they ranked both the city of Charlotte and the county of Mecklenburg last (i.e., reflecting the lowest levels of upward economic mobility). Moreover, they found a strong, positive relationship between upward mobility and school quality (Chetty et al., 2014). This study brought attention to the cycle of poverty entrapping many residents in Charlotte and pointed to an opportunity for CMS to improve school quality and facilitate upward economic mobility for children born into poverty.

While the responsiveness of CMS to meet the needs of children and families remains a core focus of this project, the directionality of the relationship between economic mobility and school quality is unknown. It could be argued that poverty predicts school quality. To that end, well-documented causal mechanisms in support of this direction include the implementation of discriminatory housing policies (see Rothstein, 2018) that created high concentrations of poverty such that children born into poverty in Charlotte tend to live in racially segregated, low-income neighborhoods and attend the neighborhood school to which they were assigned (i.e., racially segregated, high-poverty schools).

The impact of geographic segregation and highly concentrated poverty on students' school experiences in Charlotte was exacerbated in 2001 after the Fourth Circuit Court of Appeals ruled that CMS could no longer consider race in student assignment (Rhew, 2016). Prior to this ruling, and since 1971, CMS had utilized strategies (e.g., student busing, school-choice policies) to create schools that closely reflected district-wide demographics, but by 2019 such within-school diversity had been mostly undone in CMS (Rhew, 2016; Tamilin et al., 2019). Isolation of students based on race and wealth has increased steadily since 2001; the number of Title I and high-poverty schools (i.e., those in which there are sizable concentrations of students from low-income backgrounds) in CMS provides evidence to support this conclusion.

CMS serves more than 148,000 public school students across 176 schools throughout the cities and towns of Mecklenburg County, NC (Charlotte-Mecklenburg Schools, n.d.-a). The number of Title I schools in CMS increased from 12 in 2001 to 80 (upwards of 45% of the system's schools) in 2019 (Tamilin et al., 2019). Schools were eligible for Title I funding in 2019 if at least 37% of students were identified as economically disadvantaged based on Community Eligibility Provision guidelines (CMS, n.d.-b; Tamilin et al., 2019). As the largest federal program that provides financial assistance to schools, the purpose of Title I funding is to *ensure* all children have fair, equitable access and opportunity to obtain a high-quality education (CMS Family Engagement and Community Outreach, n.d.).

In addition to the alarmingly high number of Title I schools that reflect how children growing up in poverty in Charlotte tend to be concentrated in neighborhoods and, in turn, schools (see Billings et al., 2014; Tamilin et al., 2019), additional sources (see The Charlotte-Mecklenburg Opportunity Task Force, 2017) have concluded that equity is a distant goal for children attending CMS. As a result of Chetty and colleagues' (2014) findings—that it is

unlikely that low-income children will escape the cycle of intergenerational poverty in Charlotte—a task force was created. After this group of community, government, and philanthropic leaders spent 18 months investigating and deliberating, they shared findings and recommendations to bridge this opportunity gap. To provide context, using current data at the time, they began *The Charlotte-Mecklenburg Opportunity Task Force Report* (2017) with a "Wake-up Call for Charlotte-Mecklenburg"; they explained:

> …Approximately 147,000 students are enrolled at CMS, with about 39 percent black, 29 percent white, 23 percent Latino and 6 percent Asian. A third of the 168 schools in the system are segregated by poverty, half are segregated by race and a fifth are hyper-segregated, meaning that 90 percent of their students are from a particular race. Over half of all African American students attend schools that are 90 percent non-white. The majority of white students attend majority-white schools in our high-growth southern and northern suburbs where most of our new schools have been built in recent years, as well as in more affluent close-in neighborhoods… (p. 13)

Subsequent to this task force report, which included 91 recommendations but little guidance on concrete next steps (i.e., implementation of recommendations), CMS contributed to the conversation around the broader issue of breaking down barriers to equality in Charlotte via multiple detailed reports of their own. In the system's own work, CMS found differences in students' academic achievement within and across schools were predictably correlated with school poverty level and a student's race/ethnicity – students of color, on average, performed consistently lower than their white peers (Barnes et al., 2018, 2019). Grappling with the challenges associated with working to improve equity in the system (including the multiple factors that contribute to why this predictive link exists and how to effect change), CMS

increased transparency and potentially public awareness by analyzing district-wide data through an equity lens and initiating a series by which they would report their findings annually (see Barnes et al., 2018, 2019). Findings included significant differences in students' performance on nearly every measure analyzed based on school poverty level and race/ethnicity.

Notably, independent of school poverty level, achievement gaps between Hispanic, black, and white students were found (see Barnes et al., 2018, 2019). As one case in point, in grades 3-5 within CMS high-poverty schools (i.e., Identified Student Percentage ≥ 50.1%; see Barnes et al., 2019 and see section 2.1.1 School Poverty Level for more information), 26% of all students and 24% of black students were reading at the "College and Career Ready" (CCR) level according to school year 2017-2018 End-of-Grade (EOG) assessments (Barnes et al., 2019). Within these same high-poverty schools, EOG results suggested that 50% of white students were reading at the CCR level. In fact, even in low poverty schools, the racial disparity was significant: The average grade 3-5 rate for CCR in reading was 74% among white students compared to 44% among black students. Similar patterns were found across all subjects and grade spans. By creating and disseminating an annual report, CMS has provided some context and data to explain schools' and students' progress (or lack thereof) over time, and the greater Charlotte community has hopefully become more aware of current disparities as well as the importance of improving educational experiences for all students across all district schools.

Many organizations, parents, educators, and other stakeholders in the Charlotte community are keenly aware of this social injustice of disparities in K-12 public education based on students' race/ethnicity and school poverty level, and have been working to improve educational equity and excellence in CMS for decades. Notably, since its inception in 1985, the Charlotte-Mecklenburg affiliate of Communities In Schools (CIS) has been partnering with CMS

to work towards the mission of "surrounding students with a community of support, empowering them to stay in school and achieve in life" (CIS-CM, n.d., para. 2). CIS-CM serves approximately 7,000 CMS students and their families within high-poverty, low-performing schools across the district. Many stakeholders agree that students and families are in this situation (i.e., attending high-poverty, low-performing schools) because of a combination of highly segregated neighborhoods in Charlotte and the neighborhood-based student choice plan (i.e., assigning students to their neighborhood school by default); they also agree with the evidence-based conclusion that ending court-ordered desegregation in CMS harmed students of color by widening inequality of educational outcomes between students based on race (see Billings et al., 2014).

At the same time, regardless of the mechanisms by which students and families ended up in this situation – and regardless of if or when a NC court and/or the state's legislators are swayed by research findings to enact change – students and families need supports and interventions that are effective within the context of their current reality. High-poverty, low-performing schools need solutions now; stakeholders (e.g., district leaders, principals, parents, teachers, nonprofits) are not sitting idly by waiting for macro-level policy changes to desegregate neighborhoods and schools in Charlotte.

Within the current parameters, it is likely that the relationship between poverty and school quality is bidirectional; thus, opportunities exist that are within our control to improve educational experiences and outcomes. In fact, at least once per year (e.g., on CMS school improvement plans and CIS-CMS partnership agreements), decisions are made regarding how to best allocate resources and how to best respond to students' and families' needs. One support that CIS-CM offers is a school-based program in which services are delivered via site

coordinators, using a case management model employed with individual students. Site coordinators' direct impact on case-managed students can be measured using fairly straight-forward, existent methods (e.g., improved attendance, behavior, and academic performance among case-managed students). Beyond this individual-level impact, CIS-CM leaders and staff believe the organization's presence may benefit all students in high-poverty, low-performing partner schools by positively impacting the school environment. Including and beyond the schools that partner with CIS, CMS currently implements 15+ school-wide initiatives that aim to improve aspects of school climate or culture; however, school personnel decide (1) whether and how to measure these constructs and (2) which data (e.g., test scores, teachers' anecdotes) to consider or ignore when deciding to continue or abandon improvement strategies (e.g., specific supports or interventions). The mutual goal of CIS-CM site coordinators' school-wide supports and interventions and the CMS school-wide climate and culture initiatives is to create better school environments.

It seems logical that successful schools would have better school environments than unsuccessful schools. However, there are varying opinions (as well as confusion) about the optimal approach for measuring a construct as intangible as school environment. In the literature to date, there has been little consistency in the conceptualizations and definitions of school climate or culture (see Denison, 1996; Kohl et al., 2013; Sailor, 2009; Wang & Degol, 2016), with overlap and disagreement regarding what the essential components are and how to assess them in schools. To improve the conditions in which children learn, the school system and the community would benefit from a reliable and valid measure of the essential elements of the school environment in CMS. By using the measure to collect school environment data annually or semiannually, school leaders could draw on these data to make evidence-based decisions to

focus on improving specific aspects of their school environment that relate to children's success. All schools could utilize findings to improve student outcomes by enhancing evidence-based facilitators to learning (e.g., successful supports and interventions), and the community could create a blueprint of the seemingly intangible elements of high performing schools.

Therefore, in partnership with CIS-CM and CMS, the present school environment study was designed to support the development and piloting of a stakeholder-informed measure of school environment. Ultimately, the present research not only contributes to the existing literature by defining and operationalizing school environment, but it also holds promise for improving student achievement. That is, the effort (and the subsequent use of the measure) would yield data that would support the exploration of how to modify our community's schools to promote equitable outcomes for students while also improving student achievement overall.

The present study's activities began with piloting the School Environment Survey in 2021. However, the ongoing, multi-year initiative began in 2017. Through focus groups with elementary school teachers and noninstructional staff, and interviews with principals, current and former CMS district office staff, and learning community leaders in 2018 and 2019, themes were identified that guided the development of a school environment measure. The results of this study could help the district and CIS-CM to interpret student achievement in context, with a better understanding of what works in each school's environment. The next section outlines relevant theory that framed the effort.

1.2 Theoretical Frameworks

The conceptualization of school environment is guided by the belief that individuals' interactions with their environment shape their behavior. According to Bronfenbrenner's (1977, 1979, 2006) ecological systems (and now bio-ecological) framework, human development takes

place gradually through reciprocal interactions between a person and others in both proximal and distal environments:

> A microsystem is the complex of relations between the developing person and environment in an immediate setting containing that person (e.g., home, school, workplace, etc.). A setting is defined as a place with particular physical features in which the participants engage in particular activities in particular roles (e.g., daughter, parent, teacher, employee, etc.) for particular periods of time. The factors of place, time, physical features, activity, participant, and role constitute the elements of a setting (1977, p. 514).

Therefore, bio-ecological theory supports the notion that individual behaviors *(i.e., behaviors of teachers and students)* are shaped by the school environment. Of particular importance for developing a measure, our view of conceptualizing school environment as a set of environmental constructs (or at least the perceptions of them) is consistent with the very foundation of bio-ecological theory, which explicitly conceives of environmental contexts as multidimensional in nature (Wang & Degol, 2016).

Similar to the bio-ecological model, resilience-framed models (see Brooks, 2006; Masten, 2001, 2011; Masten & Barnes, 2018) are non-specific regarding any particular dimension of school environment, but provide theoretical support for the notion that a school environment that facilitates the development of assets will increase student resilience. Resilience is a dynamic developmental construct that reflects effective coping and adaptation in the face of major life stress (Masten & Barnes, 2018). Including and beyond the individual child's self-righting tendency to overcome adversity, Masten's (2001, 2011) conceptualization of resilience is scalable across system levels (e.g., children, families, schools, school systems): "Resilience can be broadly defined as the capacity of a system to adapt successfully to challenges that

threaten the function, survival, or future development of the system" (Masten & Barnes, 2018, p. 2). While racial segregation and concentrated poverty in CMS create challenges across system levels (e.g., contributing to students' low academic performance; depleting school-level resources), improving school environments by identifying the challenges as well as the criteria for adaptive success (e.g., mental health) and "what makes a difference" (e.g., community and relational processes that support success; Masten & Barnes, 2018, p. 4) could provide protection and promote positive development, enhancing the likelihood of better outcomes at multiple levels (Brooks, 2006).

Many theories support the notion that selecting and implementing specific supports and interventions to improve school environment is a promising, well-justified approach to promote educational excellence and equity. According to stage-environment fit theory (Eccles & Midgley, 1989; Eccles et al., 1993), characteristics of individuals and their environments impact human behavior, emotions, and cognitions. In this view, students' motivation for academic success depends, at least in part, on students' school environment meeting their psychological needs. In addition, social control theory posits that weakened social and cultural constraints result in delinquency (Agnew, 1993; Hirschi, 1969), which often results in missed instructional time for students (e.g., office behavioral referral; suspension). Both delinquency and social withdrawal have been found to significantly predict low academic achievement (Farhat & Ruhi, 2016; Maguin & Loeber, 1996). Research guided by this theory suggests that individuals with strong attachment (e.g., respect for and connection to significant people in their life), commitment (e.g., current or future investment in expected activities), involvement (e.g., the amount of time spent doing various activities, which means less time available for delinquent acts), and belief (e.g., level of dedication to the moral value system of their society) tend to avoid

delinquent acts (Agnew, 1993; Hirschi, 1969). Therefore, our measure of school environment was designed with manifest indicators (i.e., items) to capture students' levels of attachment, commitment, involvement in educational activities, and dedication to the school's values.

1.3 School Culture and Climate

Previous research has investigated the school context (i.e., positive school environment) in terms of school culture and climate. Despite definitional differences, the underlying conceptualization of these two constructs is largely the same (Denison, 1996), suggesting that culture and climate may reflect, and be examples of, redundant constructs. This section will illustrate the definitions employed and the applications of school culture and climate work to date, identify the shortcomings of these overlapping constructs, and indicate how the use of a "school environment" concept addressed these challenges.

School culture has been defined as the common values, norms, expectations, and beliefs of a school community (Sailor, 2009). School culture has also been defined as a "system of shared orientations that hold the unit together and give it a distinctive identity" (Hoy & Miskel, 2008, p. 177). Problematically, inconsistent criteria have been used to categorize a school culture as "positive"; therefore, findings that more "positive" school cultures improve student behavior, achievement, attendance, and teacher satisfaction (Benner et al., 2013; Hatchett, 2010; Jimerson et al., 2016; Louis & Wahlstrom, 2011) often reflect circular reasoning with limited utility for other school leaders. Nevertheless, for decades, the U.S. Department of Education has recognized the influence of school culture on student learning, such as the role that leaders play in shaping cultural patterns and practices (Deal & Peterson, 1999).

School climate is based on patterns of people's experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and

organizational structures (Thapa et al., 2013). According to Wang and Degol's comprehensive (2016) review, school climate represents "virtually every aspect of the school experience" (p. 315), with researchers citing school-community relationships, school organization, and both institutional and structural features of the school environment. There is no universal definition of school climate, and researchers have used myriad definitions that vary tremendously. Some definitions are extremely abstract and theoretical, which limits their utility in applied settings, while other definitions are too concrete or fitted to specific situations (Wang & Degol, 2016). Nonetheless, considerable research has documented a direct connection between a school's climate and students' attendance, achievement, and behavioral outcomes (Wang & Degol, 2016).

Recognizing the importance of school climate elements on student outcomes, the Every Student Succeeds Act (ESSA) now requires schools to choose and report an indicator of "School Quality or Student Success" as part of their school accountability systems, with the option of reporting on school climate (see Woods, 2018). North Carolina currently chooses to report on elementary and middle schools' Education Value-Added Assessment System (EVAAS) growth as the School Quality or Student Success Indicator; EVAAS is a value-added growth model that produces a composite growth value of student performance on the English language arts/reading (ELA), mathematics, and science assessments (North Carolina Department of Public Instruction, 2017). In addition to reporting a School Quality or Student Success Indicator (e.g., school climate or growth), state-developed accountability systems must also include proficiency in reading and math (e.g., EOG test results).

1.4 School Environment

Historical context explains, at least in part, why there are overlapping definitions of the two constructs throughout the interdisciplinary, social sciences literature. The concepts of school

culture and climate both originated in the organizational leadership field. Organizational culture is considered the set of expectations that "govern the way things are done in an organization" (Glisson, 2007, 742) or the accumulation of an organization's learning, while organizational climate is defined as how employees collectively perceive, appraise, and feel about their current working environment (see Denison, 1996; Glisson, 2007; Schein, 1992). As Denison (1996, p. 634) explained, the difference between these literatures "lies not in the nature of the phenomenon or the methods used to study it, but in the theoretical traditions that have been borrowed from other branches of the social sciences". Organizational climate researchers adhering to Lewinian field theory assume that behavior is a function of the person interacting in an environment (B = *f*(P, E)) and, therefore, they seldom study the *agents* of an organizational system (e.g., management). These climate researchers focus on the impacts of the system on its *subjects* (Denison, 1996). In contrast, through symbolic interaction and social construction perspectives, organizational culture researchers assumed that "the individual cannot be analytically separated from the environment and that the members of social systems are best regarded as being agents and subjects simultaneously" (Denison, 1996, p. 635). The difference in these theorists' perspectives centers on the question of whether or not social context should be considered as merely the impact of the system on its members, or both the medium and the outcome of social interaction (Denison, 1996).

However, in the development of the *school* culture and climate literatures, this distinction was either overlooked or purposefully ignored, likely because in the applied context of schools, aspects of both theoretical perspectives have utility, as do the slightly differing operationalizations (i.e., manifest indicators) that have emerged from both the school culture and climate literatures. The overlap has become so apparent that some educators believe school

climate tools can be used to measure school *culture*. For example, while describing the utility of measuring and altering school *culture,* Sailor (2009) suggested adopting measures of school *climate*, thinking of climate as a "closely related concept…[that] can be reliably assessed…to provide evidence of changes at the level of school culture" (Sailor, 2009, p. 60). From a measurement perspective, this conceptual confusion is problematic because if educators believe that school culture can be reliably assessed through school climate measures, separate constructs of school culture and climate are redundant and unnecessary.

A primary goal of science is to develop theories that are only accepted to the extent the data support them as the most logical and parsimonious explanations for observed phenomena. Culture and climate do not appear parsimonious by definition, and the use of separate measures reduces the likelihood that researchers choose behavioral indicators that adequately sample the common phenomenon at hand. Essentially, climate researchers may be missing key manifest indicators or even entire dimensions of the phenomenon because their literature search excludes research on culture and vice versa. To advance the understanding and application of this phenomenon, it would be advantageous for culture and climate researchers to contribute to one body of research using their multiple data sources and strategies to build on one another's work and more accurately reveal how social contexts influence individuals and schools.

Reaching consensus about the overarching construct that includes school climate and culture is an important goal that could eventually allow environmental factors to be researched and applied more effectively. Without a consensus on the nature of these constructs, they will continue to be operationalized differently in different settings. This leads to research efforts that are actually assessing the effects of multiple, variably defined constructs and makes it impossible to meaningfully compare and aggregate findings across studies. Consolidating school climate

and culture and reaching consensus on the operational definitions of relevant dimensions could yield a construct that can be understood and assessed (i.e., measured) more consistently.

As a first step, "school environment" was defined here as a category of constructs that reflect the surroundings or conditions in which people operate in school; this broad conceptualization was intended to capture the underlying, key elements of school culture and climate. Based on existent literature on school culture and climate (e.g., Deal & Peterson, 2016, 1999; Thapa et al., 2013; Wang & Degol, 2016), the following dimensions were identified and organized into five domains, which are summarized in Table 1. For more information, see Appendix A.

Table 1

Literature Review of Climate & Culture: Essential Elements of School Environment

Domain	Dimension
Shared Vision	Mission: A mission focused on student and teacher learning
	History of the school: A rich sense of history and purpose
	Values and beliefs of the organization: Core values of collegiality, performance, and improvement that engender quality, achievement, and learning for everyone; positive beliefs and assumptions about the potential of students and staff to learn and grow; collegial support based on trust
	Rituals and ceremonies: Regularly reinforce positive, core cultural values
	Myths and stories that explain the school: Stories that celebrates successes and recognize adult heroines and heroes who define what is possible and provide a standard to achieve
Safety	Social/emotional safety: Presence of caring and supportive staff; availability of counseling services; an absence of verbal bullying or harassment
	Physical safety: Frequency and severity of violence and aggression; students and staff feel safe; security measures (e.g., metal detectors, guards)
	Discipline and order: Conflict resolution, clarity, fairness, and consistency of rules; belief in school rules; knowledge and implementation of behavioral interventions and supports; behavioral order in the classroom
Community	Partnership: Role that community members and parents play; parental involvement
	Quality of relationships: Trust, interpersonal relationships between staff and students; affiliation
	Student connection: Positive regard for teachers and other adults; positive regard for student peers
	Connectedness: Cohesion; sense of belonging; sense of community; student involvement (e.g., school sponsored extracurricular activities)
	Respect for diversity: Fairness; autonomy; opportunities for decision making; cultural awareness
	Responsiveness: Social support provided to meet students/families' needs
Academics	Leadership: Principals and administration are supportive of teachers; shared leadership that balances continuity and improvement; open lines of communication
	Teaching and learning: Quality of instruction; assessments of students; willingness of teacher; student motivation and engagement; teacher expectations; achievement goal structure; teacher's use of supportive practices
	Professionalism: A strong professional community that uses knowledge, experience, and research to improve practice; review and assessment of teaching practices; opportunities for growth and development through professional development; data-based decision-making using continuous assessment
	Academic press: Demandingness, or the degree to which students perceive that teachers push them to work hard and tackle challenging assignments
Physical Environment	Environmental: Heating, lighting, air conditioning; acoustical control; cleanliness; upkeep of maintenance; quality of building
	Structural organization: Class size; student to teacher ratio; school size; ability tracking
	Availability of resources: Adequacy of supplies, resources, and materials; technology; sharing of resources
	Reminders: An environment that symbolizes joy and pride

1.4.1 Shared Vision

While individual elements of school culture may be unique to schools, general characteristics of positive, successful cultures have been identified consistently in the literature, reflecting a school's *shared vision.* The case studies described by Deal and Peterson (1999, 2016) and Wagner's (2006) School Culture Triage Survey supported the appropriateness of including the following dimensions within the shared vision domain: *mission* (i.e., unity of purpose); *history of the school; values and beliefs of the organization; rituals and ceremonies;* and *myths and stories* that explain the school. Like effective businesses, schools embodying key elements of shared vision may create environments conducive to success (Denison et al., 2012).

1.4.2 Safety

School safety encompasses all aspects of security provided by a school and formed by its members, including *physical and emotional safety*, as well as *order and discipline* (Thapa et al., 2013; Wang & Degol, 2016). These three dimensions appear consistently throughout the culture and climate literatures, with a plethora of findings asserting that violence, bullying, and disruptive behavior occur infrequently and are not tolerated in positive school environments (Benner et al., 2013; Melnick et al., 2017). All seven of the school climate survey tools endorsed by the U.S. Department of Education measure the dimension of safety to some extent (i.e., *physical safety, emotional safety,* and/or *discipline/orderly environment*; Melnick et al., 2017). As a basic need, safety concerns must be ameliorated by schools for students and teachers to be able to focus their resources and attention on learning, which should be of paramount concern in a healthy school environment.

1.4.3 Community

In the school context, *community* refers to the quality of interactions among students,

teachers, administrators, and school employees (Wang & Degol, 2016). Dimensions of the community domain are *partnership, quality of relationships, student connection, school connectedness, respect for diversity,* and *responsiveness*. *Partnership* refers to the opportunity, frequency, and quality of parental participation, as well as participation of community members in school activities. *Quality of relationships* refers to the nature of relationships among students, between students and teachers, and among school staff. This dimension also includes the extent to which members of a school trust and support one another (Melnick et al., 2017). Related to the *quality of relationships*, *student connection* refers to how students within a school see one another. *School connectedness* refers to the sense of attachment, belonging, and inclusiveness experienced by students and staff (Melnick et al., 2017; Wang & Degol, 2016). *Respect for diversity* refers to the degree of mutual respect between members of the school community from different backgrounds. Finally, *responsiveness* refers to a school's capacity to react to the various needs of students or parents and the likelihood that they will do so effectively. Schools that facilitate a high-quality school community are better able to meet students' psychological needs and promote academic development (Wang & Degol, 2016).

1.4.4 Academics

Referred to as *academic climate* by Wang and Degol (2016), *academics* includes manifest indicators of the quality of an academic environment that consistently predict student achievement (Lee & Smith, 1999; McEvoy & Welker, 2000). In high-performing schools, educators believe in their ability to improve student outcomes, which is evident through the following dimensions of the academics domain: *leadership*; *teaching and learning*; *professionalism*; and *academic press*. For over fifteen years, schools in Chicago have administered a climate survey that measures academic engagement and academic press; the 5

Essential School Report is a survey designed to measure the extent to which schools have effective leaders, collaborative teachers, and ambitious instruction that drive students to meet high academic expectations (Melnick et al., 2017). While all dimensions of school environment are hypothesized to predict student outcomes, elements such as social support have been found to only influence learning in schools when the organization endorses and facilitates an environment in which academic rigor is prioritized and taken seriously (Lee & Smith, 1999).

1.4.5 Physical Environment

Referred to as institutional environment by Wang and Degol (2016), *physical environment* encompasses the more tangible elements of an environment that play a significant role in shaping the experiences of its inhabitants. Three dimensions are supported by the climate literature: *environmental adequacy*; *structural organization*; and *availability of resources* (Wang & Degol, 2016). *Reminders*, the fourth dimension, stems from culture literature suggesting that a positive school environment provides visual reminders symbolizing joy and pride (Deal & Peterson, 1999). The School Climate Assessment Instrument endorses the inclusion of measuring respondents' perceptions of their school's physical appearance (Melnick et al., 2017).

Schools with a high percentage of students whose family income is below the poverty line often face resource inadequacy, such that many of their students experience the effects of scarcity in school and at home. The impact of increasing availability and access to resources in school, therefore, may disproportionally aid students living in poverty and contribute to more dramatic academic gains, compared to their more affluent peers, as a result of physical environment factors (Thapa et al., 2013).

1.5 The Nomological Network of School Environment

Because school environment is intended to capture the underlying concepts of school

culture and climate, the nomological network of school environment should include the various outcomes believed to be associated with both school culture and climate. This includes academic outcomes such as student achievement (typically assessed via grades, GPA, standardized test scores) and attendance (Benner et al., 2013; Hatchett, 2010; Jimerson et al., 2016). A positive school environment should also relate to a wide range of social-emotional outcomes for students such as improved self-esteem, self-concept, and general psychological well-being (Hoge et al., 1990; Kuperminc et al., 1997; LaRusso et al., 2008; Payton et al., 2008; Ruus et al., 2007). Furthermore, a positive school environment should relate to improved student behavior, reduced drug use, and decreased aggressive or violent behaviors (Gregory et al., 2010; LaRusso et al., 2008; Louis & Wahlstrom, 2011). Finally, school environment could influence academic motivation and buffer the academic consequences of low socioeconomic status (Astor et al., 2009; Eccles et al., 1993).

1.6 Participatory Community Research

There are multiple paradigms and methodologies associated with participatory research and ethical standards for community researchers (Jason et al., 2004) that guided this study's design and procedures. Because a participatory approach necessitates the prioritization of local, community-driven goals, the content that follows begins with an overview of applicable, local context. As a bit of background, Multi-Tiered Systems of Support (MTSS) is a nationally-recognized framework that the state of North Carolina adopted (i.e., NC MTSS) as its framework to "promote[s] school improvement through engaging, research-based academic and behavioral practices as well as Social and Emotional Learning" (North Carolina Department of Public Instruction, n.d., para. 2). Within CMS, specifically, the NC MTSS program requires a school MTSS team that is tasked with monitoring data-driven problem-solving activities within that

school to work towards the goal of maximizing growth for all students (see Charlotte-Mecklenburg Schools Student Services Department, n.d.).

The following section describes an opportunity to address some of the current limitations (of the NC MTSS program) that relate to the present study: A generalizable, standard system for measuring key school environment elements would enable schools to determine baseline data and then evaluate the extent to which specific interventions (i.e., included in the MTSS framework) have impacted the school environment. The subsequent two sections describe this study's participatory approach through university-community partnerships as well as the engagement of multiple stakeholders in content validation and item development activities, providing a backdrop for the present study.

1.6.1 Local Context: Evaluating Supports and Interventions Intended to Improve School Environment

While school environment is influenced by stakeholders at multiple levels (i.e., students, teachers, parents), in the absence of macrosystem changes (e.g., the aforementioned student busing, school-choice policies), administrators still have power at the mesosystem level to alter conditions within their school environments through school policies and leadership styles. For many educators, when they think about positive school environments (i.e., "positive learning environments", "school culture", and/or "school climate"), and interventions that aim to improve the extent to which a school's environment is conducive to learning, they typically consider performance or process indicators (e.g., teachers/staff implementing key components of a specific intervention they think will improve the school's environment) and student outcomes. In many cases, these outcomes are not measured in the most reliable or valid way (e.g., office discipline referrals decrease when teachers are instructed to manage students' behaviors in their

classroom instead of referring students to the office). While there are school-wide interventions being implemented (e.g., at the beginning of the 2017-2018 school year, CMS officially began implementing the Multi-tiered Systems of Supports (MTSS) framework for instruction and behavior management), the measures currently utilized do not measure school environment, but rather use the proxies of fidelity of implementation of an intervention (e.g., collected through observations, the extent to which components of an intervention have been implemented in a manner that is consistent with the intervention model). For example, according to Benner and colleagues (2013):

> PBIS [Positive Behavior Interventions and Supports] is a MTSS [Multi-tiered Systems of Supports] framework for behavior, establishing the social culture and behavioral supports needed for schools to be effective learning environments for all youth. A positive facility or school culture means [it] is one that is predictable (i.e., common language, common understanding of expectations, common experience), positive (i.e., regular recognition for positive behavior), safe (i.e., violent and disruptive behavior is not tolerated), and consistent (adults are "on the same page" with behavioral expectations). (p. 19)

At the end of each school year, schools typically utilize the PBIS Self-Assessment Survey (SAS; see Sugai et al., 2009) as an annual assessment of effective behavior support systems in their school. School staff utilize this survey to assess the status and areas for improvement of four behavior support systems: (1) school-wide discipline systems; (2) non-classroom management systems (i.e. cafeteria, hallway); (3) classroom management systems, and (4) systems for individual students engaging in chronic problem behaviors (Sugai et al., 2009).

PBIS committee members at the school summarize results to revise their action plan for implementing and sustaining effective behavioral support systems throughout the school.

However, the SAS does not actually measure the extent to which a generalizable (i.e., to non-PBIS schools) construct, such as school environment, has changed over time (i.e., comparing results to previous years, assessing change from the beginning of the school year to the end). Instead, SAS measures the proxies that PBIS developers have already assumed reflect "school culture" and "positive/effective learning environment".

Similarly, the School-Wide Evaluation Tool (SET; Todd et al., 2012) is designed to indicate the extent to which school-wide personnel are implementing specific Positive Behavioral Interventions and Supports. This is a necessary first step to evaluate the implementation of PBIS. SET results provide an overview of the extent to which each of the seven components of PBIS have been implemented at a school at a given point in time. According to the researchers who developed the SET instrument (Horner et al., 2004), an overall implementation score of 80% reflects the minimum for acceptable fidelity of overall implementation of school-wide positive behavior supports. To evaluate the effect of PBIS, schools are encouraged to monitor average referrals per day per month, referrals by problem behavior report, referrals by location report, referrals by time report, and referrals by student report.

Those data are collected because schools assume that if interventions (e.g., PBIS) are fully implemented, student outcomes will improve. Evaluations of PBIS suggest that schools that have implemented PBIS for a longer period of time produce higher SAS scores than schools that have recently begun implementing PBIS (see Molloy et al., 2013). While this type of evaluation is beneficial to those championing PBIS, the extent to which the school environment is becoming more or less conducive to learning remains unknown. CMS is currently missing this crucial information.

A standard system for measuring key school environment elements that is generalizable across CMS would enable schools to determine baseline data and then evaluate the extent to which specific interventions have impacted the school environment. Fidelity data would continue to serve the role of measuring the extent to which specific interventions have been fully implemented (and implemented consistently with the intervention plan or model), so that schools can use those results to inform improvements in the fidelity of implementation. Alternatively, if data suggest high fidelity of implementation but little or no progress regarding school environment improvement, they may choose to allocate resources to a different school reform approach or intervention. Ultimately, school environment data should be able to support or refute claims that an intervention (i.e., PBIS) improves student outcomes by improving the school environment.

1.6.2 Participatory Approach through University-Community Partnerships

The processes followed for this effort were multi-step and guided by participatory research principles (see Jason et al., 2004; Kilmer & Cook, 2021). For this project to yield a relevant, useful product, active participation from diverse groups of stakeholders at CMS and CIS was vital to define the key domains of school environment and identify manifest indicators of those domains. This project's university-community partners include leadership from the school system's Research, Evaluation, and Analytics Department, leadership from CIS-CM, and faculty and students from UNCC's Community Psychology Research Lab. After reviewing the literature, UNCC graduate students created a comprehensive definition of school environment to address the complexities and shortcomings of school culture and climate, which we hoped would yield a set of constructs that could be readily understood and applied in school settings. Improving our understanding of school environment, as well as the manifest indicators

associated with each domain, was an important first step in the development of a psychometrically sound measurement device for schools.

1.6.3 Content Validation and Item Development

Guided by the standard processes of scale development and content validation (e.g., see Crocker & Algina, 1986; DeVellis, 2012; Vogt et al., 2004), a measure of school environment was developed collaboratively with partners (e.g., content experts included CMS teachers and CIS site coordinators). After I presented findings and concepts drawn from relevant literature to community partners' leadership, we used partners' collective expertise and a participatory process to make ongoing refinements of key constructs (i.e., definitions; domains and dimensions). In March 2018, the Office of Accountability approved our request to begin conducting this research in CMS (see Appendix B). After the project champions (i.e., at least one member of each partnering organization) agreed that we were ready for additional feedback, we conducted focus groups and interviews with a variety of stakeholders, including members of the target population (e.g., teachers in grades 3-8), to gain a deeper understanding of each domain as well the manifest indicators associated with those domains. Feedback provided during focus groups and interviews guided the development of survey items, which were subjected to exploratory factor analysis and preliminary validation (e.g., concurrent criterion validity) during the next stage of this project (i.e., the present study; see analytic approach below).

The decision about the grade-level inclusion criteria of grades 3-8 was made during initial conversations about this project with CIS-CM and CMS and unanimously supported by the partners. From a practical standpoint, students in grades K-2 do not take standardized tests (e.g., MAP Reading or Math); therefore, some aspects of this study would not have been possible as designed (e.g., evaluating concurrent criterion validity). Furthermore, the long-term aims of

this project include creating versions of the measure for additional reporting groups, including students. For developmental reasons, this expectation (i.e., of self-reporting) would not be developmentally appropriate or feasible for most students in lower grades (i.e., K-2). Moreover, we would not expect high school teachers to endorse the same items that were included on this measure of school environment because school cultures and climates that work well to foster learning in grades 3-8 would not be expected to have the same effect on high school students and teachers. High schools, as well as K-2 classrooms, would be expected to yield different perceptions and experiences and have their own set of collective norms and expectations. Creating additional, developmentally appropriate versions of the measure for older and younger students and their related reporting groups (e.g., teachers) was beyond the scope of this project for feasibility reasons (e.g., time, resources). Because of the PI's professional background (i.e., certified teacher in grades 1-6) and research interests (e.g., school-age children as the population of interest because of unique characteristics of that developmental age/stage), beginning this project in grades 3-8 utilized an existent strength of the research team in terms of prior knowledge and expertise.

In partnership with CMS and CIS-CM, eight interviews and fourteen focus groups were conducted with 126 total participants between October 2018 and June 2019. All principals who participated in these measure development steps were interviewed. While some additional, current and former CMS district leaders were interviewed, others (e.g., Research, Evaluation, and Analytics Department leadership) participated in focus groups. CIS noninstructional staff (i.e., site coordinators) and CMS teachers also participated in focus groups. Each focus group was homogenous based on employer, and most focus groups were also homogenous based on participants' role (e.g., only teachers participated in the teacher focus groups that were conducted

within CMS schools; only site coordinators participated in the CIS focus groups that were conducted during a CIS staff meeting).

The following section describes the semi-structured script that researchers created and followed. The appended consent form (see Appendix C) and facilitators' semi-structured focus group and interview scripts (see Appendix D) provide a more detailed outline of procedures. These varied steps laid the foundation for the present study.

Researchers used facilitation skills to ensure the majority of discussion time was spent answering the following key questions:

- Q1. What do participants perceive to be the most important elements of the school environment in terms of what impacts student behavior and learning in CMS? It bears mention that this question was asked prior to providing a review of any specific domains/dimensions of school environment identified by researchers (e.g., found in existent literature and described by from district leaders),
- Q2. Which domains/dimensions of school environment identified by researchers (e.g., found in existent literature and heard from district leaders) resonate, and which domains/dimensions do not resonate with participants (i.e., teachers, site coordinators) based on their CMS experiences?
- Q3. Are there additional elements of school environment (e.g., unfamiliar to researchers) that participants perceive as critical for inclusion in CMS' conceptualization and measure of school environment? If so, how do participants describe these environmental conditions and perceive their impact(s) on student behavior and learning?

At the beginning of each focus group, researchers introduced the concept of school

environment and the purpose of the study. After this general introduction, participants were asked about the aspects of school environment that they perceive as important. Specifically, they were asked to imagine a *high achieving* school and then a *low achieving* school. Asking these questions before sharing the domains of school environment identified from the literature allowed participants to provide unbiased, unprovoked information. After the group had shared their general ideas, the researchers provided a handout outlining their working definition and examples of the school environment domains. The subsequent discussions, which sometimes researchers led and sometimes happened organically (i.e., initiated by participants while they reviewed the handout), addressed the extent to which points raised by participants fit into these domains. Next, researchers asked participants to discuss the domains they believe to be most important, and how those domains contribute to school effectiveness. Finally, participants were asked to provide specific positive and negative examples of how each domain and dimension could be observed in schools. At least one graduate student researcher (typically two) and at least one community partner (typically two) attended each interview and focus group session so the PI could ask questions and lead the conversation while others were dedicated note-takers and observers. For logistical reasons, the focus groups with CIS noninstructional staff that co-occurred during a CIS staff meeting were not recorded, but all other interviews and focus groups were recorded. Participants were informed in advance if that session would be tape recorded; all participants consented to being recorded.

During the first three months of qualitative data collection in 2018 (October – December), within a few days after each interview and teacher focus group, both researchers and community partners (i.e., the designated note-takers) independently analyzed our handwritten notes, and researchers transcribed applicable sections of the audio recordings. As the primary

investigator, I listened to the audio recordings at least twice, first while listening continuously and again while pausing the recording device to transcribe. Researchers used caution when drawing inferences and offering interpretations of linguistic patterns, such as long pauses in which participants subsequently changed the subject (see Marshall & Rossman, 2011). Researchers' notes were coded by grouping, categorizing, and labeling participants' feedback according to the hypothesized themes (i.e., dimensions and domains of school environment). Graduate student researchers coded notes and transcribed sections (i.e., direct quotations) to identify common patterns in participants' responses, and only those themes reflected in comments and/or nonverbal agreement (i.e., head nodding documented in researchers' notes) made by more than one participant were included as a response pattern (see Marshall & Rossman, 2011).

Additional graduate student researchers, faculty, and community partners were consulted throughout this process. Graduate student researchers compared findings to assess our level of agreement. When patterns were identified by only one researcher, researchers discussed that issue with the community partner in attendance, who was asked whether our interpretation (i.e., the finding in question) adequately reflected focus group participants' meaning and intent (Marshall & Rossman, 2011). Through an iterative process modeled by Vogt and colleagues (2004), after each additional focus group session and subsequent identification of patterns in the data, researchers reflected on emerging themes, and I continued to revise our hypothesized conceptualization of school environment through June 2019.

I presented our preliminary findings (i.e., conceptualization of school environment informed by the literature and interview and focus group themes) at a CIS Program Evaluation Committee meeting on Jan. 15th, 2019. In addition to CIS leadership, members of their Board of

Directors attended this meeting. In order for the project to become more integrated into work outside of CIS (e.g., the greater Charlotte community), we wrote an external-facing research brief (i.e., Overview of School Environment document; see Appendix E). That research brief was the first step towards our goal of engaging community members outside of CIS and CMS.

Throughout 2018 and 2019, participants provided overwhelmingly positive reactions to the project during interviews, focus groups, and presentations. Different groups of stakeholders at multiple levels (e.g., from teachers to principals to district leadership in the school system; from site coordinators to CIS leadership within CIS-CM) agreed that measuring school environment was an important and worthwhile endeavor. Key take-aways from interviews and focus groups included a high level of buy-in and support of project goals as well as the effort's process and methods. When considering the five previously-identified domains from school climate and culture literature (i.e., academics, physical environment, shared vision, community, and safety) presented via the emerging conceptualization of school environment, there were no suggested omissions; stakeholders agreed that all five domains should be included in the conceptualization of this construct.

Another noteworthy finding that emerged from the deductive coding process was that each domain (either overall or at least one dimension within that domain) was chosen by one or more groups of participants when they were asked to rank what was most important to include (i.e., a top three "essential element" of school environment). For example, most participants described in detail why all four dimensions of academics are essential to include/measure. While dimensions within the community domain were brought up less frequently during interviews, all participants chose to prioritize "quality of relationships", such as relationships between students and adults in school. Based on frequencies (i.e., how many times each domain or dimension

within a domain was ranked in the top three during interviews and focus groups), participant stakeholders' priorities for what to include in the School Environment Survey were as follows, beginning with most important: (1) academics, (2) community, (3) safety, (4) shared vision, and (5) physical environment.

To elicit constructive criticism, researchers repeatedly asked, "In what ways does this definition or item get at what you just described? How did we get it wrong?" Participants provided suggestions for improvement, including language revisions and concrete examples for item replacement or significant improvement of the wording of existing items. In addition, process suggestions included ideas for CMS that only "insiders" would have produced. As one case in point, principals suggested utilizing time during a specific, regular principal meeting (i.e., "Principal Ignite Time") to share with colleagues their thoughts regarding what they are doing to positively impact specific domains of their school environment (e.g., linking a specific practice within one or more domains of school environment with high scores, according to School Environment Survey data). Participants also shared creative suggestions for interpreting School Environment Survey data, such as investigating a potential hierarchy of essential elements of school environments. For example, the climate might feel safe, welcoming, and supportive of both students and teachers, but that will not matter if academic expectations are too low for students; alternately, if it is freezing, and there is trash everywhere, students may not be able to meet high expectations that are set for them.

In collaboration with community partners and with the support of graduate students and faculty in the CPRL, we developed 148 closed-ended survey items for CMS teachers (grades 3-8) to report on the essential components of school environments that were identified in the literature as well as prioritized and described by stakeholders (e.g., district administrators, school

principals, teachers, and non-instructional school staff). The original goal was to develop 15 to 20 Likert-scale items for each of the five domains, but additional items were needed to address all of the dimensions valued by stakeholders as well as those reflected in existing research. More specifically, items were designed to evaluate the extent to which manifest indicators for each dimension (as identified through interviews and focus groups) are generally observed at a given school. We aimed to develop items that: 1) assess unique aspects of each domain, 2) are easily and consistently understood, and 3) are consistent with the definitions of each domain.

To improve content validity and increase the likelihood that this School Environment Survey will provide answers that are trusted and used by CMS to effect school change, developing and revising items required an ongoing, participatory and iterative process. We continued to conduct focus groups (e.g., with teachers and CMS district leadership) and solicit written feedback (e.g., CMS leadership and UNCC faculty rated items on a three-point scale from "Definitely keep" to "Definitely remove") until all partners agreed that the School Environment Survey was ready to be piloted.

To illustrate how participants' feedback was utilized to develop and improve the measure and to explain briefly how additional revisions were made to continue this project during the COVID-19 pandemic, the following section provides an overview of major revisions (e.g., dimensions, procedures followed to pilot the measure) that researchers made to the School Environment Project between the first and most recent (i.e., piloted) version. For hypothesized domains and definitions of dimensions that researchers developed prior to interviews and focus groups (i.e., by August 2018), see Appendix A.

Revised dimensions and items. While the literature described *academic press* as an important dimension of the *academics* domain, participants clearly preferred the term *high*

expectations. Therefore, items were developed using stakeholders' preferred language. After multiple rounds of revisions, during focus groups with CMS leadership in 2019, the following three items were chosen for inclusion to measure the *high expectations* dimension of school environment: "Teachers expect their students to meet academically rigorous goals; our students receive the support they need to achieve their personal best; and all adults at our school believe our students are capable of achieving academic success."

Within the *community* domain, after the first round of interviews and focus groups (i.e., between Oct. 2018 and Jan. 2019), only the following three dimensions had been mentioned by participants: *partnership*, *quality of relationships*, and *school connectedness*. Compared to the literature review, the following three dimensions had been left out: *student connection*, *respect for diversity*, and *responsiveness*. CIS-CM subsequently advocated for including *responsiveness* as an important dimension of the *community* domain. One example of how the measure was revised accordingly is that the following item was added: "Our school adequately responds to meet the most serious needs of our students and their families; for example, we provide resources for students who are experiencing homelessness."

In addition, CMS researchers' interpretation of *responsiveness* included trauma-informed practices. One example of how the measure was revised accordingly is that the following item was added: "Adverse childhood experiences (ACEs) include the death of an attachment figure (e.g., parent or sibling) or another important person (e.g., grandparent, other relative, friend or peer), family dysfunction, divorce, and violence; abuse and/or neglect; parental substance use or incarceration; exposure to community violence characterized by shootings; bullying; poverty; or homelessness. Most adults in our school do not understand the effects of ACEs on students' physical and mental health."

In both of these instances, community partners' feedback was evidence-based and supported in the literature (see, e.g., Koslouski & Stark, 2021). Beyond those items, community partners concluded that while all six dimensions are likely important, the three additional dimensions (i.e., *student connection*, *respect for diversity*, and *responsiveness*) were being captured elsewhere in the measure. For example, community partners felt strongly that *respect for diversity* should be threaded throughout the entire measure (e.g., multiculturalism integrated into *shared vision* and *academics*; see Chang & Le, 2010), mainly to avoid leading questions and reduce social desirability bias (i.e., "faking good"; see Lounsbury et al., 2006, p. 127).

While the literature described *discipline and order* as an important dimension of the *safety* domain, participants clearly preferred the term *behavior management*. Guided by applicable literature on treating students equitably when they misbehave (e.g., see Smith et al., 2017), items were developed to focus on assessing evidence-based behavior management strategies, such as conflict resolution, clarity, fairness, and consistency of rules. Also guided by both the literature and community partners' feedback, a *restorative justice* dimension was added within the *safety* domain. As one example of resultant revisions to the measure, the following item was added: "Schools should handle conflict and discipline in ways that are inclusionary (i.e., help students find their way back in), rather than exclusionary (i.e., suspension)." In addition, after much discussion among partners, two originally separate dimensions were combined into one *physical and social-emotional safety* dimension based on the assumption that physical and social-emotional safety would be too highly correlated to warrant a distinction. The present study was designed to test this assumption (see section 4.2 Limitations and Future Directions).

While the literature described *history of the school* as an important dimension of the

shared vision domain, participants clearly preferred *school pride* as a related replacement. Logical arguments for this revision included principals and CIS-CM leadership recognizing a potential limitation of the measure to not capture the real, essential element of school environment (i.e., *school pride*) in brand new or relatively newer schools because of too much emphasis on history. They argued that *school pride* could be cultivated in newer schools and focusing on *school pride* has greater utility to inform school improvement efforts. Additional changes within the *shared vision* domain included reorganizing *values and beliefs of the organization* and *rituals and ceremonies* items to include those within other, existing areas of the measure (e.g., within the *academics* domain and *school pride* dimension). The present study's factor analysis tested these assumptions regarding whether or not those dimensions should be parsed out as standalone concepts. From the standpoint of this effort's potential application, the inclusion and focus on fewer dimensions may be viewed more favorably by principals so they can more easily make connections between specific practices (e.g., supports and interventions) and essential elements of the school environment. In addition, fewer dimensions would also likely yield fewer items (i.e., because redundant items can be removed within each dimension), which would reduce survey completion time and likely increase teacher participation rates.

Within the *physical environment* domain, the most significant revision was omitting the *structural organization* dimension. CMS focus group participants felt strongly that items assessing this dimension should not be included on this School Environment Survey. As examples of the resultant changes, the following items were removed from the measure: "Students would do better academically if the school-wide student to teacher ratio improved; there are too few non-instructional staff and/or teaching assistants to meet current students' needs; and I would be a more effective teacher if there were fewer students in my class." Data

that researchers considered before removing these items included the fact that *structural organization* was never chosen by teachers or noninstructional staff as an essential element to include in the measure and was only mentioned once as a side note during a noninstructional staff focus group and once by a teacher who expressed the importance of having a "well organized" school. That comment was coded as the teacher's interpretation of *structural organization* even though the concepts in the literature are seemingly unrelated because they focus instead on class size, student to teacher ratio, school size, and ability tracking. CMS leadership effectively communicated that they (e.g., the Accountability Office) have other ways to measure and assess the impact of those variables, so the purpose of this measure should focus instead on capturing information that can empower schools to effect meaningful change by making improvements they have the power to enact. Finally, *availability of resources* was removed as a dimension of *physical environment* because relevant items were already included within other domains (e.g., *academics*).

Revised design and procedures. In July 2019 researchers submitted a CMS Research Application to pilot the School Environment Survey electronically and requested that all CMS elementary and middle schools be eligible to participate. The only selection criteria were that potential participants (1) were CMS teachers and (2) taught grades 3-8. Significant revisions to the study design and research procedures (e.g., reduced sample size; reduced number of schools) were mandated by a member of CMS leadership who had not participated in the project. The school system subsequently required modifications; researchers submitted a new research application in January 2020.

Researchers obtained UNCC approval from the Institutional Review Board (IRB) on February 3, 2020 and CMS's approval to begin research activities on March 10, 2020. For one

week (March 11-17, 2020), the recruitment plan was followed (e.g., CIS-CM emailed principals and teachers; distributed flyers in eligible schools). However, schools were closed on March 16, 2020 due to the COVID-19 pandemic, and CMS and CIS-CM decided to pause recruitment efforts and survey collection. During March 2020 (prior to the closure), only 28 teachers completed the survey.

Through ongoing communication among partners between April 2020 and January 2021, significant modifications were made to enable the continuation of this project during the COVID-19 pandemic. Based on ongoing discussions with community partners, substantial revisions to study design and procedures were made between August 2019 and January 2021 to adapt to the pandemic circumstance. While necessary, they also likely impacted the statistical and practical significance of findings and the utility of this project for community partners (see 4.2 Limitations and Future Directions and 4.3 Implications for Local Practice). In the end, CMS and the UNCC IRB approved the modifications and an updated start date of January 22, 2021 (see Appendix F). Between January and May 2021, 186 teachers completed the survey.

1.7 Study Overview

The following section provides an overview of this collaborative, multi-year project's broad objectives, followed by the specific aims of developing a locally-validated measure of school environment. Including and beyond the scope of this dissertation, the School Environment Project was designed to accomplish the following, broad objectives:

(1) enhance community understanding of the environmental factors that will improve student achievement;

(2) strengthen whole-school supports by providing a way to document their impact (i.e., school environment improvement); and

(3) utilize data to identify where additional supports (e.g., resources, new partnerships) may be needed for schools to improve educational equity and quality.

In view of these broad objectives, it is important to underscore that, since the project's inception in 2017, every phase of the School Environment Project has included activities aimed to enhance community understanding of the environmental factors that will improve student achievement. Schools do not exist in a vacuum; essential elements of the school environment include bidirectional interactions with the community. For example, the *partnership* dimension was defined as the degree to which parents/guardians and community members partner with teachers and schools to support students' success. This was identified consistently by stakeholders who explained, "They help students put their best self forward." In this way, partnerships shape the school environment; utilizing this measure to collect data on partnerships will enable CMS to better understand and communicate their importance. In turn, campaigns to improve community members' engagement in schools is one example of what may be an appropriate next step based on the findings regarding the association of this aspect of school environment and students' school functioning.

Regarding the second broad objective listed above, collaborators (e.g., CIS-CM) aim to strengthen whole-school supports by providing a way to document their impact (i.e., school environment improvement). Interventions are often marketed with the promise of improving school culture or climate even when schools are not measuring either construct. The linkages between interventions and student outcomes must be better understood. Implementing school-wide initiatives requires ample time and resources. A psychometrically sound school environment measure has the potential to provide insight that schools require to weigh the costs and benefits of supports and interventions.

Finally, collaborators (e.g., CMS) aim to utilize data to identify where additional supports (e.g., resources, attention) may be needed for schools to create environments that are conducive to learning for all students. From a strengths-based perspective, utilizing this measure in the future (e.g., next school year) will create opportunities for principals to present effective strategies to each other. District leaders have identified monthly meetings during which principals could choose an area of strength (i.e., domain or dimension of school environment with a high score) within their school and share their expert knowledge (i.e., why they think they are excelling in that area) so that the system's schools can learn from each other and build upon existing strengths.

1.7.1 Primary Aims

In light of the lack of conceptual clarity in the existing literature regarding school environment and related constructs (e.g., the reliance on school climate and school culture constructs without clear, agreed upon definitions), the purpose of the present study was to refine the key domains of school environment and manifest indicators of those domains. That is, given the processes employed to identify the working domains, draft initial sets of items, and reduce the likelihood of omissions that would weaken content validity (see Vogt et al., 2004), researchers predicted that teachers would report that the questions (i.e., items) on the survey were relevant in terms of what they think matters most for their students in grades 3-8 to learn in CMS. Researchers also predicted that teachers would report that the questions (i.e., items) on the survey were clear, concise, and easily understood. Furthermore, in addition to capturing what teachers think matters most, school environment scores were predicted to positively relate to students' academic achievement.

Findings will inform the ongoing development of a standard system for measuring the

overarching, higher-order construct (i.e., school environment) that has high content validity. The resulting measure of school environment will allow CMS to (a) assess annually key elements of their schools' environments that impact student outcomes, and (b) make data-driven decisions to improve learning conditions for all students in grades 3-8.

1.7.2 Research Questions

One overarching research question guided this project: Within the current boundary conditions (e.g., CMS, grades 3-8, teacher participants), to what extent is the School Environment Survey a valid and reliable tool that relates to students' academic outcomes?

To answer the overarching research question, the following sub-questions were investigated:

RQ1: To what extent do survey items reliably reflect each hypothesized domain of school environment?

RQ2: Do domain scores measure different domains (i.e., academics, community, shared vision, physical environment, and safety) or one school environment construct?

RQ3: Do dimension scores measure different dimensions within five empirically-supported domains?

RQ4: Does the current model for the school environment construct fit the data or should the model be changed to generate a better fit?

RQ5: To what extent is school environment positively associated with students' academic outcomes?

CHAPTER 2: METHOD

2.1 Participant Recruitment and Selection

CMS has six learning communities each led by a learning community superintendent (see Charlotte-Mecklenburg Schools, n.d.-c). The CMS Research Review Panel approved recruitment in 50 schools from two learning communities: Central 1 and Northwest. CIS-CM leadership emailed relevant study information and a link to the online survey in Qualtrics to the pre-approved CMS schools' principals and teachers. Participants were eligible to pilot the School Environment Survey if they met the following inclusion criteria at the time of their participation (i.e., January-May 2021): (1) employed by CMS; (2) held official job title of "teacher" or "certified substitute teacher"; (3) taught students in grades 3-8; and (4) taught in a school affiliated with the Central 1 or Northwest Learning Community.

No individual-level incentives were provided, but CIS-CM donated supplies or technology to support teaching and learning ($250 per school) to the three schools with the highest teacher completion rates (see Table 2). Of the estimated 1,264 eligible teachers, 186 (14.7%) completed the School Environment Survey. Most participants (94.1%) responded during the first eight weeks of data collection (i.e., Jan. 26, 2021-Mar. 23, 2021); an additional 11 teachers, all of whom teach at Windsor Park Elementary, participated between May 5, 2021-May 12, 2021. Of the 50 eligible schools, 31 had at least one teacher participate. Within the 27 Central 1 Learning Community schools, 127 teachers (68.3%) participated across 18 schools. Within the 23 Northwest Learning Community schools, 59 teachers (31.7%) participated across 13 schools. The number of teacher respondents from each school ranged from 1-25 (see Table 2).

Table 2

Teacher Participants' (N = 186) Reported School

School Name	*n*	% of sample
Central 1 Learning Community		
Windsor Park Elementary	25	13.4
Druid Hills Academy	19	10.2
Thomasboro Academy	17	9.1
Westerly Hills Academy	15	8.1
Barringer Academic Center	12	6.5
Merry Oaks International Academy	7	3.8
Bruns Academy	6	3.2
Nations Ford Elementary	5	2.7
Ranson Middle	4	2.2
Highland Renaissance Academy	3	1.6
Oakhurst STEAM Academy	3	1.6
Winterfield Elementary	3	1.6
Eastway Middle	2	1.1
Hickory Grove Elementary	2	1.1
Ashley Park PreK-8 School	1	0.5
Devonshire Elementary	1	0.5
First Ward Creative Arts Academy	1	0.5
Shamrock Gardens Elementary	1	0.5
Northwest Learning Community		
Paw Creek Elementary	15	8.1
Berryhill School	13	7.0
Grand Oak Elementary	7	3.8
Francis Bradley Middle	6	3.2
Whitewater Middle School	4	2.2
Mountain Island Lake Academy	3	1.6
Renaissance West STEAM Academy	3	1.6
Barnette Elementary	2	1.1
Tuckaseegee Elementary	2	1.1
Cornelius Elementary	1	0.5
Coulwood STEM Academy	1	0.5
Davidson Elementary (K-8)	1	0.5
River Oaks Academy	1	0.5

Note: The following Central 1 Learning Community schools did not have any teachers participate: Allenbrook Elementary, Briarwood Elementary, Cochrane Collegiate Academy,

Lawrence Orr Elementary, Marie G Davis IB School, Oakdale Elementary, Reid Park Academy, Statesville Road Elementary, and Walter G Byers School. The following Northwest Learning Community schools did not have any teachers participate: Bailey Middle, Hornets Nest Elementary, Huntersville Elementary, J.V. Washam Elementary, Long Creek Elementary, Torrence Creek Elementary, Trillium Springs Montessori, Whitewater Academy, Winding Springs Elementary, and Wilson STEM Academy.

Most participants (74.7%) were exclusively teaching one grade level. Only 16 teachers (8.6%) had a consistent instructional format (i.e., one that did not change) during school year 2020-2021 because they never taught in-person; these teachers consistently taught online/remote students either from their classroom or from a remote location. An additional 18 teachers never taught students in-person, but their instructional format varied throughout the school year; they taught from their school classroom and from a remote location, such as their home. Teachers' experience working at their school ranged from three months to 30 years; the mean and median durations were 5.2 (SD = 5.6) and 3.5 years, respectively. Only one participant (0.5%) was a substitute teacher. Additional teacher characteristics are presented in Table 3.

Partial responses were collected from an additional 44 participants; these data cannot be used for the following reasons: (1) two respondents did not provide consent (i.e., after reviewing the consent form); (2) three teachers stopped participating immediately after consenting; (3) ten respondents indicated that their official job title was not "teacher" or "certified substitute teacher"; (4) five respondents stopped participating after answering the first two eligibility questions; (5) four respondents indicated that they do not teach students in grades 3-8; (6) four respondents indicated that they do not work in one of the two eligible learning communities, and an additional four respondents thought they did but then after reviewing a list of the eligible schools responded that they do not currently teach in any of those schools; (7) one respondent stopped participating immediately after choosing the name of their school; (8) five respondents

stopped participating before viewing any of the School Environment Survey items; and (9) four respondents began the School Environment Survey but did not finish or submit their responses.

Table 3.

Characteristics of teacher participants (N = 186).

Variables	*n*	%
Grade Level Taught		
Only 3	41	22.0
3 & 4	2	1.1
3, 4, & 5	22	1.1
3, 4, 5, 6, 7, & 8	3	1.6
3 & 5	1	0.5
Only 4	32	17.2
4 & 5	1	0.5
Only 5	37	19.9
5, 6, 7, & 8	1	0.5
Only 6	11	5.9
6 & 7	2	1.1
6, 7, & 8	12	6.5
Only 7	8	4.3
7 & 8	3	1.6
Only 8	10	5.4
Instructional Format		
Sometimes in-person	151	81.2
Exclusively online	34	18.3
Other*	1	0.5
Experience in Current School		
<1 year	31	16.7
1-5 years	83	44.6
5-10 years	44	23.7
10-15 years	16	8.6
15-20 years	6	3.2
20+ years	6	3.2
Job Title		
Teacher	185	99.5
Certified Substitute Teacher	1	0.5

Note: 47 teachers (25.3%) taught more than one grade level during the 2020-2021 school year.
*Exclusively taught online but sometimes taught in-person students because someone else (e.g., a TA) was present in the classroom.

2.1.1 School Poverty Level

To allow for comparison between this study's sample and other research in education and psychology that uses Title I as an indicator of school poverty, this section includes Title I information. However, to be consistent with CMS Accountability Office measures and district reports (e.g., see Barnes et al., 2019), this section also includes information about schools' poverty level based on the federal, Community Eligibility Provision (CEP) program's Identified Student Percentage (ISP; 0-24.5% is Low Poverty; 25-50% is Moderate Poverty; ≥ 50.1% is High Poverty; see Barnes et al., 2019; Food Research and Action Center, 2019). The PI obtained the publicly available ISP data from the North Carolina Department of Public Instruction (see North Carolina Department of Public Instruction, 2020). Of the 31 schools included in this study (during school year 2020-2021), the five (16%) that were not Title I schools were also low-poverty schools. However, the distinction between high-poverty and Title I schools was that only half of the Title I schools were coded as High Poverty based on their ISP (≥ 50.1%). The other half of Title I schools were coded as Moderate Poverty (25-50% ISP).

The vast majority of teachers who participated in this study work in a Title I school. Of the 31 schools with at least one respondent, 26 (84%) are Title I schools. In addition, the total number of participants from the five non-Title I schools was 17, so of the 186 teachers who piloted the School Environment Survey, 169 (91%) teach in Title I schools. All five of the non-Title I schools are members of the Northwest Learning Community. The following list of non-Title I schools includes the number of teachers who participated from each school: Barnette Elementary (n = 2), Cornelius Elementary (n = 1), Davidson Elementary (n = 1), Francis Bradley

Middle (*n* = 6), and Grand Oak Elementary (*n* = 7). All of the Central 1 Learning Community schools that participated in this study are Title I schools.

Forty-four percent of teachers who participated in this study work in a high-poverty school, 47% work in a moderate-poverty school, and only 9% work in a low-poverty school. Of the 31 schools with at least one respondent, 42% were high-poverty schools, 42% were moderate-poverty schools, and 16% were low-poverty schools. Compared to all of the schools in CMS (see Barnes et al., 2019), a disproportionately high percentage of high- and moderate-poverty schools participated in this study. For more information on ISP for each school that had at least one teacher respond to the School Environment Survey, see Appendix G.

2.1.2 Racial Diversity of Students

According to CMS' 2019-2020 School Diversity Report, there were 19,851 students enrolled in the 31 schools that participated (i.e., at least one teacher from that school completed the School Environment Survey), and this sample of CMS students was disproportionately black and Hispanic (CMS, n.d.-d). For example, while 62.8% of all CMS students were Hispanic or black (26.8% and 36%, respectively), within the sample of participating schools, 75% were Hispanic or black (32% and 43%, respectively). Moreover, while 26% of all CMS students were white, within all five of the low-poverty, non-Title I schools, students were disproportionately white (ranging from 39% - 73% of enrolled students per school). Of the 26 moderate- or high-poverty, Title I schools, 24 (92.3%) were also segregated by race with a disproportionately high number of Hispanic and black students (representing 70% - 97% of the school enrollment) and, in turn, within 21 (80.8%) of the moderate- or high-poverty, Title I schools, there was a disproportionately low number of white students (representing 0% - 8% of the school

enrollment). For more information on the racial composition of the student body of each school that had at least one teacher respond to the School Environment Survey, see Appendix G.

2.2 Measures

2.2.1 School Environment Survey

The version of the School Environment Survey that was piloted during school year 2020-2021 contained 131 total items. There were 104 items included for all participants, regardless of their instructional format. There were nine to 42 items within each of the five domains, yielding a total sample that ranged from 104 to 131 items for each respondent based on their instructional format. A 5-point Likert response scale was provided for all items; the anchors were "Strongly Agree, Agree, Neutral, Disagree, or Strongly Disagree". In some instances, answer choices also included, "Not enough time in-person to evaluate", and a few questions allowed participants to provide an open-ended response, but those were not required for survey completion. To review all items, see Appendix H.

At the end of the survey, two additional items were provided for response. These items, which were not mandatory for survey completion, asked teachers to rate their agreement regarding the degree to which the questions on the survey were (1) clear, concise, and easily understood and (2) relevant in terms of what they think matters most for student success (e.g., attendance, behavior, and academic outcomes). Teachers responded to these optional items using a 5-point Likert scale, ranging from strongly agree to strongly disagree.

2.2.2 Charlotte-Mecklenburg Schools Data

Following CMS Research Application guidelines, the PI consulted with members of the CMS Research Review Panel to request CMS data. Consent from parents/guardians was not required. Due to federal and local regulations (i.e., FERPA and CMS policies) regarding student

confidentiality, CMS limits the number of demographic variables that they will share without parental consent in order to keep the data de-identified. Therefore, the Research Team only requested two demographic variables (the maximum permitted): student grade level and current school. Per the data request, "current" refers to the last possible date of Winter MAP testing, which was Feb. 12, 2021.

CMS shared de-identified data related to student attendance, behavioral, and academic outcomes. Because of pandemic-related complications, attendance and behavioral data were excluded from the present study. For example, according to the CMS data analyst who pulled the data, the number of suspensions were too low, relative to prior school years, to trust the validity of these data. Data related to academic outcomes, which were included in the present study (i.e., see data analysis plan below), include literacy and math Measures of Academic Progress (MAP; Northwest Evaluation Association (NWEA), n.d.) scores for students in grades 3-8. MAP Reading and Math are computer adaptive tests created by the Northwest Evaluation Association (NWEA) that aim to provide teachers with information to help them deliver appropriate content for each student and determine each student's academic growth over time (NWEA, 2014). Rasch Unit (RIT) scores were reported that reflect students' academic knowledge, skills, and abilities on a stable, equal-interval scale. Therefore, a positive change of 10 RIT points on a MAP Reading or Math test indicates the same amount of growth in reading or math ability, regardless of grade level or age of the student, so scores can be compared over time to assess how much growth a student has made (NWEA, 2014). Continuous RIT scores were reported in Fall and Winter for both school years (2019-2020 and 2020-2021). Additional indicators were included in the data shared by CMS, including achievement percentile scores. See Appendix I for a detailed list of the requested variables.

2.3 Procedures

The School Environment Survey was piloted in schools within two CMS learning communities—Central 1 and Northwest—with teachers in grades 3-8. Teachers were asked to spend approximately 25 minutes completing one online survey at their convenience. Teachers accessed and completed the survey online using an anonymous link or QR code generated by the PI's UNCC Qualtrics account. Teachers were not asked their name or email address, and their IP address was not collected. Because the link was anonymous, teachers were instructed to complete the survey in one sitting because their work was not saved until the very end when they hit "submit". Participants had access to the online survey and submitted their responses between Jan. 26, 2021 and May 12, 2021.

The survey began with the consent form; in order to continue to the items, participants were required to provide consent. If teachers consented, by clicking "Yes, I agree", their participation continued immediately. They were asked closed-ended questions about the CMS school in which they currently work, and they were asked to answer all questions from the perspective of their current position teaching students in grades 3-8. Appendix H includes everything participants viewed in Qualtrics (i.e., the consent form, directions, full list of questions, items, and response choices).

2.4 Analytic Approach

One overarching research question guided this project: Within the current boundary conditions (e.g., CMS, grades 3-8, teacher participants), to what extent is the School Environment Survey a valid and reliable tool that relates to students' academic outcomes? The intent was to specify a *reflective* indicator measurement model (i.e., rather than *formative*), because the PI believes the items denote a theoretical construct – school environment (see

Hanafiah, 2020; MacKenzie, 2003). This decision was guided by the existent literature on school and classroom environment surveys (e.g., Schweig, 2014) and the conceptualization of school environment as a *category of constructs* that reflect the surroundings or conditions in which people operate in school. According to MacKenzie (2003), when a measure is *reflective* of the underlying construct, the indicators are viewed as manifestations of the construct, changes in the construct are expected to cause changes in the indicators, and the indicators share a common theme (i.e., school environment).

2.4.1 Research Questions 1-4

Data that were collected by piloting the School Environment Survey in January-May 2021 were empirically examined at multiple levels – e.g., individual items, dimensions (i.e., common themes), domains (i.e., broader themes; aka factors), and overall model – to answer the study's first four research questions:

RQ1: To what extent do survey items reliably reflect each hypothesized domain of school environment?

RQ2: Do domain scores measure different domains (i.e., academics, community, shared vision, physical environment, and safety) or one school environment construct?

RQ3: Do dimension scores measure different dimensions within five empirically-supported domains?

RQ4: Does the hypothesized model for the school environment construct fit the data or should the model be changed to generate a better fit?

Classical Test Theory item analyses were conducted to better understand the strengths and weaknesses of each item on the measure (see DeVellis, 2012, 2016). Classical Test Theory provides a foundation for evaluating measurement properties (i.e., reliability and validity); the

quality of items must be scrutinized in terms of their performance based on the data, a necessary first step in scale development that aligns with the overall research objective (Crocker & Algina, 1986; DeVellis, 2016). Prior to entering items into the exploratory factor analysis (EFA), the following Classical Test Theory item analyses were conducted to evaluate the functioning of each item: item endorsement rates (i.e., item means), item variability (i.e., the standard deviation of each item), and item discrimination (i.e., corrected item-total correlations for each item). Item-total correlations were computed to judge internal consistency. The correlation matrix was visually inspected to remove items with several coefficients below 0.30 because when correlations among variables are too small, "it is unlikely that the matrix will give rise to sensible common factors" (DiLalla & Dollinger, 2006, p. 250; see also Boateng et al., 2018; Watkins, 2021).

EFA was used to provide a better understanding of the factor structure of the items on the piloted School Environment Survey. The PI used a combination of Kaiser's Eigen rule (i.e., the number of potential factors with an eigenvalue of 1.0 or higher), Catell's Scree Test (i.e., the number of factors corresponding with the "elbow" of the scree chart), and the percent of variance explained by each factor structure to determine the number of factors (i.e., domains of school environment; see RQ2). While there were decisions that required the PI's judgment – and, in turn, different researchers might have interpreted these EFA results differently – the PI followed predetermined guidelines for interpreting the data (see Whitley & Kite, 2013). First, factors with eigenvalues greater than one were interpreted as likely important enough to include because of the amount of variance in the items (i.e., variables being analyzed) that was accounted for by that factor (Whitley & Kite, 2013). The scree plot's utility is related because sometimes there are factors with eigenvalues greater than 1 that are not necessary to include (Whitley & Kite, 2013).

Because parsimony is a goal of EFA, the scree plot helped the PI to determine the appropriate number of factors to extract. The PI interpreted the point at which the plot sharply declined and then leveled off (i.e., the "elbow") as the optimal number of factors to extract based on the data (see Whitley & Kite, 2013).

Factor analysis helped the PI answer the first four research questions by determining how many factors (i.e., domains) were needed and by condensing the information as much as possible by retaining a smaller number of variables that could explain a meaningful proportion (i.e., at least 50%) of the observed variance (see DeVellis, 2012). Thus, in an iterative process, every time one or more items were removed, another round of EFA was conducted. The PI expected and found that "as with item-scale correlations, items with the lowest squared multiple correlations [were] the prime candidates for exclusion…A poor item-scale correlation [was] typically accompanied by a low squared multiple correlation" (DeVellis, 2012, p. 113). The squared multiple correlation for each item is an estimate of the item's *communality*, which "SPSS…obtained by regressing the item on all the remaining items" (DeVellis, 2012, p. 112). Therefore, communalities were also checked at the beginning of every round of EFA (i.e., following item removal).

While all of the results for the analyses described in this section were applicable to answering all four of the aforementioned research questions, answering the fourth research question most heavily depended on achieving a simple structure. Eliminating at least some of the developing measure's items was important, per CMS' request to reduce burden on teachers and increase completion rate. To this end, coefficients in both pattern and structure matrices were considered to eliminate irrelevant items (see Kahn, 2006), while ensuring the factors had been

named appropriately and reducing the likelihood of accepting anomalous results (Watkins, 2021).

Because factors were correlated, the coefficients in the pattern and structure matrices did not match but each served a specific purpose. Pattern matrix coefficients indicate the relationship between variables (i.e., items) and each factor that accounts for the factor intercorrelation while controlling for the other factors (Kahn, 2006). Conversely, structure matrix coefficients can be interpreted as correlation coefficients between responses to an item and the factor on which that item loaded, but quantitative indicators of the relationship between the item and that factor may be much lower when controlling for another factor. “In fact, EFA can be conceptualized as a multivariate multiple regression method where the factor serves as a predictor and the measured variables serve as criteria…Pattern coefficients are regression-like weights” (Watkins, 2021, p. 4, 93).

Therefore, the pattern matrix was examined to understand how many clearly defined factors were underlying the variables, how many variables (i.e., items) were saliently loading (e.g., at 0.45 or above; see Morin et al., 2020; Whitley & Kite, 2013) on each factor, and how many variables were cross-loading on more than one factor (i.e., nontrivial factor loadings on multiple variables; see Finch, 2019). Specifically, items were considered to be cross-loading if their factor loadings exceeded 0.30 in absolute value on more than one factor and if the difference between their two strongest factor loadings was less than 0.30 in absolute value (see Finch, 2019; Whitley & Kite, 2013). Even though pattern coefficients and factor intercorrelations “should receive primary attention during the model evaluation process” (Watkins, 2021, p. 93), and researchers typically focus on the pattern matrix results (aka the rotated loading matrix; see Baglin, 2014), the structure coefficients have been described as “more appropriate for naming

factors" (Kahn, 2006, p. 699). As such, structure coefficients were weighted more heavily when naming factors, and the PI examined the items that hung together, used knowledge of the literature, and employed her best judgment to determine the common concepts (see Whitely & Kite, 2013). One of the statistical indicators used to evaluate the success of such judgments was the reliability coefficient, alpha (DeVellis, 2012); specifically, Cronbach's alpha, a widely used and reported measure of internal consistency (Whitley & Kite, 2013), was reported for the overall scale and for each of the subscales. While there are no "absolute rules", higher reliability coefficients indicate better reliability, and the PI followed Whitley and Kite's (2013) standards for reliability (e.g., minimum internal consistency coefficient of .70). The computed alphas were also assessed to ensure there were no remaining items that should be considered for removal (i.e., by examining possible improvements in the reliability of the scale if a given item were removed).

The model with the cleanest (i.e., simplest) factor structure that was both sound conceptually and accounted for a high percentage of total variance was chosen for subsequent analyses. Additional EFA model-fitting decisions that were guided by the data are explained below within the context of results (e.g., Maximum likelihood and Promax rotation).

2.4.2 Research Question 5

Data that were shared by CMS were used to evaluate concurrent criterion validity. Specifically, school environment scores were hypothesized to positively relate to typically utilized indicators of academic performance (i.e., MAP Reading and Math scores). Thus, the following question was posed:

RQ5: To what extent is school environment positively associated with students' academic outcomes?

In consultation with CMS, students' MAP Reading and Math achievement percentile scores were selected as the outcomes of interest, and it was determined that changes in the percentile score over time (i.e., Fall 2020 to Winter 2021) would yield the greatest value because of its practical utility to CMS. Marion (2021) explained NWEA's calculation of achievement percentile scores:

> This number indicates the percentage of students in the NWEA norm group for a test and grade that a student's RIT score equaled or exceeded. The achievement percentile is a normative statistic that indicates how well a student performed in comparison to similar students in the norm group. A student's achievement percentile indicates that the student scored as well as or better than the percent of students in the norm group. In other words, a student with a percentile rank of 72 scored as well as or better than 72% of comparable students in the norm group. (para. 7-8)

Correlational analyses were run at the school-level (i.e., school was the unit of analysis) to assess the relationships among school environment (i.e., each school's average school environment total score and average domain scores) and students' MAP Reading and Math achievement (i.e., within school, average change in Fall 2020 to Winter 2021 percentile scores). It would not have been appropriate to run correlations using a combination of school-level results (from the School Environment Survey) and individual students' academic outcome change scores because "unless the correlations between the variables being studied are the same for all groups and all groups have the same mean scores on the variables, the correlation of the combined group will not accurately reflect the subgroup correlations" (Whitely & Kite, 2013, p. 316). Therefore, a new dataset was created so that every case (i.e., row) represented one school. Using the other datasets (i.e., School Environment Survey and CMS data), the PI ran descriptive

statistics, computed mean scores, and then entered the following variables and data into the newly created dataset in SPSS: school ID and name; sample size of teachers who completed the School Environment Survey and each school's estimated response rate (i.e., two variables; raw data and percentage); each school's mean School Environment score as well as the mean scores within each domain (i.e., four variables, including the school environment total score and *academics, shared vision,* and *safety* scores; findings related to the identification of these domain scores are described below in section 3.2 Item Analyses and Exploratory Factor Analysis Results); each school's average change in their students' Fall 2020 to Winter 2021 MAP percentile scores for both reading and math achievement (i.e., two variables); and each school's student sample sizes (i.e., two variables; one per subject area to reflect the number of students within each school who completed both reading assessments and both math assessments). See Appendix J for that dataset.

Of the participating 31 schools (i.e., those that had at least one teacher respond to the School Environment Survey), nine were included in this new dataset. Originally (e.g., as documented in the UNCC IRB and CMS Research Applications), the community partners and the PI had agreed to set the minimum response rate at 10 teachers per school as a participation requirement for each school to be included in all aspects of this study. On the consent form, for example, the PI stated that if fewer than 10 teachers from that school participated, then school-level results would not be analyzed or reported. The PI determined that lowering that threshold from 10 to seven teachers per school was a reasonable decision within the context of lower-than-expected response rates within some schools (likely due to the COVID-19 pandemic).

Two main factors informed that decision. First, doing so increased the included schools from seven to nine and, within the nine included schools, the estimated percentage of eligible

teachers within each school who completed the School Environment Survey ranged from 26% to 96%. To consider those response rates in context of the larger sample, the PI investigated cutoffs other than seven as well. For example, if the response rate threshold were lowered to three teachers, rather than seven, the response rates would be drastically reduced (e.g., the minimum response rate would be lowered from 26% to 6%). The PI decided that in order to be reasonably confident that a given school's mean score represented school-wide experiences, school-level results should not be generated using a sample with such a low percentage (e.g., 6%) of teachers represented in some schools. The PI determined that the combination of at least seven responses and an estimated response rate of 26% reflected acceptable minimums. Second, after calculating the grade-level distributions of both teachers and students represented within each school (i.e., by School Environment Survey responses and MAP scores), the PI determined that each sample of teachers, within those nine schools, appeared to represent the school population well enough to include each school in these analyses. Of note, eight of nine schools had respondents who teach students across every grade level offered in that school; the ninth school's respondent teachers instructed students in two of the school's three grade levels that were eligible for inclusion in this study (i.e., grades 3 and 4, but not grade 5; see Appendix K).

If the original plan of retaining schools with ten or more teachers had been followed, the resultant sample size would have been seven schools. By making a data-guided decision to retain schools that had seven or more teachers complete the School Environment Survey, the sample size for these analyses was slightly larger (i.e., nine instead of seven schools; 28.6% increase in sample size). Within this group of nine schools, there were 130 participating teachers (i.e., their responses were used to calculate their school's average School Environment scores) and 2,666

students in grades 3-8 (i.e., their MAP Math and Reading scores were used to calculate their school's average change in Fall 2020 to Winter 2021 percentile scores).

2.4.3 Overarching Research Question: To what extent is the School Environment Survey a reliable and valid tool that relates to student academic outcomes?

In addition to the analyses described above, the PI determined that the relative consistency in ratings provided by multiple teachers (i.e., interrater reliability) within each school that had seven or more respondents and an overall estimate of the reliability of schools' mean ratings (i.e., intraclass correlations) would provide important evidence to help answer the overarching research question: Within the current boundary conditions (e.g., CMS, grades 3-8, teacher participants), to what extent is the School Environment Survey a valid and reliable tool that relates to students' academic outcomes?

A common approach to validating a measurement model, different forms of the intraclass correlation coefficient (e.g., *ICC(1), ICC(2),* and *ICC(K)*) estimates have theoretical (e.g., establishment of construct validity) and practical utility (e.g., detecting emergent phenomena that manifest at higher levels, such as school environment; see Bliese, 2000; LeBreton & Senter, 2008; Shrout & Fleiss, 1979).

> The degree of clustering, (i.e., the degree of correlation or nonindependence among a set of observations), is measured by the *intraclass correlation* (ICC; Shrout & Fleiss, 1979). The ICC measures the proportion of the total variance of a variable that is accounted for by the clustering (group membership) of the cases. (Cohen et al., 2003, p. 537)

Because CMS may intend to use the School Environment Survey to understand systematic differences between schools, it was important to test the extent to which teachers' ratings of their

school environment within the same school were more similar to one another than to teachers' ratings from other schools; the ICC results provided that insight.

Similar to other methods of capturing reliability, the ICC is "based on a comparison of some estimate of true score variance with total variance" (DeVellis, 2012, p. 33). *Perfect* agreement was not an appropriate criterion for assessing interrater agreement within schools (see Shrout & Fleiss, 1979). Rather, teachers ratings could be seen as reflecting reliable judgments without specific and total alignment (see, e.g., DeVellis, 2012) because of the nature of the construct (e.g., two individuals do not typically perceive or experience the same school environment in exactly the same way) and the content of the items (e.g., teachers reported their individual thoughts, feelings, and behaviors, such as "I feel like I am alone…" or "I teach character development"). Thus, Cronbach's alpha was chosen to determine the extent to which teachers generated scores that corresponded with other teachers' scores within the same school (see DeVellis, 2012).

Using SPSS, the PI created one dataset per school (for the nine schools that had a minimum of seven teachers respond to the School Environment Survey) and transformed the data so that each teacher became a "variable" (i.e., a column rather than a row; labeled Teacher_1, Teacher_2, Teacher_3, etc.) and each survey item became a "case" (i.e., a row rather than a column) so that the dataset contained every teacher's rating of every survey item. Next, one reliability analysis per school was run to generate the ICC (i.e., Cronbach's alpha). The PI specified a Two-Way Mixed model because the raters were consistent within each school (i.e., every teacher responded to every School Environment Survey item) and there was a sample of raters (i.e., approximately 25% or more teachers represented), rather than the entire population of

teachers within each school. In SPSS, the consistency definition of ICC and therefore, the following formula (see de Vet et al., 2017), generated the results:

$$\text{Cronbach's alpha} = \text{ICC}_{\text{consistency}} = \frac{\sigma^2_p}{\sigma^2_p + \sigma^2_{\text{residual}}/k},$$

where σ^2_p is the variance due to the differences between persons (i.e., teachers), $\sigma^2_{\text{residual}}$ is the error variance, and k is the number of raters (i.e., teachers). This version of ICC is commonly referred to as *ICC(2)*.

Finally, using SPSS, the PI created another dataset that restructured all applicable data (i.e., computing teachers' mean ratings of 25 School Environment Survey items, representing the nine schools with seven or more teacher respondents) so that each school was a case/target (i.e., row of that school's mean item scores) and each survey item was a variable (i.e., column). Both *ICC(1)* and *ICC(K)* were estimated in SPSS. More specifically, calculations reflect the following formulas (see Bliese, 2000; Cohen et al., 2003; LeBreton & Senter, 2008; McGraw & Wong, 1996; Shrout & Fleiss, 1979):

$$ICC(1) = \frac{MS_R - MS_W}{MS_R + (K-1)\,MS_W},$$

"where MS_R is the mean squares for rows (i.e., targets) and MS_W is the mean square within calculated from a one-way random effects ANOVA and K refers to the number of observations (e.g., ratings or judges) per target" (LeBreton & Senter, 2008, p. 822-823) and

$$ICC(K) = \frac{MS_R - MS_W}{MS_R},$$

"where K refers to the number of judges, MS_R is the mean squares for rows (i.e., targets), and MS_W is the mean square within calculated from a one-way random effects ANOVA" (LeBreton & Senter, 2008, p. 824).

CHAPTER 3: RESULTS

3.1 Preliminary Analyses

The following section describes reverse scoring and data cleaning procedures that were necessary to conduct the planned statistical tests and yield interpretable results.

3.1.1 Reverse Scoring

Both positively and negatively worded items were included in the School Environment Survey. Higher scores should indicate a more favorable school environment (e.g., positively related to academic success). Therefore, using IBM SPSS Version 27, the 32 negatively worded item scores were reversed (i.e., recoded) so that a high score reflected a positive feature for all items. For example, if the participant strongly agreed in response to the item, "The school rarely shares positive information with parents/guardians about their children", the initial response was coded as a five. Because sharing such positive information was hypothesized to reflect a favorable school environment, this response was recoded from a five to a one. For each of the 32 negatively worded items, responses of five were changed to one, four to two, and so forth (i.e., 5=1, 4=2, 2=4, 1=5). Frequencies were run pre- and post-recoding and compared to ensure there were no reverse-scoring errors.

In the generation of items, negatively worded items were included to address the potential distortion in responses arising from acquiescence (i.e., directional bias) or agreement bias (i.e., the tendency to agree with items regardless of content); however, since piloting the measure, the researcher has become aware that while the inclusion of such items used to be standard procedure, these concerns may be outdated and unwarranted (see Baumgartner & Steenkamp, 2001; Herche & Engelland, 1996). Nevertheless, according to Jordan and Troth (2020):

> Although there is a debate over the use of negatively worded items in scale construction…it is clear that using reverse coded items can break the patterns established by CMB [common method bias] and require participants to focus on the actual questions being asked. (p. 8)

3.1.2 Data cleaning

Data Shared by CMS. In the original, Excel spreadsheet shared by CMS, because *school year* was a variable, there were multiple rows per student. First, the PI created two Excel spreadsheets (one per school year with one row per student) by saving two identical (complete) spreadsheets and then deleting the rows containing the nonapplicable year from each one. To avoid confusion, the PI renamed all of the variables by adding the school year (i.e., "1920" for school year 2019-2020 or "2021" for school year 2020-2021) to the end of each variable. Each spreadsheet was then sorted by the students' research ID. Next, the PI imported the school year 2020-2021 data into IBM SPSS Version 27.

Using SPSS, cases (i.e., students) were removed if they did not meet the following inclusion criteria: assigned a unique student ID (e.g., 151,286 valid and one missing) and enrolled in grades 3-8 during school year 2020-2021 (e.g., 69,395 were retained; 81,892 students in other grade levels were removed). Cases (i.e., students) were excluded from analyses if either the Fall or Winter MAP score was missing. Two change scores per student were calculated (i.e., each student's math percentile change and reading percentile change). For the math academic outcome variable (i.e., MAP Math tests), because 19,559 students had one or more missing tests (i.e., Fall or Winter), 49,836 students had a valid percentile change score. For the reading academic outcome variable (i.e., MAP Reading tests), because 20,319 students had one or more missing tests (i.e., Fall or Winter), 49,076 students had a valid percentile change score. Due to

federal and local regulations (for more information, see section 2.2.2 Charlotte-Mecklenburg Schools Data), the only demographic variables requested for this study were student grade level and current school (only two such variables were allowable, and those two were critical to the study's analyses); thus, it was not possible to assess whether the groups of students with missing tests were systematically, meaningfully different compared to the groups of students that were retained in this sample. Within the groups that did not have any missing test scores, students' school entry dates were checked to ensure that the students who would be included in school-level analyses had attended their current school for a long enough duration to reasonably conclude *that* school's environment could have affected their learning. Within the group of students with valid math percentile change scores, 99.5% of students had been enrolled in their current school since Sep. 1, 2020 (through Feb. 12, 2021) and the latest entry date was Oct. 8, 2020. Within the group of students with valid reading percentile change scores, 99.6% of students had been enrolled in their current school since Sep. 1, 2020 (through Feb. 12, 2021) and the latest entry date was Oct. 9, 2020. The PI determined that no additional students needed to be excluded [i.e., it is extremely unlikely that results (e.g., correlation coefficients representing the associations between School Environment indicators and MAP change scores) would change if those 0.5% and 0.4% of students who were not enrolled for the entire school year were excluded, so this study need not exclude transfer students from its sample].

School Environment Survey. Consistent with the recommendations of Watkins (2021), the treatment of missing data was determined by the reason the data were missing. As a summary, Figure 1 outlines each procedural step for handling missing data. Initially, the dataset included 186 cases (i.e., teachers) and a maximum of 131 survey item responses per teacher. All 186 participants responded to 105 items, and their ratings ranged from Strongly Agree (5) to

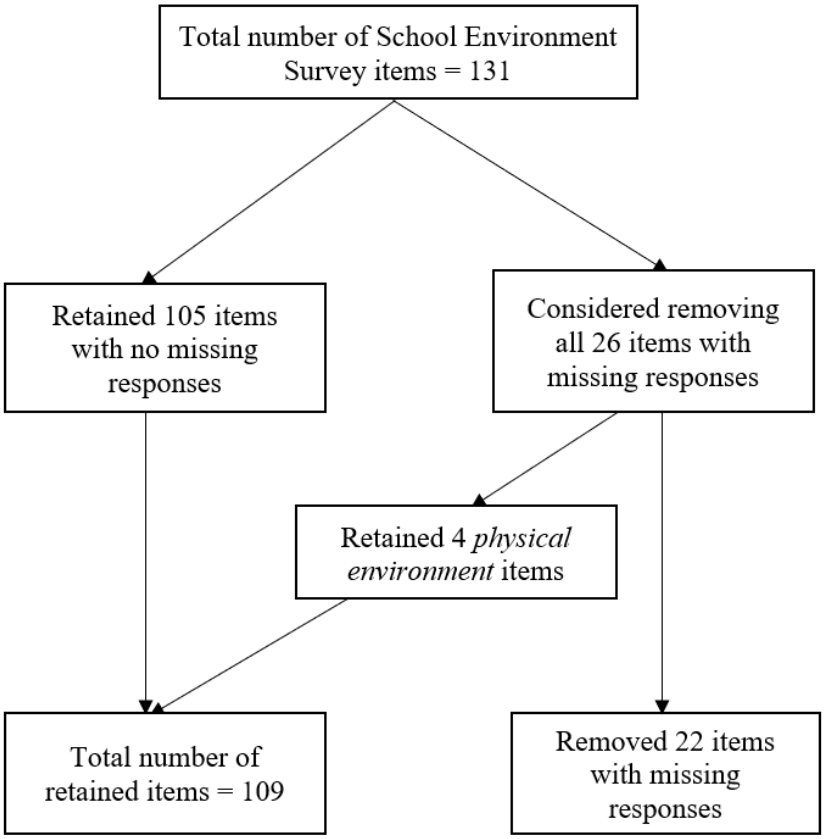
Strongly Disagree (1) on a 5-point Likert scale, which means for those 105 items there were no missing data. There were 26 items with missing data because nine or more teachers did not rate those items. The number of missing responses to each of the 26 items with missing data ranged from 9 to 50 (26.9% of respondents) because of a combination of Qualtrics logic (i.e., teachers were not prompted to respond to items that they could not rate because of their teaching format) and the response option, "Not enough time in-person to evaluate", which was provided for 24 total items (see Appendix H for more information, such as for which items this additional response choice was provided). If all cases (i.e., teacher respondents) with missing data had been excluded, the sample size would have decreased from 186 to 77 teachers. Because that sample size would not be adequate to validate a measure (see DeVellis, 2016) and would compromise the planned approach to analysis, the pattern of missing item responses that emerged from frequencies was used to determine that removing items was a better option than removing cases (i.e., teachers) initially.

Unfortunately, all eight of the items developed to capture the *physical environment* domain included missing cases (i.e., there were no *physical environment* items that all 186 teachers rated). This was considered "missing not at random" (Watkins, 2021, p. 54) because the missing data were related to the reason they were missing; teachers who had not spent enough time in-person did not respond to items pertaining to the school's physical environment. Because the inclusion of *physical environment* items was supported by both stakeholders (e.g., interview and focus group results) and the literature, the four items with the fewest missing responses (ranging from 9 to 12) were retained. The other four *physical environment* items, for which missing data ranged from 18 to 25 responses, were removed (see Figure 1 below).

Therefore, 109 items were included in the initial EFA. Because other approaches (e.g., pairwise deletion) can cause "statistical problems that create inadmissible EFA results" (Watkins, 2021, p. 54), listwise deletion was chosen to remove any remaining cases (i.e., teachers) with missing data within the School Environment Survey set of 109 items. After 17 cases with missing data were removed, the remaining sample size was 169 teachers. However, the listing of this specific subsample of teachers was excluded from Figure 1 (see below) because after multiple rounds of EFA were conducted, it became clear that none of the *physical environment* items had performed well enough to be included in the final model. Thus, the sample for the final EFA included all 186 teachers. The following section provides a detailed overview of this data-driven decision.

Figure 1

Study's Procedural Steps for Handling Missing Data



To understand the distributional characteristics of the items to be included in the EFA, skewness and kurtosis were checked. Based on the guideline of skew greater than 2.0 and kurtosis greater than 7.0 indicating severe univariate nonnormality (Curran et al., 1996; see also Watkins, 2021), these descriptive statistics indicated that most items were relatively normally distributed. For all items, skew was less than 1.0. Kurtosis was less than 2.0 for 94 items (85.2%) and ranged between 2.15 and 4.31 for the remaining 15 items. The PI interpreted these descriptive findings to suggest that variable distributions were not a concern (see Watkins, 2021).

3.2 Item Analyses and Exploratory Factor Analysis Results

Based on item endorsement rates (i.e., item means), item variability (i.e., the standard deviation of each item), and item discrimination (i.e., corrected item-total correlations for each item), 18 items were flagged for potential deletion, but none were removed prior to conducting the initial EFA because all items were deemed to be functioning at a high enough level to be included. As planned, this decision was made conservatively so that the vast majority of items that were piloted with teachers in 2021 (109 of 131; 83%) would be included in the EFA (see Figure 1 above). For a list of all 22 items that were never included in an EFA, see Appendix L.

The following section details both the item analyses and EFA results to describe and further explain the iterative process that was utilized to generate answers to this study's first four research questions. A summary of each answer is provided at the end of this section. All results (e.g., item statistics) for retained items are also provided in tables at the end of this section (see Tables 4-9); for a list of all items and criteria used for final retention decisions, see Appendix L.

When utilizing a five-point Likert scale, because mean values around 3.0 are typically expected for moderately endorsed items, and standard deviations around 1.0 are considered

acceptable (Crocker & Algina, 1986), the item means were interpreted as moderate to high (between 2.46 to 4.53 on the five-point scale). These results suggest the possibility of ceiling effects, but nothing absolute and no apparent coding errors (see DeVellis, 2016; Gravetter & Forzano, 2016). Consequently, seven items with a clustering of scores at the high end (i.e., these items' mean scores ranged from 4.28 to 4.53 and individual responses to these items ranged from 3 to 5) were flagged for potential deletion. Because items with means too near to an extreme of the response range will have low variances (DeVellis, 2016), it was unsurprising that these seven items also had low variance (ranging from 0.51 to 0.60).

An additional 11 items were flagged for potential deletion because of corrected item-total correlations below 0.3. Item-total correlations were computed because each item should correlate with the collection of remaining items (DeVellis, 2016). A judgment of good internal consistency was determined using conventional guidelines for interpreting the strength of a correlation, so 0.3 and 0.5 were interpreted as reflecting medium and large associations, respectively (see Cohen et al., 2003; Gravetter & Forzano, 2016). While stronger correlations are typically more desirable (DeVellis, 2016), overly high item-total correlations – above 0.9 – are problematic as well, suggesting an item has too much overlap with other items on the scale (see Whitley & Kite, 2013). Results indicated that all items discriminated well because all corrected item-total correlations were below 0.8 (see Humble, 2020; Whitley & Kite, 2013).

Corrected alphas were calculated to demonstrate the reliability of the scale if a given item were to be removed. All reliability coefficients were between .94 and .95, which is considered very good or excellent, depending on the source, but also an indication that "one should consider shortening the scale…[because] the researcher has 'reliability to spare'" (DeVellis, 2016, p. 145-146; Watkins, 2021). While adding more items will increase alpha and removing more will lower

it, there is a tradeoff between reliability and burden on respondents (DeVellis, 2016). While longer scales tend to be more reliable, shorter scales are preferred by respondents. After conducting an initial EFA, the PI referred back to the results of all item analyses described above to inform decisions about retaining or deleting items.

The researcher aimed to retain the best set of items that formed an interpretable, proper factor structure to answer the first four research questions. EFA results were interpreted to understand the factor structure underlying the set of items on the piloted School Environment Survey. The first set of EFAs included 109 items on the measure (see Figure 1 above). In the first analysis, the number of possible factors was not restricted, allowing SPSS to test multiple possible factor structures. Extracting the optimal number of factors was an important first step to uncover the latent structure underlying school environment. Because each unique factor should be comprised of items that strongly reflect the same domain of the underlying construct (i.e., school environment), items should share the variance to approximately the same degree.

Guided by Kaiser's Eigen rule (i.e., the number of potential factors with an eigenvalue of 1.0 or higher), Catell's Scree Test (i.e., the number of factors corresponding with the "elbow" of the scree chart), and the percent of variance explained by each factor structure, the PI determined that the likely number of factors was between two and five. Detailed results, which guided each decision, are provided below. Maximum likelihood was the model-fitting procedure chosen because the data were relatively normally distributed (e.g., skew < 2; kurtosis < 7; see Fabrigar et al., 1999; Kahn, 2006).

Based on existing theory, the PI predicted that most factors (e.g., *community* and *safety* domains) would be correlated, but some uncorrelated factors (e.g., *academics* and *safety* domains) were also possible and theoretically defensible (see Kahn, 2006; Matsunaga, 2010);

therefore, Promax rotation was chosen. An alternative to initially choosing either oblique (for correlated factors) or orthogonal (for uncorrelated factors) rotation is to use the Promax rotation because "if factors are uncorrelated, they will remain that way after rotation, but if factors are correlated, the Promax rotation will reflect that as well" (Kahn, 2006, p. 698). According to results of the EFA (e.g., factor correlation, pattern, and structure matrices), the factors were correlated; all three of the correlation coefficients were consistently, sufficiently large (e.g., > 0.4; see Finch, 2020). Therefore, oblimin extraction was also employed "to ensure stability across extraction methods" (Watkins, 2021, p. 94; also see Finch, 2020). Results were compared; the Promax and oblimin loadings were extremely similar (e.g., all loadings remained fair (0.45) or better regardless of the rotation chosen) and both yielded simple structures among the pattern loadings (see Finch, 2020; Appendix M). Because Promax rotation appears to be better suited to obtain factors/components that are maximally distinguishable (Kahn, 2006; Matsunaga, 2010), the PI chose the Promax method for the subsequent EFAs.

The primary purpose of EFA is to identify a set of latent constructs underlying the measured variables (i.e., School Environment Survey items) "to arrive at a more parsimonious conceptual understanding…by determining the number and nature of common factors needed to account for the pattern of correlations among the measured variables" (Fabrigar et al., 1999, p. 274-275). As planned, in order to determine which items should be deleted, the PI considered results from the classical item analyses (e.g., item endorsement), the communalities of each item, the loadings of each item on a factor (i.e., lambdas), and content validity. After multiple rounds of an initial EFA that included all 109 items (e.g., four models specifying two through five factors), clear content patterns for naming the factors had not emerged (i.e., interpretation of what construct underlies each factor was not possible).

After assessing a combination of theoretical meaningfulness (i.e., the hypothesized domains/dimensions; see Watkins, 2021), data quality (i.e., item analyses described above that resulted in 37 items being flagged for possible removal), and poor covariance of items within each hypothesized domain, the PI began removing items. The correlation matrix was visually inspected to remove items with several coefficients below 0.30. As a result, 16 items were removed, which reduced the number of items from 109 to 93. In addition, because factor interpretation and naming (i.e., labeling the concept common to each factor) require the researcher's judgment (Whitley & Kite, 2013), the PI decided to remove the four items intended to capture the *physical environment* domain of school environment; these items consistently cross-loaded on multiple factors and did not load saliently on any one factor. This decision reduced the number of items from 93 to 89 and increased the sample size from 169 to 186 teachers because listwise deletion was no longer necessary (i.e., the only remaining, missing responses were to *physical environment* items, so after those items were removed there were no missing data). After multiple rounds of another EFA (i.e., specifying models with two through five factors) that included 89 items, the PI determined that additional items needed to be removed in order to achieve a simple structure. Each item's squared multiple correlation was provided in SPSS. Per DeVellis (2016), items with the lowest communalities were targeted for removal – the three items with the lowest communalities, which were below 0.20, were removed (they had been flagged for possible removal already), resulting in a pool of 86 items that remained.

After multiple rounds of another EFA (e.g., four models specifying two through five factors) that included these 86 items, clear content patterns for naming the factors began to emerge. Because a simple structure had not yet been achieved, and variable elimination was still

a goal to reduce the number of items (to reduce potential burden on teachers and increase completion rate), both pattern and structure coefficients were considered to eliminate irrelevant items (see Kahn, 2006) while ensuring the factors had been "named appropriately" (Watkins, 2021, p. 93). An EFA that included 86 items and 186 teachers' responses was initially conducted with a five-factor model specified, but was re-run with four factors because a Haywood case (i.e., communality (R^2) > 1) revealed that the model had been over-identified (i.e., too many factors had been extracted based on the data; C. Reeve, personal communication, October 31, 2017). Because the *physical environment* items had already been removed, a four-factor model also made better sense conceptually; the four remaining hypothesized domains reflected by the items were *academics, safety, community,* and *shared vision.* However, it seemed likely that the model remained over-identified with four factors because the strongest four loadings on the second factor and the strongest two loadings on the third factor had been hypothesized as reflecting the *safety* domain, and *community* items had been fairly evenly distributed among the second, third, and fourth factors.

Specifying fewer (i.e., 3) factors in response to the likely over-identification of factors was not a viable option because the total variance explained was already too low (at 46%) to explain a meaningful proportion (i.e., at least 50%) of variance; therefore, the decision was made to continue to remove items to facilitate the likelihood of achieving a simple structure. The next set of items were removed based on pattern coefficients; items with loadings greater than 0.45, interpreted as "fair" (see Watkins, 2021, p. 93), were retained first. After 32 items with loadings below 0.45 were removed, 54 items remained. A four-factor model was initially chosen for the EFA that included 54 items, and although the total variance explained improved to 52%, the pattern matrix revealed that the model had been over-identified because there were no items that

saliently loaded (i.e., > 0.45) on the fourth factor. Therefore, the next EFA that included 54 items specified three factors. Communalities were evaluated; one item was removed because its extracted communality was below 0.10. No other items had communalities below 0.20, so the EFA was repeated with the remaining 53 items. The pattern matrix revealed that the model was close to achieving a simple structure; four items were still cross-loading, and six items were below the 0.45 factor loading threshold. Based on the structure matrix (i.e., strongest structure coefficients) and the fact that *community* items had continued to saliently load on multiple factors (i.e., not clustering together), the three factors were named *academics* (factor 1), *safety* (factor 2), and *shared vision* (factor 3). After the six items with loadings below 0.45 were removed, 47 items remained.

Thus, the next EFA included these 47 items, and a model with three factors was tested first. According to the pattern matrix, a simple structure was achieved. According to the Mislevy and Bock reliability estimate, which "reflects the proportion of variance in a group of items' factor score accounted for by the underlying latent variable that drives the item scores" (Baglin, 2014, p. 10), *academics* (factor 1) explained 38% of the variance, and *safety* (factor 2) and *shared vision* (factor 3) explained an additional 7.7% and 5.2% of the variance, respectively, for a total of 51% of variance explained by the model. Because the Eigenvalue for the fourth factor was three (i.e., > 1), and a fourth factor would explain an additional 3.1% of observed variance, a four-factor model was tested next. Once again, it was clear that four factors resulted in an over-identified model; for example, only one item strongly loaded on the fourth factor and that item's strongest loading was on the second factor (i.e., cross-loading). A two-factor model was tested as well, but was rejected because that model was only able to explain 46% of the variance, and

there was better conceptual support for the three-factor model (i.e., one common, underlying theme per factor).

Communalities were checked again and none were below 0.20. However, two items with communalities below 0.40 were removed based on a combination of pattern coefficients, the relative strength of structure coefficients, and interpretability. The items, which both loaded on the hypothesized *safety* factor, were, "I explain to parents/guardians where their students are academically in relation to grade level expectations" (predicted to reflect the hypothesized *community* domain) and "Teachers expect their students to meet academically rigorous goals" (predicted to reflect the hypothesized *academics* domain); conceptually, these two items do not have a reasonable or apparent connection to the *safety* domain, which was clearly underlying the rest of the items loading on this factor. In addition, although these items had "fair" (i.e., greater than 0.45) loadings on the *safety* factor, they were the two weakest loadings compared to all other items' pattern coefficients (i.e., across all three factors). Finally, according to the strength of their structure coefficients, these two items had the weakest and third weakest relations to the other *safety* items, and both items also positively related to the *academics* items, with less than a 0.20 difference between the strength of each item's relationship to *safety* and *academics* (i.e., cross-loading). Therefore, both of these items were removed from the model, which reduced the number of items from 47 to 45.

Thus, the next EFA included 45 items and a model with three factors was tested first. Communalities were evaluated; one item was removed because its extracted communality was below 0.30. No other items had communalities below 0.20.

Model 1: Three-Factor Solution with 44 Items

Thus, the next EFA included 44 items, and a model with three extracted factors was tested first. According to the pattern matrix, a simple structure was achieved. This was the first of three acceptable models (e.g., no issues with low communalities or interpretability) that achieved a simple structure (i.e., Model 1). The *physical environment* domain (i.e., all items that were hypothesized to capture those dimensions of school environment) had already been removed (see Appendix L for more information about item retention decisions); within the four remaining, hypothesized domains (i.e., *community*, *academics*, *safety*, and *shared vision*), Model 1 included at least one item per hypothesized dimension. All factor loadings were fair or better (i.e., > 0.45) and only five loadings did not meet the higher threshold of "fully satisfactory" (i.e., ≥ .50; Morin et al., 2020, p. 1052). *Academics* (factor 1) explained 39.5% of the variance, and *safety* (factor 2) and *shared vision* (factor 3) explained an additional 7.1% and 5.5% of the variance, respectively, for a total of 52.1% of variance explained by the model. The combinations of items with fair or better loadings on each factor were conceptually meaningful based on school climate and culture theory (i.e., the hypothesized domains and dimensions). In addition, reliability coefficients (i.e., individual items' and the scale's Cronbach's alpha) were high (e.g., $\alpha = .96$), which indicated that there was still "reliability to spare" (DeVellis, 2016, p. 145-146; Watkins, 2021). Because of eigenvalue results (i.e., greater than one) and a visual inspection of the scree plot (i.e., location of the elbow), models with two and four factors were also tested with the same 44 items. The four-factor model was rejected because all three of the salient loadings (i.e., ≥ .45) on the fourth factor also cross-loaded (i.e., > .3), and there were no items that loaded most strongly on this factor. The two-factor model only explained 47% of the observed variance and did not produce a simple structure (i.e., there were two cross-loading

items and two items with no salient loadings). Therefore, the EFA with three extracted factors was clearly a better fit for the data (i.e., 44 items) compared to the two- or four-factor model.

Model 2: Balanced Three-Factor Solution with 21 Items

However, because Cronbach's alpha was exceedingly high (α = .96) for the 44 items in Model 1, and parsimonious scales are preferred, the PI continued to identify items for deletion. Following scholarly and practical examples (e.g., see Lyerly & Reeve, 2015; Nathanson et al., 2013), the PI retained a "balanced" subset of seven items per factor. More specifically, the seven items with the strongest factor loadings within *academics*, *safety*, and *shared vision* were retained first. The following factors informed the PI's decision to choose seven items per factor: There were only seven items saliently loading on *shared vision* (factor 3) so reducing the other factors to seven items was the most conservative approach; it involved deleting the fewest number of items as a first step. In addition, "retaining sufficient content validity (i.e., to avoid creating measurement deficiency)" (Lyerly & Reeve, 2015, p. 49) was an important goal that seemed unlikely if fewer than seven items per factor were retained.

This "balanced" model with 21 items explained 59% of the observed variance, and another simple structure was achieved (i.e., Model 2). Three factors were extracted. *Academics* (factor 1) explained 38% of the variance, and *shared vision* (factor 2) and *safety* (factor 3) explained an additional 11% and 10% of the variance, respectively. The factor correlation matrix confirmed that the factors were positively correlated; the strengths of these relationships were medium (r = .43; factors 2 & 3) and strong [rs = .50 (factors 1 & 3) and .54 (factors 1 & 2)]. Internal consistency was excellent (α = .91), and there were no corrected item-total correlations below .30. However, even though each factor had a common theme that was interpretable and theoretical meaningful, there was both redundancy (e.g., multiple *leadership* items) and omission

of entire hypothesized dimensions that was potentially problematic (i.e., measurement deficiency and content validity issues; e.g., within *academics*, there were no remaining items from the *quality of relationships, high expectations,* or *teaching and learning* dimensions).

Model 3: Three-Factor Solution with 25 Items

Thus, the PI conducted another EFA to continue evaluating the factor structure underlying the set of items. Using Model 1 results (i.e., the 44 items that had achieved a simple structure when three factors were extracted), the PI considered both factor loadings and the breadth of content represented to determine which items to retain. Although it required a slight deviation from the seven item per factor rule, retaining nine items on factors 1 and 2 allowed the PI to improve content validity (see Lyerly & Reeve, 2015; Whitley & Kite, 2013). Twenty-five items were retained because they had relatively high factor loadings within each hypothesized dimension of school environment; items that seemed redundant were not retained.

The 25 items that were retained in Model 3 capture all fourteen of the dimensions that were hypothesized to reflect the *community*, *academics*, *safety*, and *shared vision* domains. However, each item that captures a dimension that was hypothesized as an element of *community* loaded on either the *academics* or *shared vision* factor, resulting in a three-factor solution (i.e., *academics, safety*, and *shared vision*). This means that, based on the responses of the current sample, elements of *community* cut across all of the other domains. See Table 10 for more information, including a list of each hypothesized dimension and the corresponding items that capture that dimension of school environment, organized per factor matrix results (see Tables 7 and 8).

Based on the following results, the researcher concluded that Model 3, with 25 items and three extracted factors, had the strongest combination of empirical support (see Tables 4-9 and

Figure 2 below) and conceptual meaningfulness. The minimum communality was .31 (see Table 5) and the total variance explained was 55% (see Table 6). Three factors were extracted, which achieved a simple structure. *Academics* (factor 1) explained 36.7% of the observed variance, and *safety* (factor 2) and *shared vision* (factor 3) explained an additional 9.9% and 8.1% of the observed variance, respectively (see Tables 6 and 8). Factor loadings (i.e., pattern coefficients) ranged from .47 to .94 (see Tables 7 and 8). Notably, all factor loadings were fair or better (i.e., greater than 0.45), and only three loadings did not meet the higher threshold of "fully satisfactory" (i.e., ≥ .50; Morin et al., 2020, p. 1052). All factor loadings are included in Table 7; loadings < .30 are not shown in Table 8 to better illustrate the simple structure (also see Appendix M).

To determine whether or not dimension scores measure different dimensions within these three empirically-supported domains (i.e., to answer RQ3), one EFA was conducted per domain by treating the items that loaded on that factor as if they were part of a standalone scale. In all three EFAs, based on the eigenvalue and scree plot results, only the first factor had empirical support for extraction: The eigenvalues ranged between 3.67 and 5.14 for factor 1 and between 0.72 and 0.94 for factor 2. To provide additional evidence and be certain that the second factors did not account for a meaningful amount of variance, the models were tested again with two factors extracted by conducting another round of EFAs. These three sets of EFA results (i.e., one per domain) supported the conclusion that only the first factor had empirical support for extraction. For two of the three domains – *academics* and *shared vision* – the pattern coefficients indicated that a two-factor model did not achieve a simple structure; for the *safety* domain, there was a Haywood case (revealing that the model had been over-identified) when two factors were

extracted. The following section (after Tables 4-9 and Figure 2) summarizes the results of analyses conducted for each of the first four research questions.

Table 4

Model 3: Three-Factor Solution with 25 School Environment Survey Items

Factor	Hypothesized Domain	Hypothesized Dimension	Item (Variable)
Academics			
	Academics	Leadership	In general, I do not trust the leadership team in my school. (A15)
	Academics	Leadership	Most of the time, I receive the support I need from the leadership team. (A17)
	Academics	Leadership	Teachers do not have the flexibility to do what we know we should be doing to meet our students' needs. (A26)
	Academics	Professionalism	I feel comfortable going to my leadership team for support to help me improve my teaching. (A5)
	Community	Quality of Relationships	I feel like I am alone on an island teaching my students. (C20)
	Shared Vision	Mission and Vision	In general, teachers support (i.e., "buy into") the leadership team's vision for our school. (SV6)
	Academics	Teaching and Learning	I have access to teaching materials (e.g., textbooks, online activities) that are developmentally appropriate for my students. (A27)
	Community	Communication	The leadership team encourages parents/guardians to engage in school activities (i.e., in the school or online) in meaningful ways. (C12)
	Academics	High Expectations	Our students receive the support they need to achieve their personal best. (A2)
Safety			
	Safety	Physical & Social-Emotional Safety	Students' social and emotional learning is as important as their academic learning. (S25)
	Safety	Restorative Justice	I teach my students how to repair any harm that may have occurred because of their actions. (S18)
	Safety	Physical & Social-Emotional Safety	Students are given opportunities to share their thoughts and feelings about the school. (S24)
	Safety	Restorative Justice	I teach my students how to take responsibility for their actions. (S17)
	Safety	Physical & Social-Emotional Safety	Students are encouraged to be themselves (e.g., authentic). (S23)
	Safety	Behavior Management	I teach character development. (S13)
	Safety	Behavior Management	Our students are given opportunities to learn how to regulate their own behavior. (S7)
	Community	Quality of Relationships	When school is remote/online, students know at least one adult in our school community who would miss them if they did not show up for online instruction or activities. (C32)
	Safety	Behavior Management	Our students are taught the underlying purpose(s) of school rules/procedures/behavior expectations. (S9)

Factor	Hypothesized Domain	Hypothesize Dimension	Item (Variable)
Shared Vision			
	Community	Partnership	People who live or work in the school's neighborhood and/or alumni of the school are involved in meaningful school activities (e.g., activities that reflect the mission/vision of the school). (C2)
	Shared Vision	School Pride	The school's alumni are invested in current students' academic and lifelong success. (SV1)
	Shared Vision	Stories that celebrate success	When our school is portrayed in the media (e.g., on the news) it is usually for positive reasons. (SV9)
	Shared Vision	School Pride	Most students participate in at least one school sponsored extra-curricular activity. (SV2)
	Community	Partnership	Parents/guardians and school staff (e.g., teachers, teacher assistants) work together to make the school experience better for students. (C1)
	Shared Vision	Stories that celebrate success	Students personally know and/or hear stories about successful community members (e.g., current or prior students, teachers, or administrators who are respected and productive members of society). (SV8)
	Community	Connectedness	Most students seem excited or proud to be a part of our school community. (C18)

Note. Variable labels are included for each item for the reader to reference when viewing other tables and appendices that only include variable labels (i.e., without the accompanying item).

Table 5

Model 3: Item Statistics and Communalities for the Three-Factor Solution with 25 School Environment Survey Items

Item (Variable)	*M*	95% CI	*SD*	Skewness	Kurtosis	Communalities (Extraction)
A15	3.94	[3.78, 4.09]	1.06	-1.06	.74	.65
A17	3.90	[3.75, 4.05]	1.04	-1.05	.74	.80
A26	3.52	[3.35, 3.68]	1.15	-.74	-.31	.52
A5	4.05	[3.90, 4.20]	1.05	-1.25	1.01	.56
C20	3.77	[3.61, 3.93]	1.11	-.91	.19	.55
A27	4.01	[3.87, 4.14]	.90	-1.17	1.46	.31
A2	3.87	[3.73, 4.01]	.97	-1.09	.96	.43
SV6	3.98	[3.88, 4.09]	.75	-1.00	2.39	.56
C12	4.18	[4.07, 4.28]	.73	-1.13	2.54	.49
S25	4.53	[4.44, 4.61]	.58	-.78	-.38	.52
S18	4.10	[4.01, 4.19]	.61	-.34	.82	.41
S24	4.30	[4.22, 4.39]	.59	-.52	1.14	.45
S17	4.32	[4.25, 4.40]	.53	-.11	.62	.33
S23	4.33	[4.24, 4.42]	.64	-.79	1.35	.58
S13	4.24	[4.15, 4.33]	.63	-.50	.60	.33
S7	4.19	[4.10, 4.28]	.62	-.42	.78	.39
C32	4.28	[4.18, 4.38]	.66	-.61	.32	.46
S9	4.12	[4.02, 4.22]	.69	-.86	1.73	.50
C2	3.35	[3.20, 3.51]	1.07	-.51	-.34	.67
SV1	2.96	[2.82, 3.10]	.98	-.05	-.10	.51
SV9	3.51	[3.35, 3.66]	1.05	-.42	-.27	.39
SV2	2.80	[2.67, 2.94]	.93	.21	-.25	.31
C1	3.87	[3.73, 4.00]	.91	-.99	1.09	.53
SV8	3.59	[3.44, 3.73]	.98	-.54	-.27	.43
C18	3.96	[3.83, 4.09]	.89	-.76	.26	.52

Note. N = 186 teachers. Extraction Method: Maximum Likelihood. Rotation: Promax.

Table 6

Model 3: Eigenvalues from Exploratory Factor Analysis with 25 School Environment Survey Items

	Initial Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	9.18	36.70	36.70
2	2.48	9.93	46.63
3	2.03	8.13	54.76
4	1.16	4.64	59.40
5	.99	3.95	63.35
6	.89	3.57	66.92
7	.80	3.18	70.10
8	.71	2.82	72.93
9	.64	2.55	75.48
10	.61	2.42	77.90
11	.58	2.32	80.22
12	.54	2.18	82.40
13	.54	2.15	84.55
14	.47	1.89	86.43
15	.43	1.73	88.17
16	.42	1.68	89.84
17	.38	1.53	91.38
18	.36	1.45	92.82
19	.34	1.34	94.17
20	.31	1.24	95.40
21	.31	1.22	96.63
22	.26	1.03	97.66
23	.23	.92	98.58
24	.19	.76	99.34
25	.16	.66	100.00

Note. Extraction Method: Maximum Likelihood.

Figure 2

Model 3: Scree Plot of Factor Eigenvalues from Exploratory Factor Analysis with 25 School Environment Survey Items

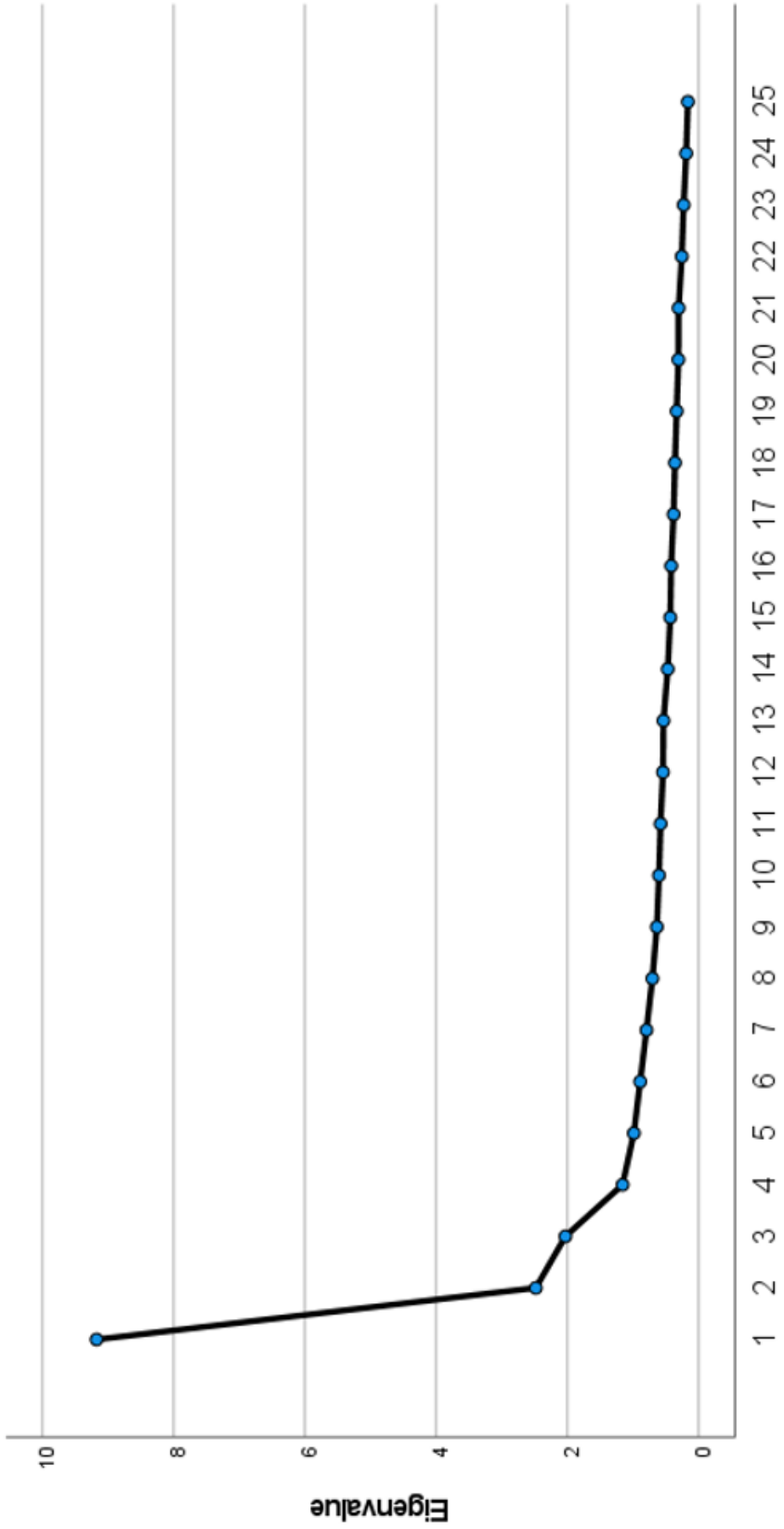


Table 7

Model 3: Pattern and Structure Coefficients for the Three-Factor Solution with 25 School Environment Survey Items After a Promax Rotation

Items	Pattern Matrix[a]			Structure Matrix		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
A17	0.94	-0.10	0.02	0.89	0.46	0.51
A15	0.89	-0.11	-0.04	0.80	0.38	0.41
A26	0.81	-0.06	-0.11	0.71	0.36	0.33
C20	0.74	0.01	-0.01	0.74	0.44	0.43
A5	0.72	-0.03	0.07	0.75	0.43	0.47
A27	0.57	0.06	-0.09	0.55	0.34	0.27
C12	0.49	0.22	0.09	0.67	0.55	0.49
A2	0.48	0.13	0.13	0.63	0.48	0.47
SV6	0.47	0.23	0.17	0.70	0.59	0.56
S25	-0.24	0.86	-0.05	0.22	0.69	0.24
S23	0.10	0.70	0.00	0.51	0.76	0.41
S24	0.04	0.66	-0.04	0.41	0.67	0.32
S18	-0.10	0.66	0.06	0.32	0.63	0.34
S7	0.14	0.62	-0.18	0.39	0.61	0.21
S13	-0.07	0.61	0.00	0.29	0.58	0.28
C32	0.00	0.61	0.12	0.43	0.67	0.43
S17	0.12	0.59	-0.23	0.33	0.55	0.14
S9	0.13	0.57	0.09	0.51	0.69	0.45
C2	-0.19	0.03	0.90	0.34	0.37	0.80
SV1	-0.08	-0.12	0.81	0.32	0.24	0.70
SV9	-0.02	-0.05	0.66	0.33	0.28	0.62
SV2	0.11	-0.25	0.59	0.31	0.11	0.53
C1	0.07	0.17	0.57	0.50	0.51	0.70
SV8	0.20	0.00	0.52	0.50	0.38	0.63
C18	0.12	0.19	0.52	0.53	0.53	0.69

Notes. Extraction Method: Maximum Likelihood.

[a.] Rotation converged in 5 iterations.

Table 8

Model 3: Exploratory Factor Analysis and Item-Total Correlations for the Three-Factor Solution with 25 School Environment Survey Items

Items	Factor 1 (Academics)	Factor 2 (Safety)	Factor 3 (Shared Vision)	r_{it}	I-T	Cronbach's α if Item Deleted
A17	.94			.84	.75	.91
A15	.89			.74	.63	.92
A26	.81			.68	.56	.92
C20	.74			.71	.64	.92
A5	.72			.68	.64	.92
A27	.57			.53	.47	.92
C12	.49			.66	.66	.92
A2	.48			.60	.62	.92
SV6	.47			.67	.72	.92
S25		.86		.61	.38	.92
S23		.70		.66	.60	.92
S24		.66		.62	.51	.92
S18		.66		.60	.46	.92
S7		.62		.59	.44	.92
S13		.61		.56	.43	.92
C32		.61		.62	.56	.92
S17		.59		.51	.38	.92
S9		.57		.65	.61	.92
C2			.90	.71	.54	.92
SV1			.81	.64	.46	.92
SV9			.66	.58	.46	.92
SV2			.59	.49	.37	.92
C1			.57	.61	.64	.92
SV8			.52	.59	.59	.92
C18			.52	.62	.65	.92
Reliability [a]	.90	.87	.85	-	-	-
% Variance[b]	36.70	9.93	8.13	-	-	-

Notes. $N = 186$. $\lambda < .30$ not shown. Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization. Rotation converged in 5 iterations.
r_{it} = corrected item-total correlation; computed using only items within factor. I-T = corrected item-total correlation; computed using all 25 items.
[a] Cronbach's α. [b] Percentage of common variance explained by factor.

Table 9

Model 3: Factor Correlation Matrix for the Three-Factor Solution with 25 School Environment Survey Items

Factor	Academics (1)	Safety (2)	Shared Vision (3)
Academics (1)	-	.54**	.55**
Safety (2)	.58	-	.43**
Shared Vision (3)	.58	.51	-

Notes. Correlations of the *factors* (from the exploratory factor analysis) are presented below the diagonal. Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.

Pearson Correlations of the *factor scores* are presented above the diagonal; $^{**}p < .01$.

3.2.1 Research Question 1

RQ1: To what extent do survey items reliably reflect each hypothesized domain of school environment?

Based on Classical Test Theory item analyses results (i.e., item endorsement rates, item variability, and item discrimination; see Table 5), the 25 retained items that comprise Model 3 functioned at an acceptable level for inclusion in the EFA. The correlation matrix was also visually inspected to ensure the correlations among variables were not too small for the EFA to detect common factors or too high to raise concerns about redundancy (see Appendix L for a list of items and criteria used for final retention decisions). Of these 25 retained items, 18 items reflect their hypothesized domains (i.e., *academics*, *safety*, or *shared vision*). Of the remaining seven items, six of them were hypothesized to reflect a *community* domain but loaded on a different factor (i.e., C20 and C12 loaded on *academics*; C32 loaded on *safety*, and C1, C2, and C18 loaded on *shared vision*), and one item (i.e., SV6) that was hypothesized to reflect the *shared vision* domain loaded on the *academics* factor instead (see Table 4). These data-driven changes make good sense conceptually. Thus, the data supported three of the five hypothesized domains (i.e., factors included in Model 3; *academics*, *safety*, and *shared vision*). Analysis indicated that, overall and for each of these three domains, Cronbach's alpha would not meaningfully improve if any of these 25 items were deleted (see Table 8). Based on r_{it} (computed using only items within each factor) and I-T (corrected item-total correlations for the overall score), the results suggest medium to strong levels of internal consistency reliability because none of these correlations were below 0.30 and the majority were above 0.50 (see Table 8).

3.2.2 Research Question 2

RQ2: Do domain scores measure different domains (i.e., academics, community, shared vision, physical environment, and safety) or one school environment construct?

Results suggest that domain scores measured three different domains (i.e., intercorrelated yet distinct factors), which supports the hypothesized conceptualization of school environment as a *category of constructs* (i.e., multidimensional construct, rather than one factor) that reflect the surroundings or conditions in which people operate in school. Three of the five hypothesized domains were supported by the data: *academics* (factor 1), *safety* (factor 2), and *shared vision* (factor 3). The factor correlation matrix confirmed that these three factors (i.e., domains) were distinct, yet positively correlated [*r*s = .58 (factors 1 & 2), .58 (factors 1 & 3), and .51 (factors 2 & 3); see Table 9]. Three extracted factors were able to explain 55% of the total variance (see Table 6). Because the sample size was not large enough to conduct a CFA, there are no goodness-of-fit results to report. To more fully answer this research question (e.g., interpret model fit indices to determine whether or not grouping the items into three factors and then one overall score was or was not an appropriate way to represent the data), CFA results are needed.

In addition to the results presented above (e.g., structure matrices and the naming and interpretability of three factors), because the eigenvalue associated with factor four was 1.16 (i.e., > 1) and the scree plot visual indicated that four factors could be rotated (i.e., the plot begins to level off after factor 4; see Whitley & Kite, 2013), Model 3 was also tested with four factors extracted. First, the SPSS output provided the following warning: “One or more communality estimates greater than one were encountered during iterations. The resulting solution should be interpreted with caution.” Next, only two items saliently loaded on factor 4, and one of these items had cross-loaded. That item’s strongest factor loading was on factor 2, rather than factor 4. Therefore, working from the same set of 25 items, specifying a model with four factors did not achieve a simple structure (i.e., it lacked empirical support) and was not conceptually superior to the version with three factors extracted.

Finally, to ensure stability of the three-factor model across extraction methods, the PI compared results from Promax rotation to that of oblimin rotation. Both methods yielded simple structures among the pattern loadings when three factors were extracted (see Appendix M).

3.2.3 Research Question 3

RQ3: Do dimension scores measure different dimensions within five empirically-supported domains?

Results suggest that dimension scores did not measure different dimensions within the three empirically-supported domains (i.e., factors). Therefore, separate dimension scores were not calculated.

Nevertheless, dimensions served an important role in the EFA process because to produce Model 3, the PI retained items with the goal of covering the depth of the hypothesized construct. Items were selected during that step based on the dimensions they were hypothesized to reflect. Correlations among items that were hypothesized to reflect the same dimensions tended to be higher (see Appendix N for the correlation matrix). For example, items A15 and A17 were both hypothesized to reflect *leadership*, and their correlation was particularly strong (i.e., it was the strongest relative to other items within *academics*), positive, and statistically significant ($r = .70$; $p < .01$). Finally, although dimension scores were not empirically-supported, the organization of items by dimension (based on definitions guided by theory), provides additional insight to support the conclusion that three conceptually meaningful factors emerged from the EFA (see Table 10).

3.2.4 Research Question 4

RQ4: Does the hypothesized model for the school environment construct fit the data or should the model be changed to generate a better fit?

The hypothesized model included five domains; results indicated that model should be changed. To generate a better fit for the data, Model 3 was constructed with three domains (i.e., factors; *academics*, *safety*, and *shared vision*). The 25 items that were retained in this model are listed below (see Table 10).

Table 10

Model 3: Dimensions, Definitions, and Items for the Three-Factor Solution with 25 School Environment Survey Items

Dimension	Definition & Items[a]
Factor 1 (Academics)	
Leadership	The degree to which school administrators are effective leaders who make everyone they work with (e.g., teachers, non-instructional staff, other schools' administrators) better, and their leadership results in positive, mission-driven outcomes (e.g., increased student and teacher learning). *Most of the time, I receive the support I need from the leadership team. (A17)* *In general, I do not trust the leadership team in my school. (A15)* *Teachers do not have the flexibility to do what we know we should be doing to meet our students' needs. (A26)* *In general, teachers support (i.e., "buy into") the leadership team's vision for our school. (SV6)*[b]
Quality of Relationships[c]	The nature of relationships and extent to which members of a school trust and support one another. *I feel like I am alone on an island teaching my students. (C20)*[c]
Professionalism	The degree to which teachers' pedagogical decisions are driven by their perception of themselves as "reflective practitioners" who are capable of effectively teaching their students. *I feel comfortable going to my leadership team for support to help me improve my teaching. (A5)*
Teaching and Learning	The degree to which teachers are personally engaged in and committed to utilizing effective teaching practices (e.g., student learning) and continuous improvement (e.g., teacher learning), which promote student engagement and motivation. *I have access to teaching materials (e.g., textbooks, online activities) that are developmentally appropriate for my students. (A27)*
Communication[b]	The degree to which schools communicate clear expectations and facilitate bidirectional communication. *The leadership team encourages parents/guardians to engage in school activities (i.e., in the school or online) in meaningful ways. (C12)*[c]
High Expectations	Demandingness, also called "academic press", is the degree to which students perceive that teachers push them to work hard and tackle challenging assignments. *Our students receive the support they need to achieve their personal best. (A2)*

Dimension	Definition & Items[a]
Factor 2 (Safety)	
Social-Emotional Safety[d]	The extent to which students and staff feel safe on the way to and during school. *Students' social and emotional learning is as important as their academic learning. (S25)* *Students are encouraged to be themselves (e.g., authentic). (S23)* *Students are given opportunities to share their thoughts and feelings about the school. (S24)* *When school is remote/online, students know at least one adult in our school community who would miss them if they did not show up for online instruction or activities. (C32)*[c]
Restorative Justice	The extent to which students are taught how to take responsibility for their actions and repair any harm that may have occurred *I teach my students how to repair any harm that may have occurred because of their actions. (S18)* *I teach my students how to take responsibility for their actions. (S17)*
Behavior Management	The extent to which the environment is orderly; specifically, through conflict resolution, clarity, fairness, consistency and belief in school rules, and students self-regulating their behavior. *Our students are given opportunities to learn how to regulate their own behavior. (S7)* *I teach character development. (S13)* *Our students are taught the underlying purpose(s) of school rules/procedures/behavior expectations. (S9)*
Factor 3 (Shared Vision)	
Partnership[c]	The degree to which parents/guardians and community members partner with teachers and schools to support students' success; they help students "put their best self forward". *People who live or work in the school's neighborhood and/or alumni of the school are involved in meaningful school activities (e.g., activities that reflect the mission/vision of the school). (C2)*[c] *Parents/guardians and school staff (e.g., teachers, teacher assistants) work together to make the school experience better for students. (C1)*[c]
School Pride	The extent to which youth are motivated by a sense of shared purpose and investment in the school. *The school's alumni are invested in current students' academic and lifelong success. (SV1)* *Most students participate in at least one school sponsored extra-curricular activity. (SV2)*

Dimension	Definition & Items[a]
Stories that celebrate success	The extent to which students' and alumni's, as well as school-wide success stories are shared with the community. *When our school is portrayed in the media (e.g., on the news) it is usually for positive reasons. (SV9)* *Students personally know and/or hear stories about successful community members (e.g., current or prior students, teachers, or administrators who are respected and productive members of society). (SV8)*
Connectedness[c]	The degree to which students, staff, and school visitors feel a sense of belonging and community, inclusiveness, and attachment to the school. *Most students seem excited or proud to be a part of our school community. (C18)*[c]

Notes. [a] Items and their variable names are listed in italics.

[b] Item was hypothesized to reflect a "mission and vision" dimension of the *shared vision* domain.

[c] Dimension/item was hypothesized to reflect a *community* domain; this standalone domain (i.e., factor named community) was not supported by the data.

[d] Dimension was hypothesized to reflect both physical and social-emotional safety, but the physical safety items were removed prior to this EFA due to missing responses because of instructional format (i.e., COVID-19 disruptions).

3.2.5 Research Question 5

RQ5: To what extent is school environment positively associated with students' academic outcomes?

Because schools that had fewer than seven teachers complete the School Environment Survey were excluded from the following analyses, only nine schools were included in this sample. Descriptive statistics for CMS data are provided in Appendices J and K.

A first step in the ongoing School Environment Survey validation process was completed by assessing criterion-related validity (CRV). Four correlations provide evidence to support the hypothesis that school environment was positively associated with academic outcomes for students in grades 3-8. First, schools' mean School Environment scores were strongly and positively related to both reading ($r = .87$, $p < .01$) and math ($r = .79$, $p < .05$) outcomes (i.e., school's average change in their students' Fall 2020 to Winter 2021 MAP percentile scores). Next, schools' mean *safety* and *academics* domain scores were strongly and positively related to reading outcomes (rs = .79 and .72, $p < .05$). In addition to the statistically significant results, the *academics* domain scores were strongly and positively related to math outcomes ($r = .66$, $p = .051$). Because only nine schools were included in this sample, that relationship may have practical significance that this study did not have the statistical power to detect (i.e., Type II error). Correlations are presented in Table 11.

Table 11

Correlations Among School-level Variables

Variable	1	2	3	4	5	6
1. School Environment	–					
2. Academics	.75*	–				
3. Safety	.72*	.58	–			
4. Shared Vision	.85**	.32	.41	–		
5. MAP Math[a]	.79*	.66	.56	.62	–	
6. MAP Reading[a]	.87**	.72*	.79*	.63	.80**	–

Note. Pearson Correlation. *$p < .05$. ** $p < .01$. All variables reflect schools' mean scores.

[a] Percentile change scores.

3.2.6 Overarching Research Question

Some additional evidence is presented below to answer the overarching research question: Within the current boundary conditions (e.g., CMS, grades 3-8, teacher participants), to what extent is the School Environment Survey a valid and reliable tool that relates to students' academic outcomes?

All teachers (*N*=186) chose to respond to the two optional items that assessed their impressions of the survey items after they had completed the School Environment Survey (i.e., at the very end of their participation). In total, 95% of teachers agreed (60%; *n* = 112) or strongly agreed (35%; *n* = 66) that the questions on the survey were clear, concise, and easily understood. Only 3% of participants (*n* = 6) chose the "Neutral (Neither agree nor disagree)" response option. In addition, 87% of teachers agreed or strongly agreed that the questions on the survey were relevant in terms of what they think matters most for student success (e.g., attendance, behavior, and academic outcomes). Only 5% disagreed or strongly disagreed and 8% neither agreed nor

disagreed. These results suggest content validity support for the School Environment Survey as a measurement tool.

One reliability analysis per school generated the following, within-school *ICC(2)* estimates (i.e., Cronbach's alpha). The relative consistency in ratings provided by multiple teachers (i.e., interrater reliability within each of the nine schools that had seven or more School Environment Survey respondents) suggests good internal consistency, with coefficient alphas ranging from .73 to .94 (see Table 12).

Table 12

Within-school ICC(2) Estimates

School	*n* (Teachers)	Estimated Participation %	ICC Results: Cronbach's α
Windsor Park Elementary	25	96	.85
Druid Hills Academy	19	75	.87
Thomasboro Academy	17	43	.94
Paw Creek Elementary	15	46	.79
Westerly Hills Academy	15	70	.90
Berryhill School	13	44	.86
Barringer Academic Center	12	45	.82
Grand Oak Elementary	7	29	.73
Merry Oaks International Academy	7	26	.78

Note. ICC(2) was calculated via a two-way random effects model where both people effects and measures effects are random.

An overall estimate of the reliability of school environment scores suggests that schools' mean ratings consistently distinguish these nine schools, indicating they are reliable scores that have potential for CMS to examine differences between schools. First, *ICC(1)* = .92 – this is a large effect size, which suggests that school environment ratings were heavily influenced by school membership. In addition, the *ICC(K)* = .74, indicating acceptable levels of interrater reliability and agreement, per Whitley and Kite's (2013) standards for reliability (i.e., minimum of α = .70). Thus, within the boundary conditions of this study (e.g., CMS, grades 3-8, teacher participants), these results have provided preliminary evidence to support the hypothesis that the School Environment Survey is a valid and reliable tool that relates to students' academic outcomes.

CHAPTER 4: DISCUSSION

While CMS utilizes existent measures to capture some culture-related information (e.g., Instructional Culture Index, as measured by the Insight Survey; see The New Teacher Project, n.d.), the school system does not currently collect information on additional elements of school culture and climate that local stakeholders believe are essential to learning for CMS students in grades 3-8. The present study aimed to address this problem (i.e., the resulting gap in knowledge, according to CMS and CIS) by developing a locally-validated measure of school environment. Essential elements of constructs in the extant psychological and educational literatures (i.e., school climate and culture) were reviewed, analyzed, and discussed (during interviews and focus groups) until the broader construct of school environment had been defined as a *category of concepts* that reflect the surroundings or conditions in which people operate in school.

With this broad definition of school environment as the underlying, multidimensional construct, the applicable concepts that were hypothesized to make up school environment were referred to as domains (see Wang & Degol, 2016). Because each domain seemed to be multifaceted as well, dimensions within each domain were chosen (i.e., from the school climate and culture literatures), and stakeholders refined the definitions of each dimension according to their beliefs regarding the information that should be captured to best reflect the variability in local school environments.

Throughout this process of measure development, the long-term aim was to better understand variability among schools regarding equitable learning conditions. For example, more fully understanding what else might explain and predict high-performing, successful schools – considering factors including but also beyond the school's poverty level and demographics (e.g., the racial diversity, or lack thereof, of students and neighborhoods) – was a powerful motivator

for all who championed this project. While it is an ambitious goal that will require continued, community-wide participation at multiple levels (e.g., CMS teachers, principals, district leaders, parents), bi-annual or annual School Environment Survey results from multiple reporting groups (e.g., in addition to teachers, students and parents) could be used to make effective policies and practices more evident (i.e., empirically supported; data-guided), celebrated, and better understood.

In that vein, results from a validated School Environment Survey could be especially empowering to principals who would have findings to suggest what went well within schools in CMS that operate under similar conditions [e.g., COVID-19; high-poverty schools with community members who disproportionately represent marginalized, historically oppressed groups (black and Hispanic students and parents)]. For example, principals and others could examine, within relatively high-performing schools (i.e., according to School Environment Survey results and academic outcomes), what seems to have worked well under similarly challenging (e.g., COVID-19) and suboptimal (e.g., high-poverty) conditions. Within relatively low-performing schools, results could help guide improvements, with the goal of fostering better and more equitable learning opportunities and academic outcomes. Moreover, annual findings regarding school environments and their changes could be communicated within and beyond that school to the broader Charlotte community (e.g., see Barnes et al., 2018, 2019). Principals and other school community experts (e.g., parents, CIS-CM site coordinators, MTSS teams) could use their collective knowledge to make connections between School Environment Survey results and specific school policies, practices, supports, and interventions.

Throughout this multi-year initiative, stakeholders were asked to imagine or think about (i.e., from their personal experiences) what it feels like to be in a high-performing school in CMS

(i.e., from the moment they entered) and what members of those school communities typically and collectively do (i.e., norms and expectations). The same question was also posed in terms of how it feels and what typical behaviors are observed in low-performing schools in CMS. The factors that participants believe matter most (e.g., explain and predict academic success or lack thereof) were conceptualized as elements (e.g., domains and dimensions) of the school environment that relate to student learning outcomes in CMS. This aim of understanding and promoting equitable learning conditions and outcomes was pursued because of its potential implications: that is, if measured with a reasonable degree of accuracy such that stakeholders could trust the results, annual or bi-annual school environment results could guide school improvement efforts and be used to evaluate the impact of targeted supports and interventions.

4.1 Advantages of the School Environment Survey (Model 3: Three-Factor Solution with 25 Items)

This first, multi-phase effort sought to develop a teacher-completed measure. Results of this study suggest that within the boundary conditions of this effort (i.e., focus on two CMS learning communities – Central 1 and Northwest, grades 3-8, school year 2020-2021), the current, 25-item School Environment Survey may be a useful indicator of teachers' perceptions of school environment. In turn, findings support the conclusion that the School Environment Survey is a promising tool that CMS and CIS could utilize in the future (e.g., after findings have been replicated with a larger sample) to serve the aforementioned, long-term purposes for which this study was designed.

Notably, items that performed well on the current version of the measure cover nearly the entire hypothesized breadth of the concept as it was defined and operationalized by stakeholders. The model with three extracted factors and 25 items (Model 3) explained 55% of the total

variance. Reliability estimates met or exceeded acceptable thresholds (e.g., Cronbach's alpha coefficients for the overall measure and for each of the three factors ranged from .85 to .92; *ICC(1)* = .92, suggesting that school environment ratings were heavily influenced by school membership, and *ICC(K)* = .74, indicating acceptable levels of interrater reliability and agreement). Finally, school environment results were found to positively relate to student learning outcomes – specifically, mean School Environment scores were positively associated with reading and math outcomes on a standardized assessment for students in grades 3-8 within the nine schools that had seven or more teachers pilot the School Environment Survey. However, findings from any study with such a relatively small sample size – 186 teachers and nine schools – should be presented with an appropriate amount of caution and interpreted judiciously. Therefore, recommendations for ongoing validation and improvement are provided below (see section 5.2 Limitations and Future Directions), following an overview of specific advantages and the empirical and theoretical support for the current version of the School Environment Survey.

4.1.1 Participatory Community Research Approach

This study's partnership-oriented, participatory community research approach was a noteworthy strength. This study was planned, developed, and conducted in partnership with CMS and CIS. Without the support of these key partners, their leadership, and their access to resources and social capital, this project would not have been possible. Ongoing consultation with community partners and teachers' and other stakeholders' participation have been vital throughout this scale development process, especially since the COVID-19 pandemic caused schools to close (March 2020) and frequently adjust their practices to meet pandemic-related demands, but also since the very onset of this project (i.e., literature review; Fall 2017). Beyond sheer feasibility – for example, CMS' and CIS' willingness to accept proposed modifications and

undergo two recruitment cycles (i.e., re-initiating data collection during Winter 2021) – there are key, interrelated advantages of this participatory community research approach that merit attention: it promoted buy-in and increased confidence in the accuracy of inferences (i.e., measurement and decision validity; see Crocker & Algina, 1986; Reeve, 2007).

Buy-in at multiple levels was necessary for this study to be conducted, and ongoing buy-in will be necessary for the continuation of this project so that the effort achieves its long-term goals. In typical scale development projects, researchers often recruit college students to respond to the scale first to test scale reliability; the limitations of this approach, including researchers' concerns that responses are not accurate, have been well-documented (see Lounsbury et al., 2006). The population of interest (i.e., CMS teachers in grades 3-8) participated in the present study (i.e., piloting the survey), as well as throughout the measure development process (i.e., population consultation through focus groups conducted in 2018-2019; see Vogt et al., 2004). Access to the population of interest was made possible by leaders from key community partners (i.e., CMS and CIS-CM) who believe in this project's aims. From logistical support (e.g., scheduling) to prioritizing this effort (e.g., attending interviews with principals and focus groups with teachers; introducing the PI and thanking participants in attendance for contributing to this meaningful work), community partners played an essential role that also set the tone for productive conversations. In addition, interviews and focus groups with additional stakeholders (e.g., principals; current and former CMS district leaders, including Research, Evaluation, and Analytics Department leadership; CIS noninstructional staff) were scheduled by community partners and will likely increase the confidence that stakeholders have in the accuracy of the inferences. Thus, the results of this study are more meaningful because many stakeholders,

including many representing the population of interest, participated and contributed in meaningful ways.

Two psychometric constructs are of paramount importance to this study: (1) measurement validity refers to the category of inferences relating to whether a measurement device actually denotes the construct (i.e., as it was designed to do), and (2) decision validity refers to the category of inferences relating to whether the predictions or decisions that are made about future behavior are accurate (C. Reeve, personal communication, September 26, 2017; Reeve, 2007). Validation in the present study context, then, is the process of investigating (i.e., collecting empirical evidence) to ascertain whether the inferences that are made based upon school environment scores are appropriate and, more specifically, content validation is the extent to which "the content on a measurement device adequately represents the universe of possible content denoting the targeted construct domain" (Reeve, 2007, p. 866). Teachers and other stakeholders played an important role in this effort by helping to define and operationalize school environment in a way that would be most meaningful and reflective of school environments, locally, for CMS students and teachers. The participatory process increased the likelihood that item content reflected the specific construct of interest, school environment, and did not include irrelevant content. While there are additional concepts included in the school climate and culture literature that are not represented in the School Environment Survey, that was intentional. For example, the *structural organization* dimension was omitted because of a combination of stakeholders' feedback (i.e., interview and focus group findings), CMS' (e.g., the Accountability Office's) alternative methods of measuring and assessing the impact of those variables (e.g., class size, student to teacher ratio, school size, and ability tracking), and the intended purpose of this measure, which is to capture information related to changes that individual schools have the

power to enact (see section 1.6.3 Content Validation and Item Development). The participatory approach used here increased the likelihood that predictions of the relations between school environment (specifically, the manifestations of the construct chosen for inclusion) and student learning are accurate and appropriate to guide and evaluate school improvement efforts (i.e., decision validity), particularly when viewed in comparison to measures that teachers and other stakeholders did not have input in creating.

4.1.2 Empirical and Theoretical Support

Exploratory factor analysis results supported a three-factor solution with 25 items that reflected the domains of *academics*, *safety*, and *shared vision*. Results suggest preliminary support for the aforementioned claims of measurement and decision validity (e.g., see Table 10). There were high performing items across the three factors (i.e., domains), which include items that were developed to capture fourteen of the hypothesized dimensions. Two additional dimensions were hypothesized; however, empirical support for these remaining two dimensions (i.e., items that were developed to capture the *comfort of setting* and *reminders* dimensions within the hypothesized *physical environment* domain) remains unknown due to the present study's limitations (e.g., the effects of COVID-19, sample size). In the three-factor, 25-item solution, the overall combination of items with high loadings (i.e., both structure and pattern coefficients) on each factor made good sense conceptually, based on how those dimensions had been defined a priori.

While findings did not support the use of dimensions as lower-level, standalone factors, grouping items by hypothesized dimension into broader domains served two important purposes related to content validity: (1) it helped to ensure that items were drafted that captured the breadth of school environment (i.e., a multidimensional, category of constructs), and (2) it

supported a process of defining each domain in ways that organize and situate these findings within the broader literature on school climate and culture. Overall, most of the items (72%; 18 of 25) reflect dimensions that were hypothesized to capture the domain of school environment on which that item loaded. Six of the nine *academics* items (i.e., loaded on factor 1) were developed to reflect hypothesized dimensions of that domain. The three remaining items that loaded on factor 1 (*academics*) reflect one dimension (*mission and vision*) that was hypothesized as part of the *shared vision* domain and two dimensions (*quality of relationships* and *community*) that were hypothesized as part of a *community* domain. Eight of the nine *safety* items (i.e., loaded on factor 2) were developed to reflect hypothesized dimensions of *safety*. The one remaining item that loaded on factor 2 (*safety*) reflects the *quality of relationships* dimension that was hypothesized as part of a *community* domain. Four of the seven *shared vision* items (i.e., loaded on factor 3) were developed to reflect hypothesized dimensions of that domain. The remaining three items that loaded on factor 3 (*shared vision*) reflect the *partnership* and *connectedness* dimensions that were hypothesized as part of a *community* domain.

To illustrate and further explain the purposes and benefits of organizing items by dimension and domain in the present study, the next section closely examines one item (S25): "Students' social and emotional learning is as important as their academic learning." Item S25 was hypothesized to reflect a *social-emotional safety* dimension of a *safety* domain; the present study's structural organization of these concepts was supported by the data in Model 3 (the three-factor solution with 25 items). It also aligns with the broader literature on school climate and culture, particularly with school *climate*, given that work in this area emphasizes the inclusion of safety as a core domain as well as *social-emotional safety* as an important dimension (e.g., Melnick et al., 2017; Wang & Degol, 2016; see section 1.4.2 Safety). Empirical evidence

suggests that the hypothesized behavior of this item was supported – S25 was the highest loading item on factor 2 (*safety*).

For this study to be useful to community partners, each item should (and does) have clear empirical and theoretical support for inclusion. The first, broad objective of the School Environment Project was to enhance community understanding of the environmental factors that will improve student achievement. To that end, all dimensions were clearly defined, with items developed accordingly (see Table 10 for dimensions' definitions and a list of items for each dimension). Item S25 may exemplify how survey items and results could be a catalyst for schools to reflect on possible connections between concepts like social-emotional learning and safety. Community partners could access any number of examples in the literature to find additional evidence of the importance of students' social and emotional learning (e.g., see Elias, 2009). In the school climate literature (e.g., see Wang & Degol, 2016), typical indicators of social-emotional safety include a lack of bullying and the availability of counseling services. Thus, it seems that the framing of school safety is primarily at the individual-level and deficit-focused, such that in a safe school environment, individual students are seldom bullied and have access to counseling when needed.

An asset-focused, school-wide reframing of school safety may be a more effective approach to improving school environments, such that the role of social-emotional learning in schools could be viewed as essential for *all* students' healthy development and well-being (i.e., S25: "Students' social and emotional learning is *as important* as their academic learning." This type of reasoning, which considers additional possibilities to explain the connection between social-emotional competencies and safety, could complement (rather than hinder) bullying prevention, support services (i.e., counseling), or other individual-level interventions. There

seems to be only added benefit to considering the possibility that all students might tend to feel safer and the typical behaviors observed (i.e., including bullying) might change in a school environment that values social-emotional learning as a core part of educating children in grades 3-8. Thus, it seems that the present findings, while clearly aligned with the school climate literature, also suggest opportunities to expand the definition of the *social-emotional safety* dimension beyond individual-level efforts. The notion of creating school environments in which students' social and emotional learning and social and emotional competences are as important as their academic learning may align well with existing CMS efforts, and responses to this item (and more broadly, this dimension), in particular, may provide data to better understand the impact of policies, supports, and interventions (e.g., NC MTSS) that were in place during school year 2020-2021.

In addition to dimensions such as *social-emotional safety* that included items which loaded on their hypothesized domain, results guided some reorganization of the model's structure (i.e., Model 3 – three-factor solution with 25 items). Such reorganization and refinement were expected given the exploratory nature of this study. For example, one item that was hypothesized to load on the *shared vision* domain loaded on the *academics* domain instead (see Tables 1 & 10, item SV6). This item, "In general, teachers support (i.e., 'buy into') the leadership team's vision for our school," had been predicted to reflect a *mission and vision* dimension of school environment (within the *shared vision* domain), which was defined as "The extent to which the mission and vision of the school are enhancing student and teacher learning." Upon reflection, the loading of this item on *academics* makes sense conceptually because the content seems to capture an important aspect of the *leadership* dimension that was not being captured by other leadership items that loaded on that factor (i.e., the *academics* domain of

school environment). In addition, none of the other items that were hypothesized to reflect *mission and vision* loaded saliently on Model 3. Therefore, while the *mission and vision* dimension was the only hypothesized dimension of school environment that was omitted as a result of reorganization subsequent to analyses (within the hypothesized *academics*, *safety*, *shared vision*, and *community* domains; the aforementioned *physical environment* dimensions were excluded because of limitations, such as missing data and sample size), this content was still included at the item-level.

As illustrated by Table 10, all of the other items that did not load on their hypothesized factor were predicted to reflect a unique *community* domain, which was not empirically supported. Instead, the hypothesized dimensions of *community* are represented by items that loaded on the three *domains* included in Model 3 (i.e., *academics*, *safety*, and *shared vision*). The following sections discuss each domain's *community* items in turn.

Hypothesized community* items that loaded on *academics. Items reflecting *communication* and *quality of relationships*, dimensions that were hypothesized to load on a *community* domain, loaded on *academics*. It was not surprising that the retained *communication* item, "The leadership team encourages parents/guardians to engage in school activities (i.e., in the school or online) in meaningful ways" strongly related to other *academics* items, such as the *leadership* items. Within this domain (i.e., factor 1 – *academics*), the three *leadership* items had the highest factor loadings. While the definition of *communication* is "the degree to which schools communicate clear expectations and facilitate bidirectional communication", this particular item explicitly focuses on the leadership team's behavior, as opposed to that of any other school community members. Thus, this emphasis on leadership likely led to this item loading on factor 1 (academics).

Because of the focus of the retained *quality of relationships* item (C20), "I feel like I am alone on an island teaching my students," it was also not unexpected to find that this retained item strongly related to the *leadership* items on the *academics* domain. Because of how this item was worded, teachers' relationships with whom, specifically, remains vague. In other words, the feeling of loneliness could be attributed to the quality of teachers' relationships with other teachers (e.g., peers or a teaching mentor), their supervisor (i.e., the school leadership team), and/or their students' parents. It is noteworthy that this item performed better than the related item (A12), "The teacher mentoring program at my school is effective," which was included in Model 1 [i.e., the simple structure with 44 items; EFA pattern coefficients were .64 for the item retained in Model 3 (C20) compared to .59 for the item that was not retained in Model 3 (A12)]. This suggests that while teacher mentoring programs may be important (i.e., an effective leadership practice that promotes a better school environment), there may be other approaches to improving the quality of teachers' relationships that may include relationships beyond that of a teacher and their designated (i.e., typically paid) teacher mentor that also result in teachers feeling less alone (e.g., teachers' relationships with other teachers, administrators, parents, staff, etc.). How resources are utilized to achieve this goal may vary across schools depending on the specific strengths and challenges of that school, such as the ratio of experienced teachers and administrators to new hires or whether they are employed at an established school compared to a new school community.

***Hypothesized community* items that loaded on *safety* (factor 2).** One item hypothesized to reflect a *community* domain of school environment loaded on the *safety* domain. This item (C32), "When school is remote/online, students know at least one adult in our school community who would miss them if they did not show up for online instruction or activities," had empirical

(i.e., EFA results) and conceptual support (e.g., the membership element of sense of community includes emotional safety; see McMillan & Chavis, 1986; see additional discussion of sense of community below) to reorganize as an important component of the *social-emotional safety* dimension of *safety.* This was also the only item included in Model 3 that was written specifically for the COVID-19 pandemic-era context (i.e., if school is not offered remote/online during future school years, this item will not be relevant). The PI expects that the original item (i.e., C31 was developed prior to the COVID-19 pandemic) would replace the online version (C32) in the future; because of missing data, item C32 was removed in step 1, prior to the first EFA (for more information about item retention decisions, see Appendix L).

***Hypothesized community* items that loaded on *shared vision* (factor 3)**. Three items reflecting the hypothesized dimensions of *partnership* and *connectedness*, which were predicted to reflect a *community* domain of school environment, loaded on factor 3, which was named *shared vision.* This was not surprising because the content reflecting *community* and *shared vision* exemplifies how the constructs of school climate and culture overlap in the literature, which has created confusion and limited the application of this research in practice (and resulted in such actions as using school climate measures to understand school culture; see Sailor, 2009). The hypothesized *community* dimensions (i.e., *partnership*, *communication*, *connectedness*, and *quality of relationships*) were developed using the school climate literature (e.g., see Melnick et al., 2017; Wang & Degol, 2016), while the hypothesized *shared vision* dimensions (i.e., *school pride, mission and vision,* and *stories that celebrate success*) were developed using the school culture literature (e.g., Deal & Peterson, 1999; Denison et al., 2012; Wagner, 2006). Most of the school culture literature emphasizes the importance of leaders (e.g., by making comparisons to effective businesses, the line of reasoning is that schools' leaders are primarily responsible for

changing the culture in organizations; Denison et al., 2012). Culture behaviors (e.g., professional collaboration – the extent to which teachers and staff members work together to solve professional issues) are measured in school culture surveys to help principals, for example, determine the current status of their school's culture and what they can do to improve it (Wagner, 2006). Thus, the role of leaders is paramount to researchers who frame culture as a contemporary model of leadership (e.g., see Denison et al., 2012); however, at the same time, leadership in not typically conceptualized as a dimension of *culture* as it is in the *climate* literature.

Because of the existing school *climate* literature and the school environment project's qualitative results (i.e., themes from interviews and focus groups), *leadership* was separated from *shared vision* (i.e., the domain most heavily influenced by school culture literature) and hypothesized to best reflect the *academics* domain. It is notable that EFA results supported that decision (i.e., *leadership* items loaded strongly on factor 1, *academics*). The EFA results also supported the combining of two dimensions from the school culture literature – school pride and stories that celebrate success – with two dimensions from the school climate literature – partnership and connectedness – to create the third domain of *shared vision*. The results suggest that while *leadership* is important in its own right (i.e., reflecting the *academics* domain of school environment), *shared vision* is also a unique factor with items that include all community members (e.g., people who live or work in the school's neighborhood, alumni of the school, parents/guardians, school staff, and students), rather than school *leadership* alone. Therefore, drawing on the school culture literature (e.g., see Deal & Peterson, 1999; Wagner, 2006), the results suggest that *shared vision* could be reframed from how the *leader* helps to create a shared view of a desired future state for their organizational unit to how *all members* of the school

community help to create a shared vision, by actively contributing to the following dimensions of school environment: *partnership, school pride, stories that celebrate success,* and *connectedness*.

The third factor was named *shared vision*, rather than *community* for a few reasons. First, among the seven items that loaded on the factor, most (4 of 7) had roots in the school culture literature and reflected content and ideas developed by researchers who use the term *shared vision*. *Climate* researchers do not typically use this term (i.e., shared vision as a standalone dimension) because they prefer to conceptualize vision as part of the *leadership* dimension (see Wang & Degol, 2016). Next, rather than finding a distinct factor to support one *community* domain, there were multiple items and dimensions that had been hypothesized to reflect *community* that loaded on the other two factors (i.e., *academics* and *safety*). These findings may align with an idea presented during an interview with a CMS district leader who suggested that the PI consider a "hierarchy of needs approach" to understanding school environment. Referring to Maslow's (1970) theory, this stakeholder wondered if this study might illuminate aspects of the school environment that must be present, at least to some degree, as a foundation that makes improvement across all domains possible.

In light of her community psychology background, the PI has interpreted the combination of this qualitative information (i.e., the stakeholder's insight) and quantitative results (i.e., EFA finding that *community* items loaded on all three factors) as evidence that *sense of community* (Sarason, 1974; McMillan & Chavis, 1986) may be foundational (e.g., predict higher scores) across all three domains of school environment. Across decades of research, community psychologists have investigated psychological sense of community (SOC) using methods that epitomize key ideas and principles of community psychology, that is, that flexibility (as opposed

to rigidity) is a necessary consideration in community-based research because communities are diverse, contexts vary (see, e.g., Chipuer & Pretty, 1999; Sarason, 1997), and ecology (i.e., ecological thinking) matters (see, e.g., Trickett, 1984).

McMillan and Chavis (1986) posited four elements of SOC – membership, influence, integration and fulfillment of needs, and shared emotional connection. In the present study, stakeholders defined connectedness as "the degree to which students, staff, and school visitors feel a sense of belonging and community, inclusiveness, and attachment to the school" and the manifest indicator of *connectedness* that saliently loaded on factor 3 (*shared vision*) is item C18: "Most students seem excited or proud to be a part of our school community." Although local stakeholders did not use the terms membership or shared emotional connection, taken together, the present results suggest alignment with these elements of SOC, defined by McMillan and Chavis (1986) as the sense among community members of personal investment in the community and of belonging to it (i.e., membership), and the deep bonds that are strengthened through important community experiences such as shared rituals (i.e., shared emotional connection, which has been described as the definitive element for true community). Item C18 provides one example of the six *community* items that loaded across the three factors; these items have broad, theoretical support (e.g., SOC) that may explain foundational components of the school environment that facilitate or foster better conditions for teaching and learning across all domains.

4.2 Limitations and Future Directions

Multiple limitations to this work warrant mention. As with most of the school climate and culture research, this study utilized a correlational design, which precludes the use of these data to make causal inferences regarding the relationship(s) between school environment and student

outcomes. In turn, the finding that nine schools with higher school environment scores tended to have better student learning outcomes, on average, necessitates continued investigation. If school environment had been measured first (e.g., towards the beginning of the school year), then this study could have been designed to test the hypothesis that school environment not only *relates* to, but *predicts* academic outcomes (e.g., cross-lagged design; regression analysis). The interpretation of results was guided by theory (i.e., the direction of the relationship that is more likely), but because of the correlational design, the possibility remains that better academic outcomes could predict higher school environment scores, rather than vice versa. In addition, replicating research findings across a larger sample of teachers and CMS school settings would strengthen the inference that better school environments lead to improvements in student learning.

4.2.1 Limitations of the School Environment Survey (Model 3: Three-Factor Solution with 25 Items) and Future Directions

A major limitation of the current School Environment Survey (i.e., Model 3) is that some of the piloted survey items were never considered for inclusion in this model. This was a noteworthy issue for items assessing the physical environment. Ideally, data cleaning would have begun by removing cases with missing data (i.e., excluding teachers who had not responded to every School Environment Survey item). As explained above (see Section 3.1.2), listwise deletion would have reduced the sample size from 186 to 77 teachers, so an alternative approach of removing *items*, rather than *teachers*, with missing data was chosen. Teachers were permitted to submit their School Environment Survey with missing responses if their reported instructional format (e.g., online-remote teaching) prohibited them from evaluating that aspect of school environment (e.g., *physical environment*) during school year 2020-2021. To ease the burden of

completion, teachers who had never taught in-person during that school year were not given the opportunity to respond to items that would not have been possible to evaluate from a remote/online location. Teachers who reported both (i.e., some online-remote and some in-person teaching) were provided the response option, "Not enough time in-person to evaluate", which resulted in additional missing responses to those items.

To address this limitation, as part of ongoing validation efforts, the 22 items that were removed prior to the initial EFA in this study (see Appendix L) could be piloted the next time the survey is administered. In addition, the PI recommends piloting all eight of the *physical environment* items during a future school year, for a total of 26 items to pilot again, in addition to the 25 items included in Model 3 (thus, that version of the School Environment Survey would include 51 items in total). In fact, such ongoing work may yield empirical support for the inclusion of a fourth domain of school environment, *physical environment*, that was either not detectable because of missing data or was significantly less meaningful during the 2020-2021 school year compared to other years because of remote/online instruction.

In addition, the PI decided to retain 25 of the 44 items that first achieved a simple structure (i.e., EFA results, Model 1). These decisions were guided by theory and a priori definitions (i.e., the dimensions of school environment that matter most, according to local stakeholders) in addition to the relative strength of the retained items' pattern coefficients. Especially because the Model 3 factor solution has far fewer than CMS' preferred limit of 40-60 survey items, the PI recommends that CMS review all of the 44 items in Model 1 and consider piloting some or all of those items during a future school year to compare results across a larger sample of teachers and schools. Then there would be additional evidence to support or refute these decisions; the resulting "balanced" model that best fits the data (based on a future data

collection) may not be the same combination of items that were included in the present study's Model 3 (the three-factor solution with 25 items).

4.2.2 Impact of the COVID-19 Pandemic and Future Directions

The PI is acutely aware that to have meaning (and relevant practical application), the construct – and this measure – of school environment must have demonstrated relationships to other constructs or observable phenomena (i.e., in addition to MAP Reading and Math academic outcomes; Crocker & Algina, 1986). This study was originally designed accordingly, with additional variables included from the proposed nomological net of school environment. Three noteworthy limitations caused by the COVID-19 pandemic warrant specific consideration. Compared to the study as it was originally designed and proposed (e.g., the initial CMS Research and UNCC IRB applications), the pandemic likely reduced the sample size and prohibited plans to continue factor analysis methodology (i.e., beyond exploratory to confirmatory factor analysis, or CFA) and further establish validity (e.g., concurrent criterion and convergent). The following sections discuss these issues in turn.

Limited sample size. The School Environment Survey was piloted with 186 teachers during the 2020-2021 school year. Recruitment of teachers and data collection were planned for and began during the previous school year (2019-2020); all research activities were suspended in response to the COVID-19 pandemic in March 2020. In line with Whitley and Kite's (2013) guidelines for EFA within the context of scale development, the original sample size estimation was a minimum of 200 participants and at least 10 participants per item. Because 25 items were retained (i.e., Model 3), ideally the minimum sample size for the final EFA would have been at least 250 teachers. Because 109 items were included in the initial EFA, ideally the sample size for that analysis would have been 1,090 teachers. It is difficult to gauge fully the effect that the

reduced sample size had on the EFA computations and results, given that guidelines in scale development vary. As one case in point, DeVellis (2016, p. 137) argued that although a minimum of 300 people has been recommended as a sample size that is "sufficiently large to eliminate subject variance as a significant concern…practical experience suggests that scales have been successfully developed with smaller samples". In a similar vein, Henson and Roberts (2006) concluded that it is common to find disagreement in the factor analytic literature (e.g., sometimes 100 is portrayed as "poor", 200 as "fair", 300 as "good", 500 as "very good", and 1,000 as "excellent", and another common approach is the aforementioned focus on the ratio of participants to variable/item, with recommendations ranging from 5:1 to 20:1). There are additional considerations for judging whether the sample size was adequate, such as items' communalities. As articulated by Fabrigar et al. (1999, p. 283): "Under good conditions (communalities of .70 or higher, four to five variables for each factor), a sample size of 100 might well be adequate (although it is always best to have larger sample sizes if possible)". In the present study, communalities of items ranged from .31 to .80, and both the mean and median communalities were .5. Given the significant challenges that the COVID-19 pandemic has caused community partners and teachers, specifically, it was notable to recruit nearly 200 teachers to pilot the School Environment Survey during the 2020-2021 school year. Whether or not the sample size was a major limitation (i.e., altered the results in a meaningful way) will remain unknown until further research is conducted with a larger sample (e.g., replication attempts); however, it is a promising sign that findings were interpretable and included some statistically significant results despite the small sample size.

Inability to conduct a Confirmatory Factor Analysis. Directly related to the sample size, the PI was unable to continue with the originally planned CFA. Because CFA cannot be

conducted using the same sample as EFA, common approaches are to split the sample (i.e., use half for EFA and the other half for CFA) or administer the survey twice (i.e., use the first sample for EFA and the second for CFA). Neither choice was feasible given the limited sample as well as the context of the COVID-19 pandemic. Of particular relevance because of the timing of the present study's data collection, Diliberti and colleagues (2020) found that "at least for some teachers, the COVID-19 pandemic seems to have exacerbated what were high stress levels pre-pandemic by forcing teachers to, among other things, work more hours and navigate an unfamiliar remote environment, often with frequent technical problems" (p. 1). Therefore, it is unsurprising that online survey completion rates were lower than expected (compared to pre-pandemic estimates).

Additional data collection will be necessary to continue conducting planned analyses, such as a CFA to test Model 3 (i.e., the particular pattern of relationships predicted based on theory and EFA results). If the current model continues to fit the data, future research could more fully establish the reliability and validity of the School Environment Survey.

Inability to estimate additional forms of validity. In terms of structural validity, future research is needed to assess the goodness-of-fit of the current model with 25 items and three extracted factors (i.e., academics, safety, and shared vision domains) because "whether the item set continues to perform as the assigned name implies will ultimately determine validity" (DeVellis, 2012, p. 147). Additional plans to assess concurrent criterion and convergent validity were disrupted by the COVID-19 pandemic. This study was designed to include two more variables from the expansive nomological network of school environment – students' attendance and behavioral outcomes (e.g., suspension) – in addition to academic outcomes, to better establish concurrent criterion validity (see section 1.5 above for more information about the

hypothesized nomological network of school environment). School environment scores were hypothesized to positively relate to attendance (e.g., see Benner et al., 2013; Hatchett, 2010; Jimerson et al., 2016) and negatively relate to behaviors that impede learning (e.g., violence, drug use; see Gregory et al., 2010; LaRusso et al., 2008; Louis & Wahlstrom, 2011). These variables were excluded from the present study because of pandemic-related complications that resulted in the inability to trust the validity of these data.

In addition, other surveys (e.g., Insight Survey of Instructional Climate) were not administered during school year 2020-2021; those data were needed to establish convergent validity. To continue assessing criterion-related validity (CRV), it will be necessary to examine the associations of school environment scores on each scale with variables in the proposed nomological net. Specifically, school environment scores should relate to additional, typically utilized indicators of academic performance (i.e., grades, GPA, and attendance) and attitudes, such as academic motivation (e.g., see Benner et al., 2013; Hatchett, 2010; Wagner, 2006; Wang & Degol, 2016). School environment scores should also relate to student social-emotional outcomes (e.g., self-esteem, general psychological wellbeing; see Hoge et al., 1990; Kuperminc et al., 1997; LaRusso et al., 2008; Payton et al., 2008; Ruus et al., 2007) and behavior (e.g., aggressive behaviors, drug use; see Gregory et al., 2010; LaRusso et al., 2008; Louis & Wahlstrom, 2011). Furthermore, school environment scores may relate to job satisfaction for teachers, Instructional Culture (for instance, as assessed via the Insight survey), and parents' general satisfaction with their child's school.

As a future direction, assessing convergent and discriminant validity of the new school environment measure by comparing results to that of other measures (e.g., school culture and climate) would provide empirical evidence to either support or refute this claim. Data must be

collected or shared for each of these variables to assess these relationships and estimate CRV. Convergent and discriminant validity can be established by comparing the correlations listed above to the correlations between school environment scores and seemingly unrelated variables.

School environment should relate more strongly to variables within its nomological net compared to its associations with outside variables. However, one challenge for future researchers to overcome is the difficulty in identifying and accessing data regarding a variable outside of the nomological net of school environment (i.e., theoretically unrelated, available information for each school).

4.2.3 The Sole Focus on Teachers' Perceptions of School Environment

In order to fully understand school environment, it would be helpful to gather information from the perspectives of different reporters, including students, parents, and administrators. This effort focused solely on teachers and their perceptions of school environment, which may or may not be entirely consistent or in agreement with that of other reporting groups (i.e., members of the same school community). For example, students should be empowered to self-report information, such as the extent to which they are encouraged to be themselves (item S23). Learning from students in grades 3-8 (i.e., by administering a version of the survey developed for them) would strengthen the broader effort and set this project apart from similar endeavors in the literature. For example, compared to elementary school students, it is more typical for middle school students to report on their perspectives (e.g., of school climate; see Wang & Degol, 2016). That said, overall, "only a small number of empirical studies (17%) combined multiple perspectives (e.g., students, teachers, and parents)" (Wang & Degol, 2016, p. 335), yet the utility of this approach is promising. Input from additional groups of reporters in CMS could improve the community's understanding of the environmental strengths and weaknesses of a given

school. However, the various domains of school environment may "look different" from these perspectives. As one case in point, after analyzing New York City School Survey results, Nathanson and colleagues (2013) found that responses varied significantly by reporting group (i.e., teachers, parents, and students); therefore, analyzing data from each respondent group separately was helpful to understand that each group had their own interactions with schools and, in turn, a unique perspective of the school environment. For this reason, future research directions include creating versions of this school environment measure to be completed by additional reporting groups (e.g., students, parents, and administrators).

Item development, piloting, item analyses, factor analysis, and validation would need to be repeated to develop an appropriate measure for each group of reporters. Importantly, it would not be necessary or appropriate to replicate the same, full range of participatory steps – for instance, all versions of the measure should be created utilizing a consistent definition of school environment informed by the present study. Although the items may assess manifest indicators in slightly different ways, they would be focused on the same underlying domains of school environment. Developing multiple versions of this school environment measure that are all guided by the same underlying definition would not only allow administrators to understand their school environment more fully, but also indicate where their perceptions differ from the experiences of their teachers, students, and parents. Providing this "360° view" of school environment may also help administrators identify and evaluate school improvement interventions.

Finally, given the potential importance of a range of personal characteristics – including such factors as race and ethnicity, socioeconomic status, and English Language Learner or special education / exceptional child status – on reporters' perceptions of school environment,

additional research could investigate subgroup differences within varying reporting groups (e.g., teachers, students, parents) as well as similarities based on that characteristic across reporting groups. Such work could seek to enhance understanding regarding the ways in which school environments may be experienced differently by these diverse groups. Such an investigation would require collecting additional information from respondents (e.g., demographics), but could provide meaningful data to guide school improvement efforts for specific groups of students, teachers, and/or parents.

4.3 Implications for Local Practice

This project was designed to provide a strengths-based approach to intervention, whereby similar schools (e.g., within the same learning community) could learn from each other, and the effectiveness of existing practices, such as CIS-CM's school-wide supports and interventions, could be better understood within CIS-CM partner schools and beyond (e.g., informing school improvement plans, which in CIS-CM partner schools are developed with site coordinators' services in mind, as one resource to implement supports and interventions). Schools that do not partner with CIS-CM may have other resources available to them to carry out similar activities.

This project was also designed to provide a data-informed approach to improving schools that have been historically low-performing – the School Environment Survey was developed as a tool for CMS and CIS to utilize to improve learning and promote equitable outcomes within and across district schools. This study's preliminary results could serve as a catalyst for data-guided conversations among school leaders (e.g., share school-wide practices that are working well and that likely relate to school environment results; abandon ineffective practices).

Going forward, after psychometric properties have been more fully established, CMS could begin measuring school environment regularly (e.g., annually or bi-annually) in

elementary and middle schools. Because of their strong partnership with CMS and positive relationships with community members, CIS continues to be an important partner that could continue to support research and lead efforts to begin implementing a measure of school environment that stakeholders trust to capture the current quality of schools. Through their collaboration, these partners could pursue a number of potential applied research aims. For example, the findings of this study suggest that the School Environment Survey (i.e., either the current model or an improved version based on future research) may be utilized for the following purposes: (1) researching the effects of school environment on student learning and other outcomes of interest (e.g., behavior, attendance) across CMS; (2) identifying and comparing different groups' interactions with and perceptions of school environment; (3) identifying areas of strength and opportunities for improvement or intervention within schools; (4) evaluating the effects of such supports and interventions by measuring changes in school environment over time; and (5) per the ESSA accountability system requirements, reporting school environment results as an indicator of school quality.

4.4 Conclusion

This study contributes to the literature on school climate and culture by reconceptualizing these overlapping constructs into the overarching concept of school environment. The framework for the new construct, school environment, as well as this study's participatory community research approach could be useful to other communities that have similar goals. This study contributes to the broader community psychology literature by demonstrating how values-based competencies and skills (e.g., a participatory community research approach; collaborative, university-community partnerships) were instrumental in the development and piloting of a measure of school environment for the Charlotte community (specifically, for CMS and CIS).

Initial results have begun establishing some basic psychometric properties (e.g., internal consistency) and suggest that the current (25-item) School Environment Survey may provide a reasonably valid and reliable way to measure teachers' perceptions of school environment in local elementary and middle schools (i.e., CMS grades 3-8). Because this dissertation project is the initial and only research study using the School Environment Survey to date, subsequent research is needed to more fully establish the validity and reliability of this measurement device.

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APPENDIX A: LITERATURE REVIEW: SCHOOL ENVIRONMENT DOMAINS AND DIMENSIONS

The following was developed by August 2018, prior to conducting interviews and focus groups.

***School environment**: a category of concepts that reflect the surroundings or conditions in which people operate in school.*

Based on existent literature on school culture and school climate, dimensions have been identified and organized into the following five domains (Deal & Peterson, 1999; Thapa et al., 2013; Wang & Degol, 2016).

Domain 1: Shared Vision

Dimensions

- **Mission:** A mission focused on student and teacher learning
- **History of the school:** A rich sense of history and purpose
- **Values and beliefs of the organization:** Core values of collegiality, performance, and improvement that engender quality, achievement, and learning for everyone; positive beliefs and assumptions about the potential of students and staff to learn and grow; collegial support based on trust
- **Rituals and ceremonies:** Regularly reinforce positive, core cultural values
- **Myths and stories that explain the school:** Stories that celebrate successes and recognize adult heroines and heroes who define what is possible and provide a standard to achieve

Domain 2: Safety

Dimensions

- **Social/emotional safety:** Presence of caring and supportive staff; availability of counseling services; an absence of verbal bullying or harassment
- **Physical safety:** Frequency and severity of violence and aggression; students and staff feel safe; security measures (e.g., metal detectors, guards)
- **Discipline and order:** Conflict resolution, clarity, fairness, and consistency of rules; belief in school rules; knowledge and implementation of behavioral interventions and supports; behavioral order in the classroom

Domain 3: Community

Dimensions

- **Partnership:** Role that community members and parents play; parental involvement
- **Quality of relationships:** Trust, interpersonal relationships between staff and students; affiliation
- **Student connection:** Positive regard for teachers and other adults; positive regard for student peers
- **Connectedness:** Cohesion; sense of belonging; sense of community; student involvement (e.g., school sponsored extracurricular activities)
- **Respect for diversity:** Fairness; autonomy; opportunities for decision making; cultural awareness
- **Responsiveness:** Social support provided to meet students/families' needs

Domain 4: Academics

Dimensions

- **Leadership:** Principals and administration are supportive of teachers; shared leadership that balances continuity and improvement; open lines of communication
- **Teaching and learning:** Quality of instruction; assessments of students; willingness of teacher; student motivation and engagement; teacher expectations; achievement goal structure; teacher's use of supportive practices
- **Professionalism:** A strong professional community that uses knowledge, experience, and research to improve practice; review and assessment of teaching practices; opportunities for growth and development through professional development; data-based decision-making using continuous assessment
- **Academic press:** Demandingness, or the degree to which students perceive that teachers push them to work hard and tackle challenging assignments

Domain 5: Physical Environment

Dimensions

- **Comfortability of setting:** Heating, lighting, AC; acoustical control; cleanliness; upkeep of maintenance; quality of building
- **Structural organization:** Class size; student to teacher ratio; school size; ability tracking
- **Availability of resources:** Adequacy of supplies, resources, and materials; technology; sharing of resources
- **Reminders:** An environment that symbolizes joy and pride

APPENDIX B: INITIAL LETTER OF APPROVAL TO CONDUCT RESEARCH IN CMS, MARCH 2018

Charlotte-Mecklenburg Schools

Office of Accountability
4421 Stuart Andrew Blvd Suite 250
Charlotte, North Carolina 28217
980-343-6242

March 22, 2018

Virginia Covill
601 E. 5th St. Suite 300
Charlotte, NC

RE: School Environment: Measuring Key Elements of School Climate and Culture

Dear Virginia Covill,

Thank you for your interest in conducting research in the Charlotte-Mecklenburg Schools. Your proposal summary and application for "School Environment: Measuring Key Elements of School Climate and Culture" has been reviewed and approved by the Office of Accountability.

Please register at http://www.cms.k12.nc.us/cmsdepartments/cpfe/volunteers/Pages/default.aspx for clearance if you plan to enter any school for research-related purposes at any time.

Given the increasing level of accountability placed upon schools, and the need to recruit and retain quality teachers, identifying programs and strategies that work is of paramount importance. CMS asks that you share your results within 30 days of completion, including any recommendations for the district based upon your findings.

Please sign and return one copy of the enclosed CMS "Memorandum of Understanding" indicating your agreement with its terms. Please retain the remaining copy for your records. Should you have any questions or future needs, please feel free to contact Lindsay Messinger, Director of Research, Evaluation, and Analytics, at lindsay1.messinger@cms.k12.nc.us. Best wishes and continued success as you begin your study.

Sincerely,

Frank D. Barnes
Associate Superintendent for Accountability
Charlotte-Mecklenburg Schools
frankd.barnes@cms.k12.nc.us

APPENDIX C: INFORMED CONSENT TO PARTICIPATE IN FOCUS GROUP OR INTERVIEW

Communities In Schools of Charlotte-Mecklenburg
601 E. 5th Street | Suite 300 | Charlotte, NC 28202
704.943.9441 direct | 704.335.0601 main | 704.335.0697 fax | vcovill@cischarlotte.org

CONSENT TO PARTICIPATE IN A RESEARCH STUDY
"School Environment: Measuring Key Elements of School Climate and Culture"

You are being asked to participate in a research study, "School Environment: Measuring Key Elements of School Climate and Culture." Communities in Schools of Charlotte-Mecklenburg has partnered with Charlotte Mecklenburg Schools to better understand and measure the key elements of school climate and school culture (i.e., school environment) that impact student behavior and achievement.

We want to understand how CMS personnel, principals, and teachers conceptualize school environment and its key components. To do this, we will facilitate interviews with district leaders and principals, and focus groups in which 4-10 teachers within CMS discuss aspects of school environment that matter most for students to succeed, and how those elements can be captured best in a survey of school environment. The resultant survey will be piloted in CMS schools next school year.

Please read the information carefully. At the end of this study description, you will be asked to consent if you agree to participate in the study.

Dr. Virginia Covill, Director of Research & Evaluation, and a trained research assistant will be facilitating this interview. You were recruited because of your current or former role as a CMS district leader, principal, and/or teacher.

In this study, you will participate in a 45-minute interview, during which researchers will ask you to describe your conceptualization of school environment, specifically how you think key elements of a school environment manifest and can be measured in a survey. Your experiences working for CMS and applicable, prior experiences in any school environment may be relevant. Focus groups will be homogeneous in terms of participants' roles; for example, if you are a teacher, all participants in your focus group session will also be teachers.

You may have the opportunity to participate at a second time point, for an additional 15 minutes. If you consent, researchers may follow-up by phone or e-mail to ask you to review and provide feedback on the measure of school environment created using interview and focus group findings.

It is possible that answering questions about the school environment in CMS could make you feel uncomfortable. You are welcome to abstain from answering any questions that make you feel uncomfortable, and you may also stop participating at any time.

Some people find that participating in focus group discussions can be a validating, even empowering, experience because researchers will invite participants to share their professional and personal perspectives. The measure that participants will co-create through their participation holds promise for improving student achievement.

Specifically, school districts can utilize the measure's pre-test data to determine which elements of their school environment necessitate improvement efforts, then implement interventions to improve accordingly. Researchers plan to provide recommendations for such intervention efforts. At the end of the school year, the measure's post-test data will provide evidence of the interventions' impact on the school environment. Furthermore, the Every Student Succeeds Act (ESSA) now requires schools to choose and report an indicator of "School Quality or Student Success" as part of their school accountability systems. Since this measure will reconceptualization school climate, it could be an option for this indicator.

The research team will make every effort to protect your privacy. All responses will be kept confidential. If all participants consent, focus groups will be audio recorded. During interviews and focus groups researchers will take notes on what participants say, their nonverbal cues, particular questions that produce illustrative responses, what participants do not say (i.e., content that seems conspicuously absent), and particular questions that seem to produce confusion. Following each interview and focus group session, researchers will review notes, and following each focus group session, researchers will listen to audio recordings twice, and transcribe the recordings. Typed notes and transcriptions will be stored on a secure server. Immediately following transcription, recordings will be permanently deleted.

The decision to participate in this study is voluntary. You will not be treated any differently if you decline this request. If you decide to participate, you have the right to withdraw from the study at any time.

If you have any questions about the purpose, procedures, and outcome of this project, contact Dr. Virginia Covill (704.943.9441 direct, 704.335.0601 main, 704.335.0697 fax, vcovill@cischarlotte.org).

This form was approved for use on *March 22, 2018* for a period of one (1) year.

I have read the information in this consent form. I have had the chance to ask questions about this study, and those questions have been answered to my satisfaction. I am at least 18 years of age, and I agree to participate in the following:

I consent to participate in an interview or focus group	_____Yes	_____No
Focus group participants only: I consent to audio recording	_____Yes	_____No
I consent to participate in reviewing the school environment measure	_____Yes	_____No

_____ _____
Signature Date

_____ _____
Print Name Date

APPENDIX D: SEMI-STRUCTURED FOCUS GROUP AND INTERVIEW SCRIPTS

School Environment: Measuring Key Elements of School Climate and Culture in Charlotte Mecklenburg Schools

Researchers: Use facilitation skills to ensure the majority of discussion time is spent answering these key questions.

- Q1. What do participants perceive to be the most important elements of the school environment in terms of these conditions' impacts on student behavior and learning in CMS?

- Q2. Which domains/dimensions of school environment identified by researchers (e.g., found in existent literature and heard from district leaders) resonate and which domains/dimensions do not resonate with participants (i.e., teachers, site coordinators) based on their CMS experiences?

- Q3. Are there additional elements of school environment (e.g., unfamiliar to researchers) that participants perceive as critical for inclusion in CMS' conceptualization and measure of school environment? If so, how do participants describe these environmental conditions and perceive their impacts on student behavior and learning?

Prior to beginning each focus group, obtain informed consent by:

- describing to potential participants what participation entails;
- giving them as much time to read the consent form as they need;
- informing participants that they are free to withdraw at any time and that they will not be adversely affected by withdrawing;
- and informing them how data will be collected, used, and stored.

Thank all participants who consent, and remind the group that the session will conclude in 30 minutes. *We have a lot to cover, so we are going to jump right in!*

Part A. Introduce the concept of school environment and the purpose of the study

According to the literature, a student's ability to succeed in school (i.e., academically, socially, etc.) is a product of the student's interactions with her or his school environment. Therefore, student behavior is influenced by the system of expectations, traditions, beliefs, policies, and norms in their school and their community. Researchers have investigated this phenomenon by studying school culture and school climate.

However, these two concepts overlap in multiple areas and contain flaws in how they are defined and measured, limiting their utility in schools. We are addressing these concerns by merging the essential components of school climate and school culture. ***"School environment" refers to the overarching category of concepts that reflect the surroundings or conditions in which people operate in school.*** *By reconceptualizing key elements of the school environment, this project*

aims to clearly define school environment and set the stage for the development of a measure that can enhance school improvement efforts. Specifically, what you discuss today will inform the creation of a survey to be piloted in CMS elementary schools next school year. This first survey will ask teachers to respond to questions about their school's environment, but eventually researchers aim to develop a version of the survey for administrators, parents, and students to create a more complete picture of the school environment.

Part B. Gauge participant's immediate thoughts/reactions

Think about a school where the norm is for students to have few behavioral challenges and high or at least average academic achievement.

- *What elements of the school immediately come to mind?*
- *Can you rank those elements as a group – which 3 are most important in terms of their impact on student behavior and academic success?*

Think about a school where the opposite is true- frequent/serious behavioral challenges and below average academic achievement are common.

- *What elements of the school immediately come to mind?*
- *Can you rank those elements as a group – which 3 are most detrimental in terms of their impact on student behavior and academic success?*

After the group has shared their general ideas, share the handout (1 per participant).

Part C. Ascertain how participants' experiences/views do and/or do not align w/ the literature

As you can see, there are five domains. Hold up the last page with the visual of school environment. *These five domains are made up of dimensions from the literature we reviewed that collectively reflect the school environment.* Give everyone a moment to look at the visual. *If anything immediately comes to mind, feel free to write or draw on this page. At the end of the session, participants will collect your handouts, so please do not write your name anywhere.*

To begin discussing specific dimensions, turn to the first page: shared vision.

Facilitate conversation around how concepts/ideas generated initially by participants do or do not fit into these domains.

Provide opportunities for participants to share examples, and encourage participants to write down examples on their sheets as well.

Next, ask participants: *Now, which dimensions and/or domains do you think are most important? How does each contribute to school effectiveness?*

Finally (time permitting), ask participants to provide specific positive and negative examples of how each domain and dimension could be observed in schools.

STOP at Minute 25 and ask:
In order for you to endorse a measure of school environment, what key elements would have to be included? Why?

Interviews: Facilitator Guide

Part A. Introduce the concept of school environment and the purpose of the study

- Review consent form

- Unique opportunity: two concepts overlap in multiple areas and contain flaws in how they are defined and measured, limiting their utility in schools.

    - We are addressing these concerns by merging the essential components of school climate and school culture. **"School environment" refers to the overarching category of concepts that reflect the surroundings or conditions in which people operate in school.** This project aims to clearly define school environment and set the stage for the development of a measure that can enhance school improvement efforts.
    - Specifically, what you discuss today will inform the creation of a survey to be piloted in CMS elementary schools next school year. This first survey will ask teachers to respond to questions about their school's environment, but eventually researchers aim to develop a version of the survey for administrators, parents, and students to create a more complete picture of the essential components of the school environment in CMS – what really matters in terms of student success!

Part B. Gauge participant's immediate thoughts/reactions and decide when to provide handout – first or after a few minutes?

Think about a school where the norm is for students to have few behavioral challenges and high or at least average academic achievement.

- What elements of the school immediately come to mind?
- Examples of what that looks like (stories to share with us to describe/illustrate)?

Think about a school where the opposite is true- frequent/serious behavioral challenges and below average academic achievement are common.

- What elements of the school immediately come to mind?
- Can you rank your top 3 elements – which are the most detrimental in terms of their impact on student behavior and academic success?
- Examples of what that looks like (stories to share with us to describe/illustrate)?

After participant reviews the handout.

- What's missing?
    - *He/she can keep it and let us know in the future if they have additional feedback after reviewing more carefully on their own.*
- Reminder: When the survey is ready you'll have access to it first and you'll be able to weigh in again at that time.

***School environment**: a category of concepts that reflect the surroundings or conditions in which people operate in school.*

Based on existent literature on school culture and school climate, and community partners' feedback, dimensions have been identified and organized into the following five domains (Deal & Peterson, 1999; Thapa et al., 2013; Wang & Degol, 2016).

Domain: Academics	
Dimensions	**CMS Examples & Additions?**
• **High expectations:** Demandingness, or the degree to which students perceive that teachers push them to work hard and tackle challenging assignments • **Leadership:** Principals and administration are supportive of teachers; shared leadership that balances continuity and improvement; open lines of communication • **Teaching and learning:** Quality of instruction; assessments of students; willingness of teacher; student motivation and engagement; teacher expectations; achievement goal structure; teacher's use of supportive practices • **Professionalism:** A strong professional community that uses knowledge, experience, and research to improve practice; review and assessment of teaching practices; opportunities for growth and development through professional development; data-based decision-making using continuous assessment	

Referred to as academic climate by Wang and Degol (2016), *academics* includes manifest indicators of the quality of an academic environment that consistently predict student achievement (Lee & Smith, 1999; McEvoy & Welker, 2000). In high performing schools, educators believe in their ability to improve student outcomes, which is evident through the following dimensions of the academics domain: leadership; teaching and learning; professionalism; and academic press. For over fifteen years, schools in Chicago have administered a climate survey that measures academic engagement and academic press; the 5 Essentials School Report is a survey designed to measure the extent to which schools have effective leaders, collaborative teachers, and ambitious instruction that drive students to meet high academic expectations (Melnick et al., 2017). While all dimensions of school environment are hypothesized to predict student outcomes, elements such as social support have been found to only influence learning in schools when the organization endorses and facilitates an environment in which academic rigor is prioritized and taken seriously (Lee & Smith, 1999).

Domain: Community	
Dimensions	**CMS Examples & Additions?**
• **Partnership:** Role that community members and parents play; parental involvement • **Quality of relationships:** Trust, interpersonal relationships between staff and students; affiliation • **School connectedness:** Cohesion; sense of belonging; sense of community; student involvement (e.g., school sponsored extracurricular activities) • **Student connection:** Positive regard for teachers and other adults; positive regard for student peers • **Respect for diversity:** Fairness; autonomy; opportunities for decision making; cultural awareness • **Responsiveness:** Social support provided to meet students/families' needs	

In the school context, *community* refers to the quality of interactions among students, teachers, administrators, and school employees (Wang & Degol, 2016). Dimensions of the community domain are partnership, quality of relationships, student connection, school connectedness, respect for diversity, and responsiveness. Partnership refers to the opportunity, frequency, and quality of parental participation, as well as participation of community members in school activities (Wang & Degol, 2016). Quality of relationships refers to the nature of relationships among students, between students and teachers, and among school staff (Wang & Degol, 2016). This dimension also includes the extent to which members of a school trust and support one another (Melnick, Cook-Harvey, & Darling-Hammond, 2017). Related to the quality of relationships, student connection refers to how students within a school see one another. School connectedness refers to the sense of attachment, belonging, and inclusiveness experienced by students and staff (Melnick, Cook-Harvey, & Darling-Hammond, 2017; Wang & Degol, 2016). Respect for diversity refers to the mutual respect between members of the school community from different backgrounds. Finally, responsiveness refers to a school's capacity to react to the various needs of students or parents and the likelihood that they will do so effectively. Schools that facilitate a high quality school community are better able to meet students' psychological needs and promote academic development (Wang & Degol, 2016).

Domain: Safety	
Dimensions	**CMS Examples & Additions?**
• **Social/emotional safety:** Presence of caring and supportive staff; availability of counseling services; an absence of verbal bullying or harassment • **Physical safety**: Frequency and severity of violence and aggression; students and staff feel safe; security measures (e.g., metal detectors, guards) • **Behavior Management:** Conflict resolution, clarity, fairness, and consistency of rules; belief in school rules; knowledge and implementation of behavioral interventions and supports; behavioral order in the classroom	

School safety encompasses all aspects of security provided by a school and formed by its members, including physical and emotional safety, as well as order and discipline (Thapa et al., 2013; Wang & Degol, 2016). These three dimensions appear consistently throughout the culture and climate literatures, with a plethora of findings asserting that violence, bullying, and disruptive behavior occurs infrequently and is not tolerated in positive school environments (Benner et al., 2013; Melnick, Cook-Harvey, & Darling-Hammond, 2017). All seven of the school climate survey tools endorsed by the U.S. Department of Education measure the dimension of safety to some extent (i.e., physical safety, emotional safety, and/or discipline/orderly environment) (Melnick et al., 2017). As a basic need, safety concerns must be ameliorated by schools for students and teachers to be able to focus their resources and attention on learning, which should be of paramount concern in a healthy school environment.

Domain: Shared Vision	
Dimensions	**CMS Examples & Additions?**
• **School pride:** A rich sense of history and purpose • **Mission and Vision:** A focus on student and teacher learning • **Values and beliefs of the organization:** Core values of collegiality, performance, and improvement that engender quality, achievement, and learning for everyone; positive beliefs and assumptions about the potential of students and staff to learn and grow; collegial support based on trust • **Stories that celebrate success:** Stories that celebrate successes and recognize adult heroines and heroes who define what is possible and provide a standard to achieve • **Rituals and ceremonies:** Regularly reinforce positive, core cultural values	

While individual elements of school culture may be unique to schools, general characteristics of positive, successful cultures have been identified consistently in the literature, reflecting a school's *shared vision.* The case studies described by Deal and Peterson (1999) and Wagner's (2006) School Culture Triage Survey support the appropriateness of including the following dimensions within the shared vision domain: mission (i.e., unity of purpose); history of the school; values and beliefs of the organization; rituals and ceremonies; and myths and stories that explain the school. Like effective businesses, schools embodying key elements of shared vision will create environments conducive to success (Denison, Hooijberg, Lane, & Lief, 2012).

Domain: Physical Environment	
Dimensions	**CMS Examples & Additions?**
• **Comfortability of setting:** Heating, lighting, AC; acoustical control; cleanliness; upkeep of maintenance; quality of building • **Structural organization:** Class size; student to teacher ratio; school size; ability tracking • **Reminders:** An environment that symbolizes joy and pride • **Availability of resources:** Adequacy of supplies, resources, and materials; technology; sharing of resources	

Referred to as institutional environment by Wang and Degol (2016), *physical environment* encompasses the more tangible elements of an environment that play a significant role in shaping the experiences of its inhabitants. Three dimensions are supported by climate literature: environmental adequacy; structural organization; and availability of resources (Wang & Degol, 2016). Reminders, the fourth dimension, stems from culture literature that suggests a positive school environment provides visual reminders symbolizing joy and pride (Deal & Peterson, 1999). The School Climate Assessment Instrument endorses the inclusion of measuring respondents' perceptions of their school's physical appearance (Melnick et al., 2017). Schools with a high percentage of students who qualify for free and reduced lunch often face resource inadequacy, meaning these students experience the effects of scarcity in school and at home. The impact of increasing availability and access to resources in school, therefore, may disproportionally aid students living in poverty in terms of those students experiencing more dramatic academic gains, compared to their more affluent peers, as a result of physical environment factors (Thapa et al., 2013).

APPENDIX E: AN OVERVIEW OF SCHOOL ENVIRONMENT

An Overview of School Environment

December 2018

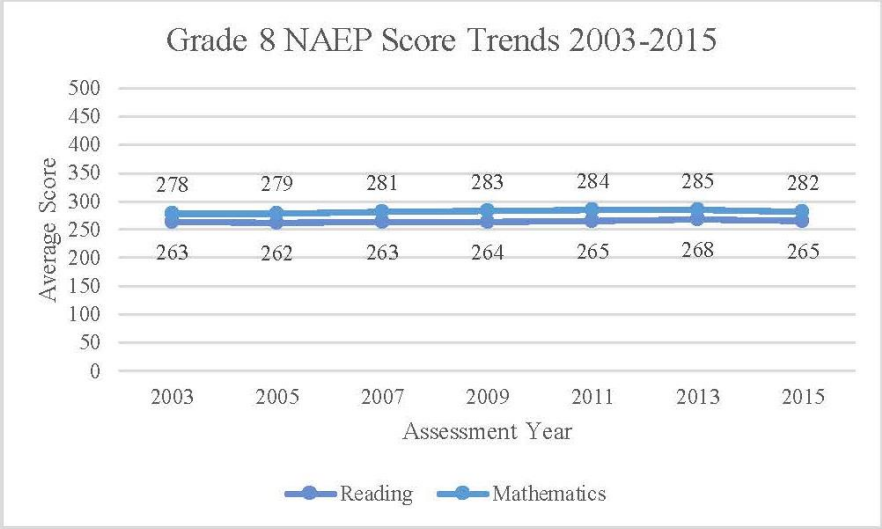
Prepared by:

Virginia Covill, Ph.D.
Director of Research & Evaluation

Erin Godly-Reynolds, M.Ed.
Community Psychology Doctoral Student, University of North Carolina Charlotte

The Importance of School Environment

Educators know what *should* improve educational outcomes based on decades of educational research that has produced a plethora of evidence-based curriculum, instructional strategies, and behavioral management techniques. This research, however, has not translated into performance outcomes; in reality, reading and mathematics achievement scores have remained relatively static for decades [1].



We know that all students do better (e.g., higher academic achievement, social-emotional competencies, graduation rates, etc.) under certain conditions, or supportive learning contexts. A student's ability to succeed in school (i.e., academically, socially, etc.) is a product of the student's interactions with her or his school environment [2,3]. Student outcomes are influenced by the system of expectations, traditions, beliefs, policies, and norms in their school and their community [4]. While research has investigated school culture and school climate, findings are limited due to:

- The two constructs of "climate" and "culture" appear to overlap in multiple ways [3,5–9]
- Both constructs contain flaws in how they are defined and measured [8,10,11]

Goal: Develop a locally-validated measure of school environment, in partnership with Charlotte-Mecklenburg schools, to meet the following objectives:

(1) Enhance community understanding of the environmental factors that will improve student achievement
(2) Strengthen whole-school supports by providing a way to document their impact (i.e., school environment improvement)
(3) Utilize data to identify where additional supports (e.g., resources, new partnerships) may be needed for schools

Charlotte-Mecklenburg School Environment Research Study

Charlotte-Mecklenburg Schools (CMS) examined differences in the socioeconomic and racial demographics across all schools in the district. CMS found significant differences in students' performance on nearly every measure analyzed based on school poverty level and race [13]. Notably, achievement gaps between black, Hispanic, and white students cannot be explained by other factors, including school poverty level [13]. Therefore, the present school environment study offers the opportunity to explore how to promote equitable outcomes for students while also improving student achievement overall.

Comprehensive School Environment Measure: Overview of Research Study Process & Benefits

The present study will identify key elements that promote student stuccess by incorporating multiple perspectives throughout the proces of developing a comprehensive measure, or survey of school environment. In addition, the measure will be designed so that multiple groups of people (i.e., stakeholders) can participate twice yearly to provide a more complete picture of school environments in CMS. The following activities outline this process.

In progress:

(1) Develop a measure of school environment by reviewing relevant literature and making ongoing refinements of definitions of key dimensions.
(2) Conduct interviews with CMS district leaders and principals, and conduct focus groups with teachers and CIS site coordinators (i.e., non-instructional school staff). Gain a deeper understanding of each domain as well as what those essential elements of the school environment look like in CMS.
(3) Using knowledge acquired during interviews and focus groups, create items that are developmentally appropriate and interpreted as intended.

Spring 2019:

(4) Revise items using written feedback from participants (e.g., district leaders, teachers).
(5) Renew CMS research application, and request permission to conduct parent focus groups.

Fall 2019:

(6) Assess the components that participants believe are essential to students' success in CMS environments: Pilot the measure with CMS teachers in grades 3-8.
(7) Support school leaders' efforts to utilize this knowledge to effect school improvements.

Spring 2020:

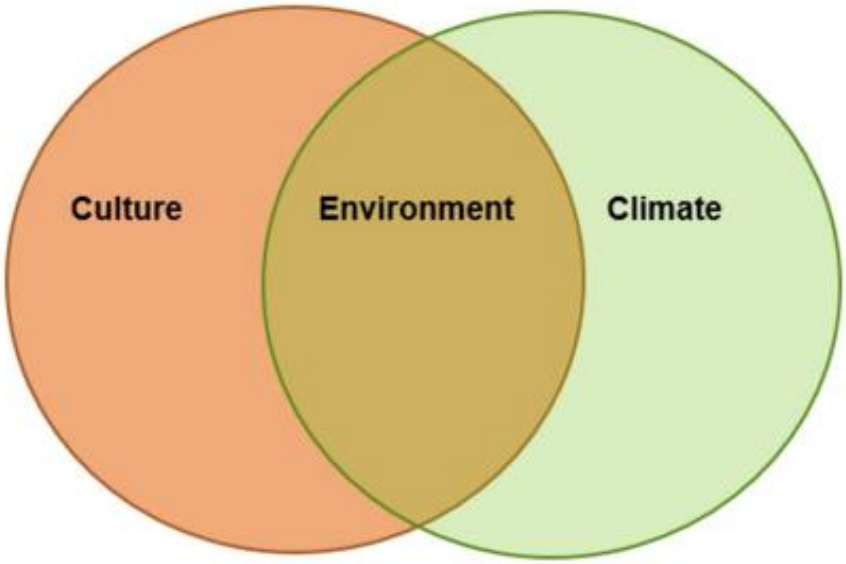
(8) Administer the measure for a second time with CMS teachers in grades 3-8.
(9) Compare results within and across schools, and continue to support school leaders' efforts to utilize this knowledge to effect school improvements.
(10) Conduct factor analysis and validation of measure.

Long-term (2020-2024):

(11) Administer the measure to teachers yearly (revising as needed to improve).
(12) Create and administer complimentary, unique versions of the measure for students, parents, administrators, and non-instructional staff at two levels: grades 3-8 and high school.

School Culture & School Climate

Previous research has investigated school context in terms of school culture and school climate. This section will illustrate the definitions and applications of school culture and school climate, identify the shortcomings of these overlapping constructs, and indicate how the use of a "school environment" concept addresses these challenges.



School Culture Definition

School culture has been defined as the common values, norms, expectations, and beliefs of a school community [11]. School culture has also been defined as a "system of shared orientations that hold the unit together and give it a distinctive identity" [8]. School cultures described as "positive" based on inconsistent criteria have been associated with improved student behavior and achievement, attendance, and teacher satisfaction [4,14–16]. The U.S. Department of Education has pointed to the influence of school culture on student learning, citing the importance of the symbolic roles of leaders in shaping cultural patterns and practices (Deal & Peterson, 1999).

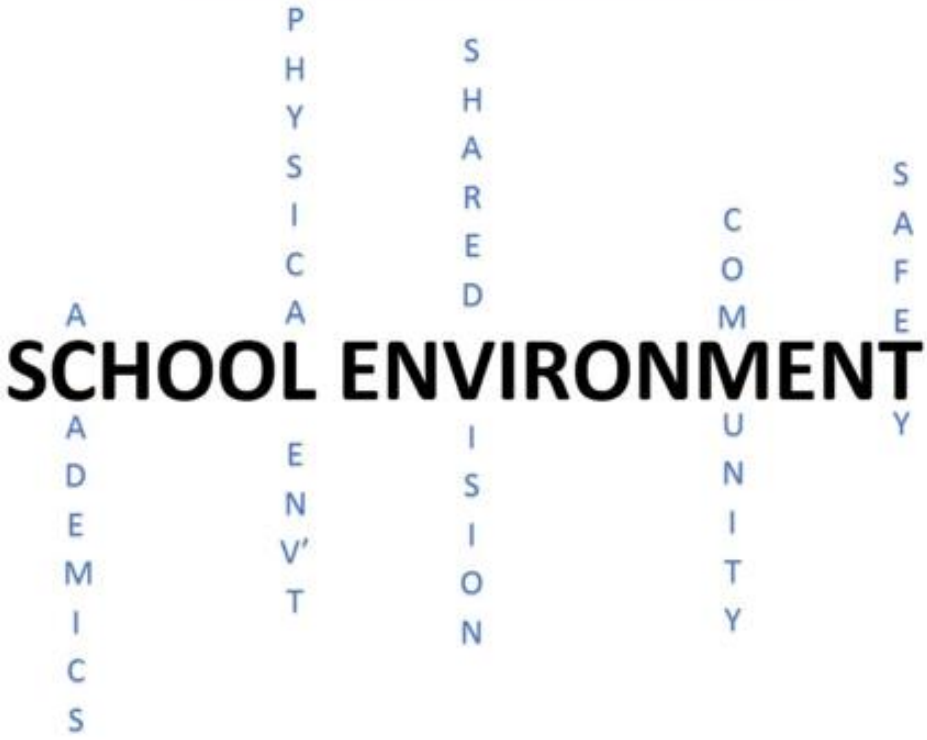
School Climate Definition

School climate is based on patterns of people's experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures [3]. According to Wang and Degol's (2016) review, school climate has been described as representing "virtually every aspect of the school experience" (p. 315), with researchers citing school community relationships, school organization, and both institutional and structural features of the school environment. Since there is no universal definition of school climate, researchers have typically characterized and described the construct differently, with definitions ranging from abstract and theoretical to concrete and narrow [5]. Nonetheless, a large number of research studies support a direct connection between a school's climate and students' attendance, achievement, and behavioral outcomes [5].

School Environment Survey Dimensions

Developing a positive school environment can ultimately improve student outcomes by promoting the accumulation of developmental assets, which lead to resilience in the face of adversity. In school settings, student behaviors reflect the extent to which the school environment inspires greater attachment to peers and role models, commitment to the school, involvement in school-related activities, and belief in the school's value system.

> ***School environment**: a category of concepts that reflect key attributes of the surroundings or conditions in which people operate in school.*



Based on existing literature from school culture and school climate research, the following dimensions have been identified and organized into five domains that are summarized in the table below [2,3,5]. Importantly, concepts frequently included in culture and climate research, albeit with differing or no definitions provided, have been included, as well as some concepts that have been consistently excluded from one or the other. In addition, a definition accompanies each subdimension in order to begin the process of meticulously and collaboratively clarifying each concept. Defining what school environment means is essential to designing survey items that fully and accurately capture the essential elements that our stakeholders identify and describe.

Domain	Dimensions
Shared Vision	• Mission: A mission focused on student and teacher learning • History of the school: A rich sense of history and purpose • Values and beliefs of the organization: Core values of collegiality, performance, and improvement that engender quality, achievement, and learning for everyone; positive beliefs and assumptions about the potential of students and staff to learn and grow; collegial support based on trust • Rituals and ceremonies: Regularly reinforce positive, core cultural values • Myths and stories that explain the school: Stories that celebrate successes and recognize adult heroines and heroes who define what is possible and provide a standard to achieve
Safety	• Social/emotional safety: Presence of caring and supportive staff; availability of counseling services; an absence of verbal bullying or harassment • Physical safety: Frequency and severity of violence and aggression; students and staff feel safe; security measures (e.g., metal detectors, guards) • Discipline and order: Conflict resolution, clarity, fairness, and consistency of rules; belief in school rules; knowledge and implementation of behavioral interventions and supports; behavioral order in the classroom
Community	• Partnership: Role that community members and parents play; parental involvement • Quality of relationships: Trust, interpersonal relationships between staff and students; affiliation • Student connection: Positive regard for teachers and other adults; positive regard for student peers • Connectedness: Cohesion; sense of belonging; sense of community; student involvement (e.g., school sponsored extracurricular activities) • Respect for diversity: Fairness; autonomy; opportunities for decision making; cultural awareness • Responsiveness: Social support provided to meet students/families' needs
Academics	• Leadership: Principals and administration are supportive of teachers; shared leadership that balances continuity and improvement; open lines of communication • Teaching and learning: Quality of instruction; assessments of students; willingness of teacher; student motivation and engagement; teacher expectations; achievement goal structure; teacher's use of supportive practices • Professionalism: A strong professional community that uses knowledge, experience, and research to improve practice; review and assessment of teaching practices; opportunities for growth and development through professional development; data-based decision-making using continuous assessment • Academic press: Demandingness, or the degree to which students perceive that teachers push them to work hard and tackle challenging assignments
Physical Environment	• Comfortability: Heating, lighting, AC; acoustical control; cleanliness; upkeep of maintenance; quality of building • Structural organization: Class size; student to teacher ratio; school size; ability tracking • Availability of resources: Adequacy of supplies, resources, and materials; technology; sharing of resources • Reminders: An environment that symbolizes joy and pride

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APPENDIX F: CMS AND UNCC IRB APPROVED MODIFICATIONS, JANUARY 2021

OFFICE OF RESEARCH COMPLIANCE
9201 University City Boulevard
319 Cameron Hall
Charlotte NC 28223-0001
(704)-687-1871
Web site: http://research.uncc.edu/
Federalwide Assurance (FWA) #00000649

To: Erin Godly-Reynolds
Psychology

From: Office of Research Protections and Integrity

Date: 1/22/2021
RE: Notice of Modification Approval (Exempt)
Exemption Category: 2.Survey, interview, public observation **Study #:** 19-0600

Study Title: School Environment: Measuring Key Elements of School Climate and Culture in Charlotte-Mecklenburg
Schools

This modification submission has been reviewed and approved by the Office of Research Protections and Integrity (ORPI).

Important Information:

1. Human Subjects Research (HSR) activities that can be conducted virtually/remotely should be conducted virtually/remotely. Protocol Modifications are required to adjust data collection procedures to remote data collection (e.g., phone, online or virtual).
2. The operational status of the research/study location where HSR activities will occur will guide whether the activities should occur.
3. Off-campus HSR activities may occur if the organization, institution, agency, business, etc. is operational and is willing to support the researcher to conduct the research.
    - Researchers will be representing the University and therefore, regardless of the organization's standards, researchers must adhere to University, local, and state requirements regarding the use of face coverings, physical distancing standards, group size limitations, etc.
4. Conducting HSR activities on-campus (Main campus, Center City campus, and other locations that may be extensions of the University) is subject to the operational status of the University.
    - Researchers must adhere to all University, local, and state public health and safety requirements including wearing face coverings whenever indoors and maintaining physical distancing.
    - Researchers must adhere to the Niner Nation Cares requirements including the 6 Ws (Wash, Wear, Wait, Wipe, Watch, and Wave) and limitations on the size of gatherings.
5. Should the operational status of off-campus study locations change, the University's operational status change, Mecklenburg County and/or the state of North Carolina impose higher restrictions (stay-at-home orders), researchers must comply with these requirements and therefore HSR activities, regardless of whether the activities are off-campus or on-campus may need to halt.

Submission Description:

IRB Modifications, 1/21/21

1. General Information. Answer #4.

- Requesting approval to restart this study ASAP. The following, proposed modifications were already approved by the CMS Research Review Panel, including an updated DSP and MOU that were signed by all parties again in Nov-Dec, 2020.

A.1. Background and Rationale

- Answer #2. Research Question modification: "…students' Winter (SY 2020-2021)…" instead of "…schools' 2019-2020…" because of COVID-19 interruption to data collection in March 2020.

A.4. Study design, methods and procedures

Changes within answer #2.

- Estimated completion time revised from 35 to 25 minutes based on 28 teachers' average completion time in March.
- The number of items has been revised. All participants will see 104 items. Teachers who have taught in-person this school year will see all 129 items. The total number of items has increased because some items have been duplicated and revised slightly to distinguish between in-person and remote/online experiences.
- Please see the attachment, "School Environment Measure_CMS IRB Approved_COVID-19 modifications tracked_1.21.21", which is a Word document that shows all track changes, including the
    - following: language changed slightly to clarify whether the directions/questions/items are relevant to in-person school, remote/online school experiences, or both;
    - language/wording of items changed very slightly to include the nature of current challenges (e.g., ACEs examples now include the death of an important person), which are evidence-based and will always be relevant (i.e., even after this pandemic ends);
    - two questions added (new Question Block #3) to ask teachers about their teaching/learning format
- Timeline, as previously approved: The measure will be piloted between 2/24/2020 and 3/31/2020. Timeline modifications: Participants will have access to the online survey and will submit their responses between the date that UNCC IRB approves these modifications (hopefully in January, 2021) and May 28, 2021. Based on ever-changing plans for students to return to in-person learning, CMS and CIS will provide a recommended six-week window to target during the approved data collection window. Questions have been added to the survey so the researcher will understand and take into consideration (e.g., important context for analyses) if some schools participate before students are transitioned back to in-person learning. Approving a wide window of January - May will allow for flexibility to adjust plans as needed based on the most up-to-date information.
- Attachments to replace: Within answer #3, the School Environment Measure. Please see the attachment, "School Environment Consent Form & Measure_IRB Modification_1.21.21", which is a pdf with the updated consent form and a clean (no track changes) version of the measure. This is everything that participants will see in Qualtrics.

A.8. Data analysis

- **Answer to #1.** "EOG" removed. Measures of Academic Progress (MAP) Rasch Unit (RIT) scores will be shared (by CMS), which replaced EOG data to measure academic outcomes. CMS will NOT provide EVAAS growth that was removed from the data request. For all remaining data on the variable request, instead of SY 2018-2019 & SY 2019-2020, the current academic year (2020-2021) is being requested, and more specifically, data must include the following time period: the first day of school through the final day of Winter MAP Testing.

B.1. Methods of recruiting

- Attachments to replace: School Environment Project_Flyer_FINAL_1.pdf Uploaded by Catherine Runden &
- School Environment Project_Recruitment Emails_FINAL.pdf Uploaded by Erin Godly-Reynolds

Please see "CIS Recruitment Email & Flyer Attachment_January 2021". The same language would be repeated in follow-up emails if needed (e.g., low participation rates), and the "flyer" is included in this same document. The flyer will not be hung in schools, but rather will be included as an email attachment in recruitment emails. ● **Answer to #3.** Recruitment Materials & Plan: Modified as needed to reflect all aforementioned modifications due to COVID-19. In addition, since March (the last time recruitment for this study was underway), there were leadership changes at CIS (e.g., a new president & CEO), so the email sender has changed. Finally, because of COVID-19, flyers will not be hung in schools. Rather, they will be included in emails as attachments.

B.3. Participant Contact, Duration and Privacy

- #3. Total duration revised from 35 to 25 minutes based on 28 teachers' average completion time in March.
- #4. All proposed modifications have already been approved by the CMS Research Review Panel and all parties
  (e.g., CMS and CIS) are ready to restart this study as soon as the UNCC IRB approves these modifications (hopefully in January, 2021).
- Please see the attachments, "DSP Amendment 01 - School Environment - Kilmer" & "MOU Addendum and Variables_GodlyReynolds_signedCMS.UNCC"

B.4. Incentives for participation

- Answer #1. The incentive was changed slightly because instead of a free breakfast for all teachers, which would not be safe right now, CIS will donate supplies or technology to support teaching and learning.
- CIS will celebrate the three schools that have the highest teacher completion rates by donating supplies or technology to support teaching and learning ($250 per school / $750 total). Each school will choose materials (i.e., school supplies, headphones for remote learning, student attendance incentives, etc.) to meet their needs.

C.1. Data Sources

- Attachments to replace: School Environment Project_CMS Variable Request.pdf
- Answer #2. The CMS Research Review panel and Office of Accountability has already officially approved, signed an updated DSP and MOU, and met with the researcher via Zoom to confirm that they will provide the data requested for this study.
- Since March 2020, after data collection was suspended because of COVID-19, the researcher has been in regular communication with CMS. The current modifications reflect months of discussing the best path forward to restart this study.
- Please see the attachments, "DSP Amendment 01 - School Environment - Kilmer" & "MOU Addendum and Variables_GodlyReynolds_signedCMS.UNCC"

C.3. Coding and Data Use Agreements

- Timing for CMS to share data with researcher changed because of COVID-19

Investigator's Responsibilities:

1. It is the investigator's responsibility to promptly inform the committee of any changes in the proposed research, and of any adverse events or unanticipated risks to participants or others.
2. You are required to obtain Office of Research Protections and Integrity and/or IRB approval for any changes to any aspect of this study before they can be implemented.
3. Data security procedures must follow procedures as approved in the protocol and in accordance with ITS Guidelines for Data Handling.

Your approved consent forms (if applicable) and other documents are available online at http://uncc.myresearchonline.org/irb/index.cfm?event=home.dashboard.irbStudyManagement&irb_id=19-0600.

CC: James Cook, Psychology

APPENDIX G: SCHOOL-LEVEL IDENTIFIED STUDENT PERCENTAGE (ISP) AND RACIAL DIVERSITY

School Name	*n*	ISP*	Poverty Level**	Title I	Learning Community	% Hispanic	% Black	% White
Druid Hills Academy***	19	75.12	High	Y	Central 1	13%	82%	0%
Renaissance West STEAM Academy	3	74.57	High	Y	Northwest	23%	65%	1%
Westerly Hills Academy***	15	72.8	High	Y	Central 1	19%	71%	3%
Bruns Academy	6	71.07	High	Y	Central 1	19%	72%	2%
Ashley Park Pre K-8 School	1	69.06	High	Y	Central 1	10%	81%	2%
Thomasboro Academy***	17	65.7	High	Y	Central 1	20%	63%	3%
Winterfield Elementary	3	56.44	High	Y	Central 1	64%	23%	2%
Highland Renaissance Academy	3	56.35	High	Y	Central 1	39%	54%	3%
Ranson Middle School	4	55.67	High	Y	Central 1	23%	67%	2%
First Ward Creative Arts Academy	1	52.88	High	Y	Central 1	18%	72%	5%
Devonshire Elementary	1	52.8	High	Y	Central 1	61%	31%	3%
Hickory Grove Elementary	2	51.4	High	Y	Central 1	48%	42%	2%
Merry Oaks International Academy***	7	50.77	High	Y	Central 1	68%	26%	3%
Eastway Middle School	2	50	Moderate	Y	Central 1	63%	27%	4%
Coulwood STEM Academy	1	46.96	Moderate	Y	Northwest	26%	65%	4%
Paw Creek Elementary***	15	45.57	Moderate	Y	Northwest	31%	54%	8%
Tuckaseegee Elementary	2	45.37	Moderate	Y	Northwest	40%	44%	4%
Barringer Academic Center***	12	44.23	Moderate	Y	Central 1	9%	51%	11%
Whitewater Middle School	4	43.42	Moderate	Y	Northwest	35%	52%	4%
Oakhurst STEAM Academy	3	42.83	Moderate	Y	Central 1	29%	41%	20%
Mountain Island Lake Academy	3	40.35	Moderate	Y	Northwest	15%	61%	15%
River Oaks Academy	1	40.22	Moderate	Y	Northwest	15%	69%	7%
Windsor Park Elementary***	25	40.15	Moderate	Y	Central 1	64%	16%	5%
Berryhill School***	13	39.48	Moderate	Y	Northwest	73%	11%	12%
Nations Ford Elementary	5	38.56	Moderate	Y	Central 1	74%	23%	0%
Shamrock Gardens Elementary	1	35.08	Moderate	Y	Central 1	21%	33%	40%
Francis Bradley Middle	6	18.12	Low	N	Northwest	16%	34%	39%
Cornelius Elementary	1	16.94	Low	N	Northwest	16%	11%	65%
Barnette Elementary	2	12.09	Low	N	Northwest	13%	18%	62%
Grand Oak Elementary***	7	9.54	Low	N	Northwest	9%	9%	73%
Davidson Elementary	1	6.26	Low	N	Northwest	12%	6%	78%

Note. n = School Environment Survey teacher respondents.

*Community Eligibility Provision program's ISP data were publicly accessed (see https://www.dpi.nc.gov/districts-schools/district-operations/school-nutrition/sn-data-reports).

**0-24.5% is Low Poverty; 25-50% is Moderate Poverty; 50.1%+ is High Poverty.

***School had enough teacher participants (i.e., ≥7) complete the School Environment Survey to be included in all data analyses.

APPENDIX H: INFORMED CONSENT AND SCHOOL ENVIRONMENT SURVEY PILOTED IN 2021

School Environment Measure

Title: The School Environment Project: Teacher Survey 2021

Question Block #1: Consent Form

UNC CHARLOTTE
Department of Psychological Science
9201 University City Boulevard, Charlotte, NC 28223-0001
Contact: 704-687-1477 / egodlyre@uncc.edu

Consent to be Part of a Research Study

Title: The School Environment Project: Measuring Key Elements of School Climate and Culture in Charlotte-Mecklenburg Schools

Principal Investigator: Erin Godly-Reynolds, MA, M.Ed, Doctoral Student in Community Psychology, UNC Charlotte

Faculty Advisor: Ryan Kilmer, PhD, Professor of Psychology, UNC Charlotte

You are invited to participate in a research study. Participation in this research study is voluntary. The information provided is to help you decide whether or not to participate. If you have any questions, please ask.

Important Information You Need to Know

- The purpose of this study is to improve the conditions in which children learn: The Charlotte community would benefit from a survey designed to measure what matters most at the school level in order for children to succeed academically in CMS. The survey will ask you questions about aspects of your school climate (i.e., how being a member of your school community feels) and school culture (i.e., what your school collectively does; also known as school norms and expectations).
- You will be asked to complete an online survey. Only teachers in grades 3-8 will participate this year, but we aim to ask parents, students, administrators, and noninstructional staff members similar questions in the future.
- If you choose to participate it will require approximately 25 minutes of your time.
- Risks or discomforts from this research are minimal, but answering questions about the school environment in which you work could make you feel uncomfortable.
- Benefits may include: 1) feelings of empowerment – this is an opportunity to share your knowledge about what's working well and report what could be improved in your school, and 2) exposure to new ideas or reminders of evidence-based practices that exemplify what teachers and other members of your school community could do to improve the school environment.

- All survey questions were written using a combination of your colleagues' (CMS teachers, noninstructional school staff, principals, and district staff) input and academic literature on aspects of school environment that matter most in terms of students' academic, behavioral, and attendance outcomes. Your responses to this survey will be used to draw data-informed conclusions about the relationships between school-level factors included on this survey and your students' likelihood of achieving academic success.
- The study link or QR code for this study is anonymous. We will never ask for your name or email address and your IP address will NOT be collected.
- If you choose not to participate, or terminate your participation at any time before completion, there will be no adverse consequences.

Please read this form and ask any questions you may have before you decide whether to participate in this research study.

Why are we doing this study?

In partnership with Charlotte-Mecklenburg Schools (CMS) and Communities In Schools of Charlotte-Mecklenburg (CIS), a UNCC doctoral student researcher has developed and aims to pilot a tool to consistently measure the school environment. Through focus groups with elementary school teachers and noninstructional staff, and interviews with principals, district office staff, and learning community leaders, themes were identified that guided the development of a school environment measure during SY 2018-2019. Piloting the resulting tool will allow for a way to interpret student achievement, attendance, and behavioral gains in context, with a better understanding of what works in each school's environment. Ultimately, the proposed research not only contributes to the existing research literature by defining and operationalizing school environment, but it also holds promise for improving student achievement.

Why are you being asked to be in this research study?

Current CMS teachers in grades 3-8 who work in specific schools (i.e., one of two learning communities chosen for this study) are being asked to participate.

What will happen if I take part in this study?

If you consent below by clicking "Yes, I agree", your participation will continue immediately. You will be asked closed-ended questions about the Charlotte-Mecklenburg School in which you currently work, and you will be asked to answer all questions from the perspective of your current position teaching students in grades 3-8. It will be very important that you do not include any information about prior work experiences; all questions must be answered about your current school only. If you work in more than one school, please take the survey once for each school that you work in. The closed-ended answer choices will be, "Strongly agree, Agree, Neutral, Disagree, or Strongly Disagree". Some items include an additional response choice, "Not enough time in-person to evaluate" because you may not have had enough time in-person with students this school year (2020-2021) to observe these elements of your school environment. A few questions will allow you to provide an open-ended response, but those are not required for survey completion.

You will be asked to complete one, online survey. Your time commitment will be about 25 minutes; because the link is anonymous, be sure that you have at least 25 minutes to complete the survey in one sitting before you begin because your work will not be saved until the very end when you will hit "submit". If your browser were to close at any point before then, your responses would be lost.

Please respond to all required items and submit your survey responses once this school year (2020-2021).

We will also collect academic, behavior, and attendance data directly from CMS about students who are currently enrolled in grades 3-8 in your school; the Office of Accountability will share de-identified academic, behavior, and attendance data with the Principal Investigator.

What benefits might I experience?

During school year 2018-2019, teachers discussed the topic of school environment, including specific items on this survey, in a focus group setting facilitated by researchers. Throughout the focus groups, teachers seemed energized by this research because it provided an opportunity for their voices to be heard and an avenue for their collective input on what matters most to be utilized by principals and other district leaders to improve students' and teachers' experiences in CMS.

Therefore, benefits may include: 1) feelings of empowerment – this is an opportunity to share your knowledge about what's working well and report what could be improved in your school community, and 2) exposure to new ideas or reminders of evidence-based practices, and time to reflect on current practices in your school that exemplify what teachers and other members of your school community could do to improve the school environment for all school community members.

The survey that you will help improve by piloting it this year holds promise for improving student achievement. After researchers reduce the survey to a more manageable size, school districts can utilize the measure to determine which elements of their school environment would benefit from improvement efforts, and then implement interventions to improve accordingly. Researchers plan to provide recommendations for such improvement efforts. Future survey responses (e.g., next school year) will provide evidence of any subsequent changes in your school environment.

Principals will also have a consistent way to compare their school's environment to that of other district schools, and could share what they think your school is doing well with other principals who aim to improve in areas where your school is excelling, and vice versa.

Furthermore, the Every Student Succeeds Act (ESSA) now requires schools to choose and report an indicator of "School Quality or Student Success" as part of their school accountability systems. Since this measure will reconceptualize school climate, it could be an option for this indicator.

What risks might I experience?

It is possible that answering questions about your school environment could make you feel uncomfortable or embarrassed, depending on your experiences, behaviors, and observations. For example, you will be asked questions about the extent to which you feel physically and psychologically safe, and other questions will ask about how your school typically responds to students and families who are experiencing challenges such as homelessness. You may stop participating at any time.

The researcher will ask for the name of your CMS school and the grade level(s) that you currently teach in order to 1) make sure you are eligible to participate and 2) group responses by school.

How will my information be protected?

The study link that brought you here is anonymous: We will never ask for your name or email address and your IP address will NOT be collected.

Only one researcher (Erin Godly-Reynolds) will have access to teacher survey data that could potentially enable someone to figure out your identity (e.g., school and grade level), and she will not share that or any other potentially identifiable information about you with anyone or any organization.

If 10 or more teachers from your school participate, your school can be included in all aspects of this study, and then school-level results can be reported to CMS (e.g., your principal). If fewer than 10 teachers from your school participate, school-level results cannot be analyzed or reported. **Individual-level responses will never be reported or shared; your principal will NEVER have access to any potentially identifiable information (e.g., the grade levels of participating teachers). CMS will only know the total number of teachers from your school that participated.**

In addition, teacher surveys will be administered using Erin Godly-Reynolds' password protected UNCC Qualtrics account and data will be stored using Erin Godly-Reynolds' password protected UNCC data storage account. Erin Godly-Reynolds commits to: Keep her logins and passwords protected and confidential and terminate any session when not in use, and ensure that no one else has access to her password protected computer workstation or UNCC password protected accounts. We plan to publish results of this study, but only at the school level or higher (e.g., learning community level). To protect your privacy we will not include any information that could identify you.

How will my information be used after the study is over?
After this study is complete, raw data will be permanently deleted. Any data that could be used to figure out your identity (e.g., school and grade level) will be removed immediately and then the data can be stored for a maximum period of three years. The data collected for this study cannot be used for another study.

Will I receive an incentive for taking part in this study?
No individual-level incentives will be provided. However, Communities In Schools of Charlotte-Mecklenburg will donate supplies or technology to support teaching and learning **($250 per school** / $750 total). Each of the **three schools** that have the highest teacher completion rates will choose materials (i.e., school supplies, headphones for remote learning, student attendance incentives, etc.) to meet their needs.

If there is very little or no variability in your responses (i.e., you choose the same answer for virtually all questions), the researchers will not be able to utilize your responses in this study, so your participation will not count towards your school's completion rate. Items are worded in such a way that valid submissions will include varied response choices throughout.

What are my rights if I take part in this study?
It is up to you to decide to be in this research study. Participating in this study is voluntary. Even if you decide to be part of the study now, you may change your mind and stop at any time. You do not have to answer any questions you do not want to answer. Your responses will only be recorded and utilized if you complete the entire required portion of the online survey. If you choose not to answer the optional questions at the end, you must continue to hit next until you are notified that your responses have been recorded. If you withdraw before you reach that last screen, your participation will be terminated and your responses will not be recorded or utilized in this study.

Who can answer my questions about this study and my rights as a participant?
For questions about this research, you may contact the Principal Investigator, Erin Godly-Reynolds, at egodlyre@uncc.edu or 704.687.1477, or you may contact her Faculty Advisor, Dr. Ryan Kilmer, at rpkilmer@uncc.edu or 704.687.1340.

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Office of Research Compliance at 704-687-1871 or uncc-irb@uncc.edu.

Consent to Participate

By choosing "Yes, I agree" below, you are agreeing to be in this study. If you have any questions about the study at any time, you can contact the study team using the information provided above.

I understand what the study is about and my questions so far have been answered. I currently teach students in grades 3-8 in a Charlotte-Mecklenburg School. I agree to take part in this study.

○ Yes, I agree.

○ No, I do not agree.

Question Block #2: Checking Eligibility Criteria

Note for reviewer: For all of the following, if participants respond "No", they will be sent to the end of the survey, and a message will appear that lets them know their participation in the study has been terminated.

Q: Are you currently employed by Charlotte-Mecklenburg Schools?
Response choices: Yes or No

Q: Is "teacher" or "certified substitute teacher" your official job title?
Please note, if you are a Teaching Assistant, the correct answer to this question is "no". Only CMS teachers in grades 3-8 will participate this school year, but we aim to ask parents, students, noninstructional staff, and school administrators similar questions in the future.
Response choices: Yes or No

Qualtrics Logic: If yes…

a. Which best describes your job title?
   Response choices:
   - Teacher or
   - Certified Substitute Teacher

   Please note, if you are a Teaching Assistant, the correct answer to the previous question was "no". Only CMS teachers in grades 3-8 will participate this school year, but we aim to ask parents, students, noninstructional staff, and school administrators similar questions in the future. Thank you for your interest, and we look forward to hearing from you in the future.

b. For how long have you been teaching at this school?
   Response: *Teacher will enter how many years and how many months. One or the other will be required (e.g., 1 year or 6 months), and both will be allowed (e.g., 1 year and 6 months)*

Q: In your current position, do you teach students in grades 3-8?
Response choices: Yes or No

Qualtrics Logic: If yes…
Which grade level(s) do you currently teach?
Response choices: 3, 4, 5, 6, 7, 8

Q: Do you work in a [Central 1] or [Northwest] learning community school?
Response choices: Yes, Maybe, or No

Qualtrics Logic: If yes or maybe…
Choose your school (all Central 1 schools listed first, alphabetically, then all Northwest schools, alphabetically):

- Allenbrook Elementary
- Ashley Park PreK-8 School
- Barringer Academic Center
- Briarwood Elementary
- Bruns Academy
- Cochrane Collegiate Academy
- Devonshire Elementary
- Druid Hills Academy
- Eastway Middle
- First Ward Creative Arts Academy
- Hickory Grove Elementary
- Highland Renaissance Academy
- Lawrence Orr Elementary
- Marie G Davis
- Merry Oaks International Academy
- Nations Ford Elementary
- Oakdale Elementary
- Oakhurst STEAM Academy
- Ranson Middle
- Reid Park Academy
- Shamrock Gardens Elementary
- Statesville Road Elementary
- Thomasboro Academy
- Walter G Byers School
- Westerly Hills Academy
- Windsor Park Elementary
- Winterfield Elementary
- Bailey Middle
- Barnette Elementary
- Berryhill School
- Cornelius Elementary
- Coulwood STEM Academy
- Davidson Elementary (K-8)
- Francis Bradley Middle
- Grand Oak Elementary
- Hornets Nest Elementary
- Huntersville Elementary
- J.V. Washam Elementary

- Long Creek Elementary
- Mountain Island Lake Academy
- Paw Creek Elementary
- Renaissance West STEAM Academy
- River Oaks Academy
- Torrence Creek Elementary
- Trillium Springs Montessori
- Tuckaseegee Elementary
- Whitewater Academy
- Whitewater Middle School
- Wilson STEM Academy
- Winding Springs Elementary
- *or*
- I do not work in any of these schools
    - Qualtrics Logic: they would be sent to the end of the survey, and a message will appear that lets them know that because they are not eligible to participate at this time, their participation in the study has been terminated, but to contact egodlyre@uncc.edu with questions.

Question Block #3 (Teaching/Learning Format for SY 2020-2021)

(Note for IRB reviewers: These questions will guide Qualtrics logic so that teachers are not being asked questions that are not applicable to them or their students)

1. Throughout this school year (2020-2021), please check ALL of the statements that apply to you:
    - I have taught in-person students in our school classroom
    - I have taught from my school classroom with online/remote students
    - I have taught remote/online students from a remote location, such as my home
    - With someone else present in our classroom (e.g., a TA), I have taught in-person students from a remote location, such as my home
    - Other [textbox]

2. Please answer the following questions based on recent behavior (e.g., since returning from winter break):
   How often do you usually teach…

(Note for IRB reviewers: the following questions will vary using Qualtrics logic based on the responses above)

- In or from your classroom in school?
    - Response choice possible range: 0-5 days per week
        - *For answer choices 1-5, follow-up question:* When teaching in or from your classroom in school, how do students typically attend your class?
            - Response choices:
                - All in-person students

        - All remote/online students
        - A combination of in-person and remote/online students

- From home?
    - Response choice possible range: 0-5
        - *For answer choices 1-5, follow-up question:* When teaching from home, how do students typically attend your class?
            - Response choices:
                - All in-person students
                - All remote/online students
                - A combination of in-person and remote/online students

- Other location (i.e., not school classroom or home)? [textbox to enter location]
    - Response choice possible range: 0-5
        - *For answer choices 1-5, follow-up question:* When teaching from this other location, how do students typically attend your class?
            - Response choices:
                - All in-person students
                - All remote/online students
                - A combination of in-person and remote/online students

Question Block #4: Items

Note for reviewer: For all items in block 4, the answer choices will include:
Strongly agree, Agree, Neutral, Disagree, or Strongly Disagree. *Sometimes, answer choices will also include* "Not enough time in-person to evaluate".

The order of domains will be randomized, so one participant might begin by answering "community" questions, while another might begin with "academics". A progress bar will show participant's progress after each domain completion.

Directions: Answer all of the following questions from the perspective of your current position teaching students in grades 3-8. Do not include any information about prior work experiences; all questions must be answered about your current teaching position for one school this school year (2020-2021).

The closed-ended answer choices will be, "Strongly agree, Agree, Neutral, Disagree, or Strongly Disagree". Sometimes, answer choices will also include "Not enough time in-person to

evaluate". A few questions will allow you to provide an open-ended response, but those are not required for survey completion.

The survey will take about 25 minutes to complete. Because the link is anonymous, be sure that you have enough time to complete the survey now because your work will not be saved until the very end when you will hit "submit". If your browser were to close at any point before then, your responses would be lost.

Please respond to all required items and submit your survey responses within two weeks and only once this school year (2020-2021).

Domain 1: Community

C1. Parents/guardians and school staff (e.g., teachers, teacher assistants, etc.) work together to make the school experience better for students

C2. People who live or work in the school's neighborhood and/or alumni of the school are involved in meaningful school activities (e.g., activities that reflect the mission/vision of the school)

C3. I provide meaningful opportunities for parents/guardians to support students' success in my class (online or face-to-face, e.g., through activities that reflect the mission/vision of the school)

C4. Our school provides resources that bring community members to our school (e.g., a mobile food pantry or meeting space)

C5. Our school adequately responds to meet the most serious needs of our students and their families; for example, we provide resources for students who are experiencing homelessness

C6. Adverse childhood experiences (ACEs) include the death of an attachment figure (e.g., parent or sibling) or another important person (e.g., grandparent, other relative, friend or peer), family dysfunction, divorce, and violence; abuse and/or neglect; parental substance use or incarceration; exposure to community violence characterized by shootings; bullying; poverty; or homelessness. Most adults in our school do not understand the effects of ACEs on students' physical and mental health.

C7. Most teachers would view one or more of the following student behaviors as disrespectful and/or lazy: falling asleep during class; failing to make eye contact when spoken to; not completing assigned homework; or standing up or moving around while the class is doing assigned seatwork

C8. Parents/guardians cannot always understand what our school sends home in writing or communicates online (e.g., via email or website) because of translation or English literacy needs

C9. At the beginning of the school year, the school provides various opportunities (e.g., during the day, during the evening, and/or on weekends) for parents/guardians to either come to school or attend virtual meetings to learn about school expectations

C10. The school facilitates effective communication among parents/guardians, teachers, and administrators

C11. Parents/guardians can easily share their concerns or perspectives with teachers or other members of the school staff (e.g., leadership team)

C12. The leadership team encourages parents/guardians to engage in school activities (i.e., in the school or online) in meaningful ways

C13. The school rarely shares positive information with parents/guardians about their children

C14. I explain to parents/guardians where their students are academically in relation to grade level expectations

> *C14a. Qualtrics Logic:* If "strongly agree" or "agree", ask: When students are behind, I help their parents/guardians understand how they can contribute to students' academic growth

*****C15. Every day school is open, students are welcomed to school by at least one adult who greets them by name ***(Note: answer choices will include "Not enough time in-person to evaluate")***

No logic. C16. Students contribute to school improvement efforts in meaningful ways (e.g., a community garden project) **(Note: answer choices will include "Not enough time in-person to evaluate")**

Note: For the following items, please be sure to consider both in-person and online/remote experiences (e.g., when asked about your "school community").

C17. Most staff, students, and parents/guardians in our school community feel like, "We are in this together"

C18. Most students seem excited or proud to be a part of our school community

C19. As a member of our school community, I feel like I am part of something bigger than myself

C20. I feel like I am alone on an island teaching my students

C21. I dedicate time to getting to know each one of my students

C22. In general, students feel they are listened to by adults who work or volunteer in our school community

C23. The norm is for adults in our school community to treat students fairly

C24. In general, people in our school community trust each other

C25. Students have at least one adult in our school community who they would trust to help them solve a problem

C26. Either during instructional time or through extra-curricular activities, students are mentored by adults who are not necessarily their teacher

C27. In general, relationships between students and adults in our school community are negative

C28. Adults in our school community feel comfortable connecting with students whose experiences in life are different from their own

C29. Most parents would agree that teachers genuinely care for their students

*C30. When students attend in-person, the norm is for teachers to have positive interactions with students from other classrooms (e.g., saying or waving hi in the hallway) **(Note: answer choices will include "Not enough time in-person to evaluate")**

*C31. When students attend in-person, students know at least one adult in our school who would miss them if they did not show up to school **(Note: answer choices will include "Not enough time in-person to evaluate")**

C32. When school is remote/online, students know at least one adult in our school community who would miss them if they did not show up for online instruction or activities

*C33. Every time one of my **in-person** students is absent I follow-up with their parent/guardian **(Note: answer choices will include "Not enough time in-person to evaluate")**

C34. Every time one of my **remote/online** students is absent I follow-up with their parent/guardian

C35. Non-instructional staff in our school community (e.g., teacher assistants) support teachers and students' learning

C36. There are opportunities for teachers to grow together (e.g., at professional development trainings)

Domain 2: Academics

A1. Teachers expect their students to meet academically rigorous goals

A2. Our students receive the support they need to achieve their personal best

A3. All adults at our school believe our students are capable of achieving academic success

A4. When my approach to teaching something is not working, I view it as an opportunity for me to improve

A5. I feel comfortable going to my leadership team for support to help me improve my teaching

A6. I adapt my teaching strategies every year to meet the needs of current students

A7. I learn how to improve my **teaching practices** from other teachers in our school community

A8. I learn how to improve my **behavior management strategies** from other teachers in our school community

Note: When asked about students "in your class", please be sure to consider both in-person and remote/online experiences.

A9. On a daily basis, I feel a sense of urgency to make sure students in my class learn

A10. Most teachers at my school feel confident in their ability to effectively teach their students

A11. Most teachers at my school feel confident in their ability to effectively manage their students' behavior

A12. The teacher mentoring program at my school is effective

A13. I feel like all adults at my school are on the same team

A14. At least one member of the leadership team regularly checks in with me to discuss my students' academic progress

A15. In general, I do not trust the leadership team in my school

A16. The leadership team does not clearly communicate school goals or decisions to teachers

A17. Most of the time, I receive the support I need from the leadership team

A18. Most decisions are top-down, meaning there are few opportunities for teachers to influence school-wide practices/decisions

A19. Teachers are engaged in school-wide improvement efforts

A20. Most of the time, the leadership team's work aligns with the school's mission/vision

A21. In general, the leadership team respects, values, and supports teachers

A22. The leadership team utilizes data to drive improvement efforts

A23. There is a high-functioning leadership team in our school

A24. The leadership team spends most of their time "putting out fires" instead of planning a better future for our school

A25. A member of the leadership team explains how every professional development opportunity is expected to affect students in a positive way

A26. Teachers do not have the flexibility to do what we know we should be doing to meet our students' needs

A27. I have access to teaching materials (e.g., textbooks, online activities) that are developmentally appropriate for my students

A28. The teaching materials I use (e.g., textbooks, online content) enable all of my students to see themselves in the learning (e.g., by including culturally diverse people and/or relevant stories)

A29. Most teachers view school-sponsored professional development (e.g., trainings) as worthwhile opportunities to learn and improve their teaching practices

A30. If I could earn the same amount or more money doing something else, I would leave the teaching profession

A31. During the school year, I am truly working towards at least one professional development goal

A32. In my class, I celebrate students' success daily

A33. Most of the time, students have minimal or no input in setting their learning goals

A34. During instructional time, I ask most of the questions

A35. Students have the opportunity to engage in authentic learning tasks (i.e., tasks that are meaningful to them)

A36. When they attend in-person, students often seem bored or distracted during instructional time **(Note: answer choices will include "Not enough time in-person to evaluate")**

A37. When they attend remotely/online, students often seem bored or distracted during instructional time

A38. When they attend in-person, students often choose what or how they want to learn **(Note: answer choices will include "Not enough time in-person to evaluate")**

A39. When they attend remotely/online, students often choose what or how they want to learn

A40. An important part of my job is helping students make connections between what they're learning in different subjects

A41. When they attend in-person, students in my class often have the opportunity to learn from each other **(Note: answer choices will include "Not enough time in-person to evaluate")**

A42. When they attend remotely/online, students in my class often have the opportunity to learn from each other

Domain 3: Safety

Note for IRB reviewers: Items with an asterisk will include the additional response choice, so answer choices for these items will be, "Strongly agree, Agree, Neutral, Disagree, Strongly Disagree, or Not enough time in-person to evaluate."

Note: Some of the following items include an additional response choice, "Not enough time in-person to evaluate" because you may not have had enough time in-person with students this school year to observe these elements of your school environment.

When asked about students "in your class" or about your "school community", please continue to consider both in-person and remote/online experiences.

S1. I teach my students strategies to self-regulate their behavior

S2. Most students could explain how to behave in accordance with school-wide rules/procedures/behavior expectations

S3. Students' behaviors often disrupt or diminish student learning in my class

S4. *I am currently aware of at least one student who does not want to come to school in-person because of another student's behavior problem **(Note: answer choices will include "Not enough time in-person to evaluate")**

S5. I am currently aware of at least one student who does not want to attend remotely/online because of another student's behavior problem

S6. Many of our students are going to misbehave regardless of what adults in our school community try to do about it

S7. Our students are given opportunities to learn how to regulate their own behavior

S8. Our school uses a school-wide behavior management program that focuses on reinforcing or promoting positive student behaviors

Qualtrics Logic: If “agree” or “strongly agree”, ask: Which one? (optional response)

S9. Our students are taught the underlying purpose(s) of school rules/procedures/behavior expectations

S10. *In our school, when students from other classes are misbehaving in the hallway, teachers are unlikely to say something or do anything to intervene **(Note: answer choices will include “Not enough time in-person to evaluate”)**

S11. Throughout the year (i.e., beyond the first 10 days), there is school-wide consistency in the implementation of behavior management plans

S12. To manage students’ behavior in my class, positive reinforcement usually works best

S13. I teach character development

S14. In our school community, behavior expectations are unknown or inconsistently enforced

S15. Schools should handle conflict and discipline in ways that are inclusionary (i.e., help students find their way back in), rather than exclusionary (i.e., suspension)

S16. When students in my class repeatedly misbehave, I usually recommend or agree with using suspension as a consequence

S17. I teach my students how to take responsibility for their actions

S18. I teach my students how to repair any harm that may have occurred because of their actions

S19. *Outside of my classroom, student transitions are disorderly or chaotic in our school. (Note: answer choices will include “Not enough time in-person to evaluate”)

S20. *Students worry about their physical safety while at school **(Note: answer choices will include “Not enough time in-person to evaluate”)**

S21. Students worry about their psychological safety while attending school remotely/online (e.g., cyberbullying)

S22. Students are kind to each other

S23. Students are encouraged to be themselves (e.g., authentic)

S24. Students are given opportunities to share their thoughts and feelings about school

S25. Students' social and emotional learning is as important as their academic learning

S26. In general, bullying is not a problem in our school community

S27. Adults in our school community model kindness and respect for everyone (e.g., students and other adults)

S28. *I feel physically safe while traveling to school (i.e., between leaving home and entering the building) **(Note: answer choices will include "Not enough time in-person to evaluate")**

S29. *I feel physically safe in school throughout the school day **(Note: answer choices will include "Not enough time in-person to evaluate")**

S30. I feel psychologically safe throughout the school day

S31. I have been verbally harassed or psychologically abused by a student

S32. I have been verbally harassed or psychologically abused by a student's parents/guardians

S33. *I have been physically hurt by a student

Additional answer choice will be: "Not enough time in-person to experience this."

S34. *I have been physically hurt by a student's parents/guardians

Additional answer choice will be: "Not enough time in-person to experience this."

For the following items, consider all of your experiences this school year (i.e., both in-person and remote/online) to inform your responses.

Domain 4: Shared Vision

SV1. The school's alumni are invested in current students' academic and lifelong success

SV2. Most students participate in at least one school sponsored extra-curricular activity

SV3. I make an effort to attend school-sponsored events outside of the school day

SV4. Our school's mission is focused on both student and teacher learning

SV5. The master schedule reflects our school's mission

SV6. In general, teachers support (i.e., "buy into") the leadership team's vision for our school

SV7. Teachers had input in creating a vision for the school

SV8. Students personally know and/or hear stories about successful community members (e.g., current or prior students, teachers, or administrators who are respected and productive members of society)

SV9. When our school is portrayed in the media (e.g., on the news) it is usually for positive reasons

Domain 5: Physical Environment

Note: All of the following items include an additional response choice, "Not enough time in-person to evaluate" because you may not have had enough time in-person with students this school year to observe these elements of your school environment.

P1. *The physical conditions of the school hinder learning (e.g., inadequate temperature control, noise levels due to poor acoustical control, maintenance issues (e.g., leaky roof), bugs, dust, mold, etc.)

P2. *Our school is clean and well-kept

P3. *The physical school environment affects students' attendance or family involvement in school

P4. *The physical environment of my classroom is conducive to teaching and learning

P5. *When you walk into our school it feels like a welcoming, comfortable place for kids

P6. *Our school provides positive visual reminders, such as students' work displayed on walls or bulletin boards

P7. *Posters and/or other visual reminders throughout the school illustrate/communicate school-wide expectations

P8. *I make an effort to include visual reminders of sources/symbols of school joy and pride when I decorate my classroom

Additional Questions

Answer choices will remain the same: Strongly disagree, Disagree, Neutral, Agree, Strongly Agree

Required: The questions on the survey were clear, concise, and easily understood

Required: The questions on the survey were relevant in terms of what I think matters most for student success (e.g., attendance, behavior, and academic outcomes).

- Qualtrics Logic: If "Disagree" or "Strongly disagree"
    - What should we have asked about that we didn't? *Optional response.*
    - What did we include that's not relevant? *Optional response.*

Optional two questions at the very end:

For how many total years have you been teaching (in any school)?

Do you plan on remaining in the teaching profession for at least the next five years?

- If no, why not? Please rank your top reasons (up to 3).
- *Common list will be a dropdown, and there will be an "other" option:*
- Amount of work (i.e., heavy workload, too many students, long hours during the week, need to work on the weekend to keep up)
- Challenging student behaviors (i.e., behavior management or discipline problems)
- Lack of parental support (i.e., not supporting my decisions/rules)
- Lack of support from leadership team
- Compensation (i.e., salary is too low and/or benefits not good enough)
- Constant changes (i.e., reform for the sake of reform)
- Not enough time to plan/prepare
- Lack of mentoring / support from experienced colleagues
- Other: *text box will be provided to write in a response*

Submit *(button)*

Your survey has been submitted and your responses have been recorded!

Thank you for participating in *The School Environment Project*! Questions or concerns? Please contact Erin Godly-Reynolds (egodlyre@uncc.edu) or Dr. Ryan Kilmer (rpkilmer@uncc.edu).

Reminders about Participation:

- Communities In Schools of Charlotte-Mecklenburg (CIS) will celebrate the **three schools** that have the highest teacher completion rates by donating supplies or technology to support teaching and learning **($250 per school** / $750 total). Each school will choose materials (i.e., school supplies, headphones for remote learning, student attendance incentives, etc.) to meet their needs.
- Also, if 10 or more teachers from your school participate, your school can be included in all aspects of this study. If fewer than 10 teachers from your school participate, school-level results cannot be analyzed or reported.

Feel free to copy and paste the following information from our flyer to invite your colleagues to participate in this study:

Please consider participating in ***The School Environment Project***, a research study designed to better understand and measure elements of our school's climate and culture that impact student behavior and achievement.

At your convenience, take an online survey once in the next two weeks. The anonymous survey will take ~ 25 minutes to complete and will require only closed-ended responses.

If 10 or more teachers from our school take the survey, school-level data can be used to better understand and improve our school environment.

Communities In Schools of Charlotte-Mecklenburg (CIS) will donate supplies or technology to support teaching and learning (**$250 per school** / $750 total). The **three schools** with the highest completion rates will choose materials (i.e., school supplies, headphones for remote learning, student attendance incentives, etc.) to meet their needs.

UNCC will never ask for your name or email address for this project, and your IP address will NOT be collected. The link for this study is anonymous and will direct you to more information about the study:

https://unccpsych.az1.qualtrics.com/jfe/form/SV_07IP1pwxXK5IsBf

Questions? Please contact Ms. Erin Godly-Reynolds at egodlyre@uncc.edu or Dr. Ryan Kilmer at rpkilmer@uncc.edu

Only CMS teachers in grades 3-8 will participate this school year, but we aim to include parents, students, and staff members in the future. This research project has been approved by CMS and the UNCC IRB (#19-0600).

APPENDIX I: CMS MEMORANDUM OF UNDERSTANDING ADDENDUM AND VARIABLE LIST

Charlotte-Mecklenburg Schools

Office of Accountability
4421 Stuart Andrew Blvd Suite 250
Charlotte, North Carolina 28217
980-343-6242

STATE OF NORTH CAROLINA)
) **MEMORANDUM OF UNDERSTANDING**
COUNTY OF MECKLENBURG) **ADDENDUM**

This Memorandum of Understanding Addendum is made and entered into this 25th day of September 2020, by and between the Charlotte-Mecklenburg Board of Education and Ryan Kilmer on behalf of Erin Godly-Reynolds.

This addendum adds an extension for one year and a revised variable list (attached) to the data request from Ryan Kilmer and Erin Godly-Reynolds for the study "The School Environment Project: Measuring Key Elements of School Climate and Culture in Charlotte-Mecklenburg Schools" outlined in the MOU signed by Frank Barnes on March 5, 2020 and Debbie Bolick on March 10, 2020.

Request - CMS will provide Erin Godly-Reynolds with access to data on revised variable list (attached).

This agreement will become effective immediately and will continue until terminated by either party upon 10 days notice to the other, but will expire no later than one year from the date of the execution of this extension. The provisions regarding the confidentiality and destruction of CMS data will survive its term. This Addendum may be amended by written amendment executed by all parties.

Frank Barnes — 11/5/20

Frank D. Barnes
Chief Equity Officer
Charlotte-Mecklenburg Schools

Date

Deborah L. Bolick — Digitally signed by Deborah L. Bolick Date: 2020.12.08 11:17:31 -05'00'

Research Institution /On Behalf of Researcher

Date

STUDENT LEVEL DATA - All CMS students grades 3-8		
	Teacher consent required if linking student data to teacher	
If requesting current year data, all data will be current through date pulled		Years requested/Comments from researcher
School Year	Academic year; specify which years 2012-13 through 2017-18 here; Unless specified, only the most recent completed academic year (2016-17) will be provided	2019-2020 & 2020-2021
Demographics - Consent Required if more than 2 selected. Due to federal and local regulations (i.e., FERPA and CMS policies) regarding student		
Grade*	Student grade level	2019-2020 & 2020-2021
Current School*	School at which student was enrolled	2019-2020 & 2020-2021 Please include school enrollment dates. One row per student date of entry and withdrawal at each school
	No Consent Needed	
Research Student ID	De-identified Student ID; this remains constant over time	2019-2020 & 2020-2021
School ID	School ID; this remains constant over time	2019-2020 & 2020-2021
	Literacy Data Grades 3-8	
Measures of Academic Progress (MAP)	Rasch Unit (RIT) scores, Projected Growth, Observed Growth, Growth, Date of Test	Fall & Winter scores for both SY 2019-2020 & 2020-2021
EOG Reading Achievement Level (Grades 3-8) Grade level will not be provided unless requested in demographics	Achievement level on NC End-of-Grade Reading Assessment (1,2,3,4,5) (grades 3-8); specify year(s) 2012-13 through 2016-17	*replaced by MAP (see row 12)*
EOG Reading Proficiency (Grades 3-8) Grade level will not be provided unless requested in demographics	Proficiency on NC End-of-Grade Reading Assessment (Y=proficient,N=not proficient) (grades 3-8); specify year(s) 2012-13 through 2016-17	*replaced by MAP (see row 12)*
EOG Reading Score (Grades 3-8) Grade level must be requested in demographics	Scale score on 2014-15 NC End-of-Grade Reading Assessment (grades 3-8); specify year(s) 2012-13 through 2016-17	*replaced by MAP (see row 12)*
	Math Data Grades 3-8	
Measures of Academic Progress (MAP)	Rasch Unit (RIT) scores, Projected Growth, Observed Growth, Growth, Date of Test	Fall & Winter scores for both SY 2019-2020 & 2020-2021
EOG Math Achievement Level (Grades 3-8) Grade level will not be provided unless requested in demographics	Achievement level on NC End-of-Grade Math Assessment (1,2,3,4,5) (grades 3-8); specify year(s) 2012-13 through 2016-17	*replaced by MAP (see row 17)*
EOG Math Proficiency (Grades 3-8) Grade level will not be provided unless requested in demographics	Proficiency on NC End-of-Grade Math Assessment (Y=proficient,N=not proficient) (grades 3-8); specify year(s) 2012-13 through 2016-17	*replaced by MAP (see row 17)*
EOG Math Score (Grades 3-8) Grade level must be requested in demographics	Scale score on NC End-of-Grade Math Assessment (grades 3-8); specify year(s) 2012-13 through 2016-17	*replaced by MAP (see row 17)*
	Enrollment and Attendance Data by student by school	
Total Days Enrolled	Number of days the student was enrolled during academic year ; unless specified otherwise, days enrolled in the DISTRICT will be provided.	Please include days enrolled in specific SCHOOL during the following periods: Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
% Days Absent	Percentage of school days for which student was absent in academic year	Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
Absences	Total number of days absent in academic year	Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
Unexcused Absences	Total number of unexcused absences in academic year	Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
Chronically Absent indicator	More than 10% of days absent of days enrolled ; Y/N Unless otherwise specified, this indicates chronic absenteeism for ALL schools enrolled during the year;	Please include chronic absenteeism for specific SCHOOL enrolled during the following periods: Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
	Discipline Data by student by school	
Days ISS	Total number of days in-school suspension served by student in academic year	Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
Days OSS	Total number of days out-of-school suspension served by student in academic year	Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
Total Discipline Incidents	Total number of discipline incidents recorded for student in academic year	Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021
	Mobility	
Number of schools attended	Number of schools attended with the school year	Fall (first day of school) - Winter (last day of MAP testing) for both SY 2019-2020 & 2020-2021

APPENDIX J: SCHOOL-LEVEL ANALYSES DATASET

ScID_2021	SN_2021	*n*	Response PCT	SE_mean	MPCT_c_mean	MPCT_c_*n*	RPCT_c_mean	RPCT_c_*n*	Academics_mean	Safety_mean	Shared Vision_mean
600316	Barringer Academic Center	12	45%	12.44	-2.14	197	-1.54	201	4.28	4.42	3.75
600317	Whitewater Middle School	4	7%	11.08	-3.38	526	-5.07	562	4.14	3.94	3.00
600319	Berryhill School	13	44%	11.63	-3.98	230	-5.48	218	3.90	4.41	3.32
600374	Druid Hills Academy	19	75%	11.31	-4.83	109	-6.48	106	3.84	4.23	3.23
600394	Bradley Middle School	6	10%	12.54	-2.68	973	-4.78	945	4.35	4.33	3.86
600414	Highland Renaissance Academy	3	17%	12.38	-1.57	95	-2.28	79	4.15	4.37	3.86
600453	Merry Oaks International Academy	7	26%	11.54	-7.76	139	-7.58	134	3.71	4.27	3.55
600462	Mountain Island Lake Academy	3	8%	10.89	-4.31	438	-4.67	420	3.74	4.15	3.00
600471	Nations Ford Elementary School	5	12%	11.62	-9.12	240	-9.93	221	3.98	4.27	3.37
600484	Oakhurst STEAM Academy	3	10%	8.38	-6.47	233	-1.80	220	2.22	3.78	2.38
600489	Bruns Avenue Academy	6	27%	10.38	-3.21	129	-6.85	124	3.33	4.09	2.95
600494	Paw Creek Elementary School	15	46%	11.67	-6.44	257	-7.33	232	3.96	4.12	3.59
600514	Ranson Middle School	4	6%	8.93	-4.54	585	-3.89	509	2.86	3.75	2.32
600515	Renaissance West STEAM Academy	3	7%	9.15	-1.71	228	-3.18	215	2.44	4.19	2.52
600553	Thomasboro Academy	17	43%	11.22	-5.28	168	-8.58	31	4.09	4.15	2.97
600558	Grand Oak Elementary School	7	29%	12.93	0.79	222	-2.33	222	4.38	4.43	4.12
600577	Westerly Hills Academy	15	70%	12.33	-4.72	102	-4.73	109	4.32	4.49	3.52
600587	Windsor Park Elementary School	25	96%	12.07	-2.97	244	-6.35	242	3.85	4.27	3.95
600589	Winterfield Elementary School	3	8%	10.88	-4.42	231	-0.01	237	3.48	4.44	2.95

Notes: ScID_2021 = School ID (school year 2020-2021); SN_2021 = School Name (school year 2020-2021); *n* = The number of teachers within each school who responded to the School Environment Survey; ResponsePCT = Each school's estimated response rate; SE_mean = Each school's mean School Environment score; MPCT_c_mean = Each school's average change in their students' Fall 2020 to Winter 2021 MAP percentile scores for math achievement; MPCT_c_*n* = Each school's student sample size reflects the number of students within each school who completed both math assessments; RPCT_c_mean = Each school's average change in their students' Fall 2020 to Winter 2021 MAP percentile scores for reading achievement; RPCT_c_*n* = Each school's student sample size reflects the number of students within each school who completed both reading assessments; Academics_mean = Each school's mean *academics* domain score; Safety_mean = Each school's mean s*afety* domain score; SharedVision_mean = Each school's mean *shared vision* domain score.

APPENDIX K: SCHOOL-LEVEL ANALYSES SAMPLE: GRADE-LEVEL DISTRIBUTION OF STUDENTS AND TEACHERS

School	*n*	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Total
Barringer Academic Center (Charles H. Parker Academic Center)*								
Students	279	28%	38%	33%	N/A	N/A	N/A	100%
Teachers	12	67%	42%	33%	N/A	N/A	N/A	
Berryhill School								
Students	310	13%	14%	18%	16%	21%	18%	100%
Teachers	13	23%	23%	31%	54%	38%	46%	
Druid Hills Academy								
Students	265	15%	14%	15%	18%	22%	16%	100%
Teachers	19	37%	26%	32%	32%	37%	42%	
Grand Oak Elementary School*								
Students	246	39%	32%	29%	N/A	N/A	N/A	100%
Teachers	7	57%	43%	0%	N/A	N/A	N/A	
Merry Oaks International Academy*								
Students	293	34%	33%	32%	N/A	N/A	N/A	100%
Teachers	7	43%	43%	43%	N/A	N/A	N/A	
Paw Creek Elementary School*								
Students	359	30%	33%	38%	N/A	N/A	N/A	100%
Teachers	15	33%	33%	33%	N/A	N/A	N/A	
Thomasboro Academy								
Students	443	15%	17%	20%	16%	17%	15%	100%
Teachers	17	29%	29%	35%	18%	24%	18%	
Westerly Hills Academy*								
Students	200	41%	26%	34%	N/A	N/A	N/A	100%
Teachers	15	40%	40%	47%	N/A	N/A	N/A	
Windsor Park Elementary School*								
Students	271	32%	36%	32%	N/A	N/A	N/A	100%
Teachers	25	48%	44%	56%	N/A	N/A	N/A	

*School does not include grades 6-8. *Note*: The source of teacher data was School Environment Survey results, so the *n* represents the number of participating teachers at that school. The source of student data was CMS; however, cases with missing MAP data have been removed so that totals reflect the sample used in correlational analyses (i.e., see RQ5). Because many teachers reported teaching multiple grade levels, percentages of teachers across grade level would exceed 100%. Barringer Academic Center was renamed after data were collected.

APPENDIX L: ITEM RETENTION DECISIONS

Step 1. Of the 131 items on the measure that was piloted, the following 22 items were not included in the EFA because of missing data:

Variable	*N*	Missing	Item
A36	136	50	When they attend in-person, students often seem bored or distracted during instructional time.
A38	132	54	When they attend in-person, students often choose what or how they want to learn.
A41	143	43	When they attend in-person, students in my class often have the opportunity to learn from each other.
C14b*	168	18	When students are behind, I help their parents/guardians understand how they can contribute to students' academic growth.
C15	170	16	When they attend in-person, students are welcomed to school by at least one adult who greets them by name.
C15 online*	152	34	When they attend remotely/online, students are welcomed to school by at least one adult who greets them by name.
C16	163	23	Students contribute to school improvement efforts in meaningful ways (e.g., a community garden project).
C30	171	15	When students attend in-person, the norm is for teachers to have positive interactions with students from other classrooms (e.g., saying or waving hi in the hallway).
C31	169	17	When students attend in-person, students know at least one adult in our school who would miss them if they did not show up to school.
C33	144	42	Every time one of my in-person students is absent I follow-up with their parent/guardian.
P1	163	23	The physical conditions of the school hinder learning (e.g., inadequate temperature control, noise levels due to poor acoustical control, leaky roof or other maintenance issues, bugs, dust, mold).
P2	168	18	Our school is clean and well-kept.
P6	162	24	Our school provides positive visual reminders, such as students' work displayed on walls or bulletin boards.
P8	161	25	I make an effort to include visual reminders of sources/symbols of school joy and pride when I decorate my classroom.
S10	154	32	In our school, when students from other classes are misbehaving in the hallway, teachers are unlikely to say something or do anything to intervene.
S19	142	44	Outside of my classroom, student transitions are disorderly or chaotic in our school.
S20	152	34	Students worry about their physical safety while at school.
S28	167	19	I feel physically safe while traveling to school (i.e., between leaving home and entering the building).
S29	168	18	I feel physically safe in school throughout the school day.
S33	161	25	I have been physically hurt in school by a student.
S34	161	25	I have been physically hurt in school by a student's parents/guardians.
S4	140	46	I am currently aware of at least one student who does not want to come to school in-person because of another student's behavior problem.

Note. *Item did not include the answer choice, "Not enough time in-person to evaluate", but Qualtrics logic prevented ≥18 teachers (see missing column) from responding because the item was not applicable to them based on an earlier response.

Step 2. The following items were flagged for possible removal for the following reasons:

Variable	Item	Kurtosis > 2	I-T < 0.3	Additional Reasons/Notes [b]
C5	Our school adequately responds to meet the most serious needs of our students and their families (e.g., we provide resources for students who are experiencing homelessness).	2.41	N/A	N/A
C6	Adverse childhood experiences (ACEs) include the death of an attachment figure (e.g., parent or sibling) or another important person (e.g., grandparent, other relative, friend or peer), family dysfunction, divorce, and violence; abuse and/or neglect; parental substance use or incarceration; exposure to community violence characterized by shootings; bullying; poverty; or homelessness. Most adults in our school do not understand the effects of ACEs on students' physical and mental health.	N/A	0.29	N/A
C7	Most teachers would view one or more of the following student behaviors as disrespectful and/or lazy: falling asleep during class; failing to make eye contact when spoken to; not completing assigned homework; or standing up or moving around while the class is doing assigned seatwork.	N/A	N/A	Even though it was not flagged during the initial review of data quality (item analysis), the pattern of relationships with the other *community* items revealed that only 2 coefficients were ≥ .3 and there was one negative correlation.
C8	Parents/guardians cannot always understand what our school sends home in writing or communicates online (e.g., via email or website) because of translation or English literacy needs.	N/A	0.19	Pattern of negative relationships with other *community* items
C11	Parents/guardians can easily share their concerns or perspectives with teachers or other members of the school staff (e.g., leadership team).	2.71	N/A	N/A
C12	The leadership team encourages parents/guardians to engage in school activities (i.e., in the school or online) in meaningful ways.	2.54	N/A	N/A
C14	I explain to parents/guardians where their students are academically in relation to grade level expectations.	2.63	N/A	N/A
C21	I dedicate time to getting to know each one of my students.	4.31	N/A	Rationale not as strong as the other items within *community*. Pattern of relationships shows 5 correlations that are non-significant and below 0.15, which is well below the .3 threshold.
C23	The norm is for adults in our school community to treat students fairly.	2.47	N/A	N/A
C26	Either during instructional time or through extra-curricular activities, students are mentored by adults who are not necessarily their teacher.	N/A	N/A	Even though it was not flagged during the initial review of data quality (item analysis), the pattern of relationships with the other *community* items revealed that only 5 coefficients were ≥ .3 and there was 1 negative correlation.

Variable	Item	Kurtosis > 2	I-T < 0.3	Additional Reasons/Notes [b]
C35	Non-instructional staff in our school community (e.g., teacher assistants) support teachers and students' learning.	3.92	N/A	N/A
A4	When my approach to teaching something is not working, I view it as an opportunity for me to improve.	N/A	0.30	Pattern of relationships with other *academics* items include one negative relationship and most were non-significant and < .3. Corrected item-total (i.e., *academics* only) $r = .30$, which met the threshold but was much lower than that of almost all of the other *academics* items.
A6	I adapt my teaching strategies every year to meet the needs of current students.	N/A	N/A	Potential ceiling effect and restricted range (min. of 3) and $SD = 0.57$. Corrected item-total (i.e., *academics* only) $r = .34$, which met the threshold but was much lower than that of almost all of the other academics items.
A9	On a daily basis, I feel a sense of urgency to make sure students in my class learn.	N/A	N/A	Potential ceiling effect and restricted range (min. of 3) and $SD = 0.55$. Corrected item-total (i.e., *academics* only) $r = .31$ which met the threshold but was much lower than that of almost all of the other academics items.
A20	Most of the time, the leadership team's work aligns with the school's mission/vision.	2.15	N/A	N/A
A21	In general, the leadership team respects, values, and supports teachers.	2.22	N/A	N/A
A30	If I could earn the same amount or more money doing something else, I would leave the teaching profession.	N/A	N/A	Even though the relationships with the other *academics* items are fairly weak, this item was retained in the pool because this could theoretically move to a different domain/dimension. Currently it is hypothesized as reflecting the Teaching and Learning dimension within *academics*.
A31	I am truly working towards at least one professional development goal.	4.05	N/A	N/A
A32	In my class, I celebrate students' success daily.	N/A	N/A	Potential ceiling effect and restricted range (min. of 3) and $SD = .55$. Pattern of relationships with other *academics* items (only four correlations ≥ 0.3).

Variable	Item	Kurtosis > 2	I-T < 0.3	Additional Reasons/Notes [b]
A34	During instructional time, I ask most of the questions.	N/A	0.16	Pattern of relationships with other *academics* items include 10 negative relationships and most were non-significant and < .3.
A37	When they attend remotely/online, students often seem bored or distracted during instructional time.	N/A	0.22	Pattern of relationships with other *academics* items
A39	When they attend remotely/online, students often choose what or how they want to learn.	N/A	0.24	Pattern of relationships with other *academics* items
A40	An important part of my job is helping students make connections between what they're learning in different subjects.	2.36		Was not as strong as the other items within *academics*. Pattern of relationships with other *academics* items - only 4 correlation coefficients ≥.3.
S2	Most students could explain how to behave in accordance with school-wide rules/procedures/behavior expectations.	N/A	N/A	Potential ceiling effect and restricted range (min. of 3) and *SD* = 0.54.
S15	Schools should handle conflict and discipline in ways that are inclusionary (i.e., help students find their way back in), rather than exclusionary (i.e., suspension).	N/A	0.22	Pattern of relationships with other *safety* items - one negative relationship and only one coefficient was ≥ 0.3. Most associations were very weak and not significant.
S16	When students in my class repeatedly misbehave, I usually recommend or agree with using suspension as a consequence.	N/A	0.18	Pattern of relationships with other *safety* items - only one coefficient was ≥ 0.3. The majority were very weak and statistically non-significant.
S17	I teach my students how to take responsibility for their actions.	N/A	N/A	Potential ceiling effect and restricted range (min. of 3) and *SD* = 0.51.
S21	Students worry about their psychological safety while attending school remotely/online (e.g., cyberbullying).	N/A	0.29	N/A
S22	Students are kind to each other.	3.56	N/A	N/A
S25	Students' social and emotional learning is as important as their academic learning.	N/A	N/A	Potential ceiling effect and restricted range (min. of 3) and *SD* = 0.57.
S31	I have been verbally harassed or psychologically abused by a student.	N/A	0.28	Pattern of relationships with other *safety* items - 2 negative relationships and only three coefficients were ≥ 0.3. Most relationships were also statistically non-significant.
S32	I have been verbally harassed or psychologically abused by a student's parents/guardians.	N/A	0.22	Pattern of relationships with other safety items - 4 negative relationships and only three coefficients were ≥ 0.3. Most

Variable	Item	Kurtosis > 2	I-T < 0.3	Additional Reasons/Notes [b]
				relationships were also statistically non-significant.
SV3	I make an effort to attend school-sponsored events outside of the school day.	N/A	N/A	Even though it was not flagged during the initial review of data quality (item analysis), the pattern of relationships with the other s*hared vision* items revealed that there were no correlation coefficients ≥ 0.3.
SV4	Our school's mission is focused on both student and teacher learning.	2.79	N/A	N/A
SV6	In general, teachers support (i.e., "buy into") the leadership team's vision for our school.	2.42	N/A	N/A
P4	The physical environment of my classroom is conducive to teaching and learning.	2.32	N/A	N/A
P7	Posters and/or other visual reminders throughout the school illustrate/communicate school-wide expectations.	N/A	N/A	Potential ceiling effect and restricted range (min. 3) and *SD* = 0.60.

Note. [a] I-T = corrected item-total correlation. N/A reflects that Kurtosis was < 2.0 or the I-T was > 0.3.

Step 3. The first EFA included 109 items (see Step 1; in Step 2, items were flagged but none were removed). After EFA results revealed that a simple structure was not yet achieved, the following variables were removed for the reasons listed above (e.g., item analyses results and lack of covariance after visually inspecting the correlation matrix; please see Step 2 above for details): C6, C7, C8, C26, A4, A6, A9, A32, A34, A37, A39, S15, S16, S31, S32, and SV3.

Step 4. The next EFA included 93 items. After EFA results revealed that a simple structure was not yet achieved, the following four items were removed because they were the only remaining items with missing data and because a *physical environment* domain was not supported by the data:

Variable	*N*	Missing	Item
P3	174	12	The physical school environment negatively affects student's attendance or family involvement in school.
P4	175	11	The physical environment of my classroom is conducive to teaching and learning.
P5	177	9	When you walk into our school it feels like a welcoming, comfortable place for kids.
P7	176	10	Posters and/or other visual reminders throughout the school illustrate/communicate school-wide expectations.

Note. All of these items included the response choice, "Not enough time in-person to evaluate".

Step 5. The next EFA included 89 items. After EFA results revealed that a simple structure was not yet achieved, the following three items were removed because of a combination of item analyses results (i.e., they had already been flagged for possible removal; please see Step 2 above for details) and communalities that were below 0.20: S21, A30, and A40.

Step 6. The next EFA included 86 items. After EFA results revealed that a simple structure was not yet achieved, the following 32 items were removed because they did not saliently load on any factor (i.e., all pattern coefficients were < 0.45):

Variable	Item
A3	All adults at our school believe our students are capable of achieving academic success.
A7	I learn how to improve my teaching practices from other teachers in our school community.
A8	I learn how to improve my behavior management strategies from other teachers in our school community.
A10	Most teachers at my school feel confident in their ability to effectively teach their students.
A11	Most teachers at my school feel confident in their ability to effectively manage their students' behavior.
A28	The teaching materials I use (e.g., textbooks, online content) enable all of my students to see themselves in the learning (e.g., by including culturally diverse people and/or relevant stories).
A33	Most of the time, students have minimal or no input in setting their learning goals.
A42	When they attend remotely/online, students in my class often have the opportunity to learn from each other.
C4	Our school provides resources that bring community members to our school (e.g., a mobile food pantry or meeting space).
C5	Our school adequately responds to meet the most serious needs of our students and their families (e.g., we provide resources for students who are experiencing homelessness).
C9	At the beginning of the school year, the school provides various opportunities (e.g., during the day, during the evening, and/or on weekends) for parents/guardians to either come to school or attend virtual meetings to learn about school expectations.
C10	The school facilitates effective communication among parents/guardians, teachers, and administrators.
C11	Parents/guardians can easily share their concerns or perspectives with teachers or other members of the school staff (e.g., leadership team).
C13	The school rarely shares positive information with parents/guardians about their children.
C17	Most staff, students, and parents/guardians in our school community feel like, "We are in this together".
C19	As a member of our school community, I feel like I am part of something bigger than myself.
C21	I dedicate time to getting to know each one of my students.
C22	In general, students feel they are listened to by adults who work or volunteer in our school community.
C23	The norm is for adults in our school community to treat students fairly.
C25	Students have at least one adult in our school community who they would trust to help them solve a problem.
C27	In general, relationships between students and adults in our school community are negative.
C28	Adults in our school community feel comfortable connecting with students whose experiences in life are different from their own.

Variable	Item
C29	Most parents would agree that teachers genuinely care for their students.
C34	Every time one of my remote/online students is absent I follow-up with their parent/guardian.
C35	Non-instructional staff in our school community (e.g., teacher assistants) support teachers and students' learning.
S6	Many of our students are going to misbehave regardless of what adults in our school community try to do about it.
S8	Our school uses a school-wide behavior management program that focuses on reinforcing or promoting positive student behaviors.
S14	In our school community, behavior expectations are unknown or inconsistently enforced.
S22	Students are kind to each other.
S26	In general, bullying is not a problem in our school community.
S27	Adults in our school community model kindness and respect for everyone (e.g., students and other adults).
SV5	The master schedule reflects our school's mission.

Step 7. The next EFA included 54 items. After EFA results revealed that a simple structure was not yet achieved, S3 (students' behaviors often disrupt or diminish student learning in my class) was removed because this item's communality was 0.10.

Step 8. The next EFA included 53 items. After EFA results revealed that a simple structure was not yet achieved, the following six items were removed because they did not saliently load on any factor (i.e., all pattern coefficients were < 0.45):

Variable	Item
SV4	Our schools' mission is focused on both student and teacher learning.
A25	A member of the leadership team explains how every professional development opportunity is expected to affect students in a positive way.
A29	Most teachers view school-sponsored professional development (e.g., trainings) as worthwhile opportunities to learn and improve their teaching practices.
A35	Students have the opportunity to engage in authentic learning tasks (i.e., tasks that are meaningful to them).
C3	I provide meaningful opportunities for parents/guardians to support students' success in my class (online or face-to-face; e.g., through activities that reflect the mission/vision of the school).
S5	I am currently aware of at least one student who does not want to attend remotely/online because of another student's behavior problem.

Step 9. The next EFA included 47 items. The following two items with communalities below 0.40 were removed based on a combination of pattern coefficients, the relative strength of structure coefficients, and interpretability:

Variable	Item
A1	Teachers expect their students to meet academically rigorous goals.
C14	I explain to parents/guardians where their students are academically in relation to grade level expectations.

Step 10. The next EFA included 45 items. The following item (S1) was removed because its corrected item-total correlation was 0.27 (i.e., below 0.3): I teach my students strategies to self-regulate their behavior.

Step 11. The next EFA included 44 items. This was referred to as Model 1. A list of items that were removed first (to produce Model 2; see Step 12) is available from the author; it is not provided here because the researcher returned to the 44 items (i.e., Model 1) and used a different method of removing items to produce Model 3.

Model 3: Although it required a slight deviation from the seven item per factor rule, retaining nine items on factors 1 and 2 allowed the PI to improve content validity. Twenty-five items were retained (in Model 3) because they had relatively high factor loadings within each hypothesized dimension of school environment; the following 19 items were not retained:

Variable	Item
A21	In general, the leadership team respects, values, and supports teachers.
A16	The leadership team does not clearly communicate school goals or decisions to teachers.
A23	There is a high-functioning leadership team in our school.
A18	Most decisions are top-down, meaning teachers have few opportunities to influence school-wide practices/decisions.
A19	Teachers are engaged in school-wide improvement efforts.
A20	Most of the time, the leadership team's work aligns with the school's mission/vision.
S30	I feel psychologically safe throughout the school day.
A24	The leadership team spends most of their time "putting out fires" instead of planning a better future for our school.
A13	I feel like all adults at my school are on the same team.
S11	Throughout the year (i.e., beyond the first 10 days), there is school-wide consistency in the implementation of behavior management plans.
A22	The leadership team utilizes data to drive improvement efforts.
SV6	In general, teachers support (i.e., "buy into") the leadership team's vision for our school.
A14	At least one member of the leadership team regularly checks in with me to discuss my students' academic progress.

Variable	Item
SV7	Teachers had input in creating a vision for the school.
C24	In general, people in our school community trust each other.
C12	The leadership team encourages parents/guardians to engage in school activities (i.e., in the school or online) in meaningful ways.
A12	The teacher mentoring program at my school is effective.
C36	There are opportunities for teachers to grow together (e.g., at professional development trainings).
S24	Students are given opportunities to share their thoughts and feelings about the school.
S17	I teach my students how to take responsibility for their actions.
S23	Students are encouraged to be themselves (e.g., authentic).
S7	Our students are given opportunities to learn how to regulate their own behavior.
C32	When school is remote/online, students know at least one adult in our school community who would miss them if they did not show up for online instruction or activities.
S9	Our students are taught the underlying purpose(s) of school rules/procedures/behavior expectations.
S12	To manage students' behavior in my class, positive reinforcement usually works best.
S2	Most students could explain how to behave in accordance with school-wide rules/procedures/behavior expectations.
A31	I am truly working towards at least one professional development goal.
SV2	Most students participate in at least one school sponsored extra-curricular activity.
C1	Parents/guardians and school staff (e.g., teachers, teacher assistants) work together to make the school experience better for students.
SV8	Students personally know and/or hear stories about successful community members (e.g., current or prior students, teachers, or administrators who are respected and productive members of society).

Step 12. The next EFA included 21 items. This was referred to as Model 2. Model 2 was rejected because of content validity concerns. A list of items that were removed to produce Model 2 is available from the author; for more information, see Step 11.

Step 13. The final EFA included 25 items. This was referred to as Model 3. For a list of all items included in Model 3, please see Table 10.

APPENDIX M: MODEL 3 PROMAX AND OBLIMIN ROTATION PATTERN MATRICES RESULTS

Promax Rotation:

	Pattern Matrix[a]			
	Factor			
Item	1	2	3	Discrepancy
A17	0.94	-0.10	0.02	0.9
A15	0.89	-0.11	-0.04	0.9
A26	0.81	-0.06	-0.11	0.9
C20	0.74	0.01	-0.01	0.7
A5	0.72	-0.03	0.07	0.6
A27	0.57	0.06	-0.09	0.5
C12	0.49	0.22	0.09	0.3
A2	0.48	0.13	0.13	0.3
SV6	0.47	0.23	0.17	**0.2**
S25	-0.24	0.86	-0.05	0.9
S23	0.10	0.70	0.00	0.6
S24	0.04	0.66	-0.04	0.6
S18	-0.10	0.66	0.06	0.6
S7	0.14	0.62	-0.18	0.5
S13	-0.07	0.61	0.00	0.6
C32	0.00	0.61	0.12	0.5
S17	0.12	0.59	-0.23	0.5
S9	0.13	0.57	0.09	0.4
C2	-0.19	0.03	0.90	0.9
SV1	-0.08	-0.12	0.81	0.9
SV9	-0.02	-0.05	0.66	0.7
SV2	0.11	-0.25	0.59	0.5
C1	0.07	0.17	0.57	0.4
SV8	0.20	0.00	0.52	0.3
C18	0.12	0.19	0.52	0.3

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.

[a] Rotation converged in 5 iterations.

Oblimin Rotation:

	Pattern Matrix[a]			
	Factor			
Item	1	2	3	Discrepancy
A17	0.89	-0.05	0.07	0.8
A15	0.84	-0.07	0.00	0.8
A26	0.76	-0.03	-0.06	0.8
C20	0.70	0.04	0.04	0.7
A5	0.69	0.01	0.11	0.6
A27	0.54	0.07	-0.04	0.5
C12	0.48	0.24	0.13	**0.2**
A2	0.47	0.16	0.16	0.3
SV6	0.47	0.25	0.21	**0.2**
S25	-0.19	0.79	0.00	0.8
S23	0.14	0.66	0.05	0.5
S18	-0.05	0.63	0.10	0.5
S24	0.08	0.63	0.01	0.5
C32	0.05	0.59	0.16	0.4
S13	-0.03	0.58	0.04	0.5
S7	0.16	0.57	-0.12	0.4
S9	0.16	0.56	0.13	0.4
S17	0.13	0.54	-0.16	0.4
C2	-0.13	0.11	0.83	0.7
SV1	-0.04	-0.04	0.74	0.8
SV9	0.02	0.02	0.61	0.6
C1	0.11	0.23	0.55	0.3
SV2	0.13	-0.17	0.54	0.4
C18	0.15	0.24	0.51	0.3
SV8	0.22	0.06	0.50	0.3

Extraction Method: Maximum Likelihood.
Rotation Method: Oblimin with Kaiser Normalization.

[a] Rotation converged in 6 iterations.

Notes. The strongest (i.e., salient, primary) loadings are highlighted green and the second strongest factor loadings are highlighted yellow. The primary-secondary discrepancies are sufficiently large (i.e., >.3) for almost all items. For items SV6 and C12, the discrepancies were .2; however, neither of these items' secondary loadings were considered cross-loading (i.e., because they were < .3) and both of the primary loadings were salient (i.e., ≥ .45). For an explanation of the guidelines followed, see Finch (2019), Matsunaga (2010), and Whitley and Kite (2013).

APPENDIX N: MODEL 3 – 25-ITEM THREE-FACTOR SOLUTION: CORRELATION MATRIX RESULTS

Pearson Correlation

	A15	A17	A26	A5	C20	A27	A2	SV	C12	S25	S18	S24	S17	S23	S13	S7	C32	S9	C2	SV	SV	SV	C1	SV	C1
A1																									
A1	.70*																								
A2	.60*	.61*																							
A5	.61*	.71*	.49*																						
C20	.57*	.67*	.63*	.50*																					
A2	.40*	.52*	.40*	.38*	.43*																				
A2	.44*	.56*	.45*	.43*	.47*	.34*																			
SV	.59*	.59*	.46*	.52*	.46*	.43*	.49*																		
C12	.52*	.57*	.48*	.45*	.51*	.38*	.56*	.55*																	
S25	.08	.15*	.14	.14*	.19*	.20*	.21*	.29*	.31*																
S18	.13	.26*	.16*	.22*	.28*	.21*	.31*	.38*	.32*	.37*															
S24	.27*	.34*	.29*	.25*	.29*	.23*	.26*	.39*	.37*	.49*	.32*														
S17	.23*	.27*	.19*	.17*	.24*	.29*	.36*	.24*	.35*	.39*	.53*	.37*													
S23	.42*	.40*	.30*	.42*	.30*	.17*	.41*	.51*	.52*	.57*	.43*	.57*	.34*												
S13	.21*	.21*	.15*	.23*	.23*	.36*	.17*	.32*	.21*	.47*	.44*	.37*	.39*	.34*											
S7	.26*	.33*	.21*	.30*	.33*	.18*	.32*	.34*	.26*	.33*	.38*	.48*	.32*	.41*	.39*										
C32	.30*	.35*	.21*	.37*	.30*	.29*	.33*	.42*	.32*	.42*	.46*	.40*	.39*	.54*	.35*	.41*									
S9	.32*	.43*	.32*	.45*	.42*	.23*	.33*	.52*	.41*	.40*	.47*	.48*	.22*	.52*	.42*	.57*	.51*								
C2	.22*	.31*	.17*	.30*	.27*	.16*	.34*	.34*	.35*	.21*	.24*	.25*	.04	.27*	.19*	.14	.34*	.32*							
SV	.21*	.29*	.13	.29*	.22*	.15*	.26*	.37*	.25*	.07	.22*	.14	.04	.18*	.19*	.04	.20*	.27*	.55*						
SV	.25*	.30*	.18*	.27*	.25*	.14	.21*	.35*	.31*	.17*	.14	.22*	.05	.26*	.16*	.04	.22*	.25*	.49*	.48*					
SV	.23*	.33*	.12	.21*	.24*	.23*	.21*	.25*	.16*	-.03	.09	.11	.06	.03	.16*	.03	.12	.18*	.42*	.43*	.36*				
C1	.34*	.42*	.36*	.38*	.42*	.20*	.50*	.43*	.46*	.27*	.34*	.25*	.20*	.45*	.24*	.28*	.37*	.40*	.63*	.40*	.37*	.27*			
SV	.41*	.43*	.28*	.44*	.29*	.25*	.41*	.48*	.34*	.12	.26*	.28*	.17*	.29*	.25*	.19*	.36*	.30*	.43*	.47*	.46*	.37*	.43*		
C18	.40*	.45*	.40*	.38*	.42*	.20*	.38*	.50*	.44*	.32*	.33*	.35*	.18*	.42*	.22*	.29*	.45*	.39*	.54*	.45*	.38*	.32*	.57*	.44*	

Note. * Correlation is significant at $p < 0.05$. ** Correlation is significant at $p < 0.01$.