

**Using School Climate Surveys to Categorize Schools
and Examine Relationships with School Achievement**

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The “school report card” or “school profile” has become ubiquitous in the accountability movement. Report cards, required under the provisions of the No Child Left Behind (NCLB) Act of 2001, most typically include mandated information on student achievement, teacher qualifications, attendance, and other variables that provide descriptive information about the school and its programs. All the states have some form of a school-level reporting system accessible over the world-wide web, providing a dizzying array of analyses of achievement data. Student attendance (and dropout data for secondary schools), student behavior indices (e.g., incidents of tardiness, cutting class, and disruptive or criminal acts), and teacher qualifications are customarily reported. Measures of school climate, however, have received only passing interest from policy makers as critical elements in accountability reporting.

A favorable school climate provides the structure within which students, teachers, administrators, and parents function cooperatively and constructively. Hoy & Miskel (1982) defined school climate as a school’s personality, and its importance has intrigued researchers for approximately 50 years (Anderson, 1982). Edmunds (1982) and Lezotte (1990) were prominent in linking climate directly to school effectiveness more than thirty-five years ago. School climate has been found to positively affect academic achievement (Greenberg, 2004; Lee & Burkham, 1996), and to influence a student’s decision to remain in school (Byrk & Thum, 1989; Rumberger, 1995).

South Carolina is one of three states, along with Hawaii, and Rhode Island, to include climate data from surveys of students, teachers, and/or parents on their school report cards. South Carolina’s report card was developed in response to requirements of the state’s Education

Accountability Act of 1998 (SC Code of Laws, Section 2, Chapter 18, Title 59). The specific variables and data elements were selected by the General Assembly’s Education Oversight Committee working in collaboration with the State Department of Education and the State Board of Education. The inclusion of school climate data from “evaluations of the school by parents, teachers, and students” in the school, district, and state report cards is a specific requirement of the state’s accountability legislation (SC Code of Law, 59-18-900 (D))

School climate data in South Carolina is collected annually from questionnaires administered to parents, teachers, and students. The resulting data set provides a unique opportunity to examine the dimensions of state-wide school climate data. The purpose of this study was identify factors underlying school climate surveys administered to students and teachers across the state of South Carolina and use the factor structures to create clusters of schools within the state that vary on the identified dimensions of school climate. The relationship between school cluster membership and outcomes such as student test scores, growth in achievement, and attainment of NCLB student progress goals was also investigated.

Every school may be thought of as having a distinct personality or climate. School climate is typically thought to involve four distinct parts (Allen, Thompson, Hoadley, Engelking, & Drapeaux, 1997; Sackney, 1988): ecology, milieu, social system, and culture. Ecology comprises physical and material features of schools, such as age of the building and cleanliness. The milieu involves the personnel (e.g., administrators, teachers, parents, staff, students, etc.) involved with a school. A social system is described as the “rules” which a school uses to interact with members. Finally, school culture consists of shared norms, values, and beliefs of the members. The two related topics of climate and culture are delineated by Allen et al. (1997)

where, “Culture establishes normative behavior for the members of organizations, and climate is the perceptions of those norms” (p.1).

Most studies involving school climate administer a survey to participants at a smaller level, such as one school or one district, and identify factors of climate that are important to consider. See Sackney (1998) for a comprehensive review of factors identified with previous school climate studies. School climate, as a factor to increase student achievement, has been receiving increased attention in the school improvement literature. The Consortium on Chicago School Research (CCSR) used information from principals, teachers, and students across over 200 schools to identify “five essential supports for school improvement” (Sebring, Allensworth, Bryk, Easton, Luppescu, 2006). The CCSR found the important factors to be: leadership, professional capacity (e.g., knowledge, skills, and disposition of faculty), parent-community ties, climate, and instruction. To gain a greater understanding of the impact of the five supports on school achievement, the CCSR examined the relationship between the five factors and student achievement as measured by a standardized test. The findings showed that schools strong in most (e.g., 3 to 5) essential areas were up to 10 times likely to make gains in both reading and mathematics standardized test scores on the Iowa Test of Basic Skills (grades 3-8). Sebring et al. (2006) also found that improvements in the essential supports also led to improved achievement.

An earlier study of elementary schools in Chicago also highlighted the importance of positive school climate characterized by mutual trust and respect. According to Bryk and Schneider (2002), schools with a high degree of “relational trust” between administrators, teachers, and parents are far more likely to make the kinds of changes needed to improve student achievement than schools where relationships are poor. Bryk and Schneider compared 100 schools that made the greatest improvement on achievement tests (reading and math) between

1991 and 1996 with 100 schools that made little or no improvement. They discovered that schools with high levels of trust at the beginning of reform efforts had a 1 in 2 chance of making significant improvements in reading and math achievement, while schools with low levels of trust had a 1 in 7 chance of making achievement gains. Among the schools with initially low levels of trust, only those schools where trust was strengthened over the course of reform efforts showed achievement gains. No school that continued to have low levels of relational trust improved student achievement levels to any appreciable degree.

There have been few studies that have investigated school climate on a state or national level. Using exploratory factor analysis (EFA) techniques with the California School Climate and Safety Survey and 7,524 students in grades 6 to 12, Furlong et al., (2004) identified two broad categories of climate: school climate (support from teachers, enforcement of school rules) and school safety (perceptions of safety and gang activity). However, EFA techniques were conducted within each dimension separately rather than across the survey.

Greenberg (2004) used a national dataset for 4th, 8th, and 12th graders to determine how NAEP mathematics scores were affected by school climate. Using EFA, three components of school climate were identified: student behavior, parental involvement, and school morale. Further, regression analyses showed that NAEP mathematics scores were increased as climate scores increased, even when school characteristics (e.g., poverty, urbanicity, type of school, school size) were controlled. The findings support the notion that school climate is not a fixed school condition and that climate can be changed (Greenberg, 2004). While this study provided an investigation of the relationship between student achievement and school climate, only mathematics was studied.

The studies by Greenberg (2004), Furlong et al (2004), and Sebring et al (2006) recognize the dimensional nature of school climate and its relationship to achievement. However, no previous study has attempted to create a statewide typology of school climate or to study the influence of group membership on report card indices. Subsequent sections of this report present the methodology, results, summary, and recommendations of the study.

Methods

School Climate Surveys

Students and parents at selected grades (typically grades 5, 8 and 11) as well as teachers at each school complete a survey each year to assess characteristics about a school's learning environment, parent-school relationships, and social and physical factors related to the school. Three items from each survey are included on the report card. However, the surveys consist of many items, and relationships among these items may illuminate differences between gap-closing and other schools. The full versions of the 2005 student, parent, and teacher school climate surveys were used in subsequent analyses and are briefly described in the following sections.

Student survey. The 43-item 2005 student survey includes questions from three areas:

- *Learning Environment*, measuring students' perceptions about the learning context (18 items).
- *Social and Physical Environment* measuring students' thoughts about building cleanliness, appearance of the grounds, classroom management/ behavior, school safety, and relationships with other teachers/students (17 items).
- *Home and School Relations* measures the relationship between schools and parents (8 items).

Students respond to each item using a 4-point Likert scale ranging from 1=Disagree; 2=Mostly Disagree; 3=Mostly Agree; to 4=Agree.

Teacher survey. There are 53 items on the 2005 teacher survey. While the items differ, the three scales hypothesized for the students are also hypothesized for teachers. There are 26 items included on the *Learning Environment* scale, 16 items on the *Social and Physical Environment* scale; and 11 items on the *Home and School Relations* scale. Teachers responded to each item using the same 4-point Likert scale: 1=Disagree; 2=Mostly Disagree; 3=Mostly Agree; 4=Agree.

Parent survey. The 2005 Parent Survey consists of 54 items arranged into different sections with varying formats. The survey includes 21 Likert scale questions on three scales (*Learning Environment, Home-School Relations, Social and Physical Environment*). Parents responded to each item using a 5-point Likert scale: 1=Disagree; 2=Mostly Disagree; 3=Mostly Agree; 4=Agree, 5 = 'Don't Know'. In the analyses, the "don't know" option was recoded as missing.

The remaining 33 items are organized into four sections. For eight items, parents are asked about the extent to which they volunteer or attend school-based events. This scale is labeled "*Parent Participation*." Parents responded to these items using a 4-point Likert scale: 1=I do this; 2=I don't do this but I would like to; 3=I don't do this and I don't care to; 4=The school doesn't offer this activity/event. The "*Parent Responsibilities*" section asks parents the extent to which they were active in assisting their child or assisting in their child's classroom (5 items). Parents responded to the child assistance scale using a 3-point scale: 1=I do this; 2=I don't do this but I would like to; 3=I don't do this and I don't care to. For both the *Parent Responsibilities* and the *Parent Participation* sections, the responses were recoded into a dichotomous scale

where a rating of “1” (I do this) was noted; other responses were coded as “0.” The results report the percentage of parents who do take part in the stated activity.

The two final sections of items are *Parent Obstacles to Involvement* and overall *School Ratings*. Parents are asked to rate seven statements about potential obstacles to school involvement such a lack of transportation or family health problems by responding true or false to each issue. Information on this scale was recoded as 1= True, 0 = False to report the percentage of parents who agreed that a particular issue was an obstacle to school involvement. For the section of five questions, parents are asked to provide an overall school rating, a rating for the school’s “friendliness,” and characterize the level of input the school seeks from parents. For these questions, parents responded using a 5 point Likert scale: ranging from 1=Very Good; 2=Good; 3=Okay; 4=Bad, 5=Very Bad. For these items, the responses were recoded into a dichotomous scale where a rating of “1” measured a positive rating and a code of “0” noted a negative rating (Okay, Bad, or Very Bad). The results report the percentage of parents who positively endorsed an item (Very Good or Good).

State Report Card Variables

Each year South Carolina’s public schools are evaluated using the state report card to provide information about how the state’s public schools are performing. The report card provides school level information for a variety of variables, including characteristics about the school and its programs (e.g., poverty index, number of art opportunities, percentage of students in gifted programs), faculty (teacher and principal experience, percentage of teacher vacancies, number of professional development days, average salary), and student achievement (standardized test scores from the Palmetto Achievement Challenge Test (PACT), annual yearly progress).

One focus of this study was to examine report card variables for clusters of schools defined by their school climate factor scores. The following report card variables were extracted from the Department of Education's 2005 report card file and used in subsequent analyses:

- Percentage of students in poverty (combination of free/reduced lunch status and eligibility for Medicaid services)
- Student enrollment
- Average daily attendance for kindergarten students
- Percentage of students retained
- Average daily student attendance rate
- Percentage of students served by gifted and talented programs
- Percentage of non-speech disabled students
- Percentage of students overage for grade (by more than 2 years)
- Percentage of students with out-of-school suspensions or expulsions
- Number of teachers
- Percentage of teachers with advanced degrees
- Percentage of teachers on continuing contracts
- Percentage of highly qualified teachers
- Percentage of teachers on provisional or emergency certificates
- Percentage of teachers returning from the previous school year
- Average daily teacher attendance rate
- Average teacher salary
- Average number of teachers' paid professional development days
- Principal's years at the school

- Student-teacher ratio
- Percentage of prime instructional time
- Average dollars spent per pupil
- Percentage of expenditures spent on teacher salaries
- Number of art opportunities
- Percentage of students whose parents attend conferences
- Southern Association of Colleges and Schools (SACS) accreditation
- Percentage of non-speech disabled students taking PACT English language arts
- Percentage of non-speech disabled students taking PACT math
- Percentage of teacher vacancies unfilled for more than 9 weeks
- Rating of character development program
- PACT English language arts and math scores for grades 4-5
- Absolute school rating (excellent, good, average, below average, or unsatisfactory)
- Percentage of adequate yearly progress objectives met

Schools and Participants

This report focuses on elementary schools with fourth, fifth, or sixth grade as the exit grade in the school, in order to have comparable data from report cards and the climate surveys. For consistency, survey responses were limited to students in grades 4, 5, or 6, parents with students in grades 4-6, and teachers teaching in elementary schools where one of the grades 4-6 was the highest level taught in the school. The overall sample included 30,713 parent survey responses, 44,055 student survey responses, and 19,121 teacher survey responses. While individual-level data were used for the initial factor analyses, results were ultimately aggregated to the school level. This was done in order to remain consistent with the report card

information and also to provide information at the school level about characteristics that were important in distinguishing between schools.

Data Analyses

Statistical procedures followed two analytic strategies: exploratory factor analysis and cluster analysis. Each of these procedures is described in subsequent sections. Also, SAS (version 9.2) was used for all analyses.

Factor analysis. Exploratory factor analysis (EFA) was conducted separately for student, teacher and parent datasets. Factor analysis refers to a wide array of statistical techniques used to examine relationships between items and latent factors with which items associate (Comrey & Lee, 1992; Crocker & Algina, 1986; Gorsuch, 1983; Loehlin, 1992.) The overriding purpose of EFA is to account for the relationships among observed variables by summarizing the data set into a smaller number of factors or dimensions (Comrey & Lee, 1992; Crocker & Algina, 1986; Gorsuch, 1983; Loehlin, 1992). A truly exploratory factor analysis does not have a hypothesis about the number of common factors required to account for the underlying dimensions of a data set (Crocker & Algina, 1986). However, because researchers often have an idea of the number of dimensions underlying a scale most EFA research is not truly exploratory. EFA methodology is often criticized for its subjectivity and internal validation of a final solution, researcher's subjectivity in determining a final solution, and the lack of statistical criteria to use when evaluating an EFA solution (Crocker & Algina, 1986; Gorsuch, 1983; Loehlin, 1992). There were no apriori hypotheses about how the items were related to underlying dimensions, and, therefore, the factor analyses were exploratory in nature.

An iterative maximum likelihood factor analysis with promax rotation was employed. Maximum likelihood allows for measurement error in subjects' responses and also produces fit indices to use to judge how well a given factor model fits the data. A drawback to this method is

that it assumes multivariate normality in the population ('tested' by examining univariate item statistics). If this assumption is severely violated, maximum likelihood may produce improper solutions. The rotation method helps to redistribute the relationships among the factors mathematically, without changing the relationships between items and factors. This process is conducted to aid in interpretability and explanation of the final solution (Comrey & Lee, 1992; Gorsuch, 1983). In the current study, an oblimin rotation was used to allow for relationships between factors.

A scree plot was printed to gain a sense of the number of factors needed to summarize each of the parent, student and teacher datasets. The scree plot indicates the number of factors which may be underlying a data set by plotting the percentage of variance extracted by the number of factors in the data set (Gorsuch, 1983). The point at which the plot begins to level off suggests the number of factors underlying the data set. The scree plot suggests a number of different factors underlying the data set and each factor solution should be run and evaluated to determine if there is a plausible representation of the relationships underlying the data set (Gorsuch, 1983).

Each EFA solution was evaluated based upon five criteria. First, percent of variance explained by the overall set of factors and by each individual factor was assessed. Second, the occurrence of simple structure was considered. Simple structure states that each item should associate strongly with only one factor. Items were considered markers of a factor if their loading value was at least .40. Lower item to factor correlations were considered if an item did not associate as highly with any other factor. Cross-loading items, items that have strong relationships with more than one factor, may cause problems when interpreting the factor solution. Cross-loadings were considered to be present if loading values were above .30 on the secondary factor. Third, the solution was evaluated for the absence of specific factors. Specific

factors are factors consisting of one item and are often an indication that the data set has been “over factored”. Fourth, the residual matrix, which reports the differences between the original correlations from the data set and the correlations reproduced from the data, was examined. Large residual terms imply that there are additional factors still to be extracted. Finally, the factor solution was judged upon its interpretability and match to theory. This criterion is arguably the most important. For a factor solution to be useful, it needs to be substantively important based upon knowledge of the content area.

After an optimal and final factor solution is identified, the factor information can be used in subsequent analyses. The factor solution allows for the creation of “factor scores,” which provide an individual’s placement on the factor distribution. The factor score values can range from a low of -3 to a high of 3. Values close to 0 show an average or typical level of performance. As values move away from zero, regardless of direction, the magnitude of the relationship increases. The sign of the factor score (positive or negative) shows how the school’s performance deviates from average; positive factor scores describe above average performance; negative factor scores describe a below average performance.

Cluster analysis. Using the average factor scores for each of the 521 elementary schools, a second statistical procedure, cluster analysis, was conducted. Cluster analysis refers to a set of classification procedures used to uncover homogeneous groups of people underlying a data set (Anderberg, 1973; Aldenderfer & Blashfield, 1984; Hartigan, 1975; Milligan & Cooper, 1987). The goal of cluster analysis is to identify subgroups of cases that are similar to members within a cluster while distinct from members of other clusters (Aldenderfer & Blashfield, 1984). Through this process, the clustering technique maximizes the variance between groups and minimizes it within groups.

Many different algorithms exist for clustering data. The most popular algorithm in the social sciences, Ward's hierarchical analysis, creates groups that have minimum variance within a cluster (Ward, 1963). However, a drawback to the Ward method is that once a case is assigned as a member of a particular cluster, it cannot be reassigned as the clustering procedure continues. Therefore, a case assigned to a cluster early in the procedure may ultimately have a stronger association with a different cluster at the conclusion of the analysis, but is not permitted to change cluster membership.

To overcome this drawback, one option is to employ the final solution from the Ward clustering procedure as the starting point for a K-means iterative clustering procedure (Milligan & Cooper, 1987). The K-means iterative procedure allows for cases to switch from their initial cluster assignment to a different cluster with which it most closely associates (MacQueen, 1967). After all cases in the data set have been assigned to a cluster, the K-means procedure recalculates the average values across all variables within the cluster, which is used as the starting point for the next iteration of the procedure. The iterative process continues making "passes" through the data set until cases do not change clusters. By using the final Ward's solution as the initial starting point for the K-means procedure, the researcher gains the benefits of both clustering algorithms. The squared Euclidean distance measure was used as the clustering index of similarity to group cases. Thus, cases joined the cluster in which the squared Euclidean distance between the case and the cluster centroid was minimized.

To begin the clustering procedure, a Cubic Clustering Criterion plot (CCC; Sarle, 1983) was used to judge the number of clusters underlying each of the teacher, parent, and students data sets. The CCC plot is similar to a scree plot in factor analysis, showing the number of clusters needed to reduce the larger data set into a smaller number of groups.

The interpretation of the cluster analysis solutions involved two main components. First, the centroid information for each of the clusters was examined. The centroid is the arithmetic mean for the set of variables used in the clustering process. The centroids were evaluated to determine if the clusters' pattern of mean values identified subgroups of schools. Second, supporting information about each cluster's characteristics, such as average school size, percentage of gifted students, and school poverty levels, and cluster size relative to the total sample were examined.

To support an identified cluster solution, external validation was conducted to examine differences between clusters on important variables that were not used to group cases into clusters. For the present study, external indicators from SC report card and parent survey were used to support the usefulness of the cluster solution. If the solution does identify unique patterns of schools differentiated by climate, external indicators should yield key differences. Once the final solution was determined, the cluster groupings were used in validation procedures. The objective was to identify differences between the schools relative to climate, school report card information, and parent survey information.

Results

Included in the analyses in this section of the report is information from surveys of parents, teachers, and students and various school-level indicators present on South Carolina's school report cards. These indicators encompass both contextual information and achievement outcomes, such as school ratings, based upon PACT performance, the percentage of AYP objectives met, and various measures of reading and mathematics success. For all analyses, indicator data have been aggregated to and are presented at the school level. A total of 562 elementary schools were included in the study. Data were not available for every indicator for

every school because certain report card variables had missing data for one or more schools. Typically, the analyses reflect data for more than 500 schools.

Factor Analyses of the Survey Items

In a series of iterations (four rounds for both the student and teacher instruments and one round for the parent survey), the agreement items on each survey were factor analyzed and factors extracted. Following each round, cross-loading and low-loading items were identified and eliminated from the analyses. This process resulted in the elimination of 11 items from the teacher survey, from 53 to 42 items and also 11 on the student survey, from 43 to 32 items. The results from the final round of the analyses will be presented in this section.

For the teacher survey, a five-factor solution was determined to be the most interpretable solution, and the names of the factors extracted and the factor loadings are presented in Table 1. The factor loadings are numbers which indicate how well an item is measuring the factor. The higher the number, the more closely that item is related to the underlying hypothesized latent dimension. Thus, for teachers, the first factor, *Home-school Relationship*, was measured most effectively by the item, “I am satisfied with the home-school relations” (89) and “Parents attend school meetings and other school events” (89). For the *Leadership and Climate* factor, the item “The school administration provides effective instructional leadership” had a factor loading of .93, and “The school administration communicates clear instructional goals for the school” a loading of .89. Items such as these, with very high loadings, are so called “marker items,” and are nearly pure measures of the factor. In this instance the factor clearly reflects administrative leadership. For Instructional Focus, three items with loadings of .80 to .84 indicate a focus on an understanding of instructional standards and high expectations for students to meet those standards. Teachers’ views of the social-physical environment of the schools were closely

associated with building cleanliness and maintenance, having three marker items with factor loadings of 80 or higher. Finally, the Table 1 shows that teacher perceptions of *Safety* were highly related to a) their perceived safety at school during the day (89), and b) going to and coming from school (89).

Table 2 indicates that the analyses for students yielded a four-factor solution. These factors have been named:

- *Learning Environment*
- *Expectations of Others*
- *Social-physical Environment*
- *Safety*

A number of the student items loaded to a moderate degree (factor loadings from 30 to 60) on *Learning Environment*, with “My classes are interesting and fun” (60), “My teachers spend enough time helping me learn” (59), and “I am satisfied with the learning environment in my school” (58) being the highest. Positive student responses to these items suggest the existence of a nurturing learning environment in which the student feels supported by teachers and engaged in learning. The second factor, *Expectations of Others*, also is characterized by a number of items with only moderate loadings. The central theme among the items is the notion of high expectations for student behavior and student learning coupled with a close monitoring of those behaviors by teachers and by parents. The third dimension, *Social-physical Environment*, is primarily associated with student behavior in the school – in classrooms and other areas of the school and its grounds (both with loadings above 80). Secondly, it seems to reflect student concerns about building cleanliness and maintenance (loadings generally in the 40s). Thus, the emphasis for student perceptions of the social-physical environment has a somewhat different

emphasis than that dimension for teachers. The *Safety* factor for students is comparable to that outlined for teachers: the perception of security both at school and coming to and going from school are central and strong (with factor loadings of about 80).

A four-factor solution for the parent data is presented in Table 3. It reveals that parents view the *Home-school Relationship* dimension as most closely associated with how well the school listens to their issues and concerns. The two items loading most strongly on this factor are “My child’s school considers changes based on what parents say” (73) and “My child’s school includes me in decision-making” (62). The second factor, *Social-physical Environment*, is a combination the perceived safety of their child at school (with a loading of 85), school appearance and cleanliness (68), and overall satisfaction with social and physical environment (67) of the school. Parents regard a positive *Learning Environment* in much the same way as their children, characterized by a nurturing, supportive atmosphere (“My child’s teachers encourage my child to learn” (84) in which expectations are high (75). The final factor (*Teacher-parent Relationship*) involves the interactions between the teachers and parents. Teachers telling parents how they can help their child learn was most closely associated with this factor (78). This loading was closely followed by the item “My child’s teachers contact me to say good things about my child” (75).

Correlations among contextual variables and achievement

An important purpose of this study was to examine the relationships between the school-level contextual variables and school-level achievement outcomes. The contextual measures included the report card indicators and the survey data found in Tables 1-3. For the surveys, factor scores were generated to reflect school performance on the particular dimension. Factor

scores are standardized scales developed from the factor structure and based upon the weights assigned to individual items.

The school's absolute rating, reflecting student performance on the Palmetto Achievement Challenge Tests (PACT), and the percentage of AYP objectives met were two key outcome indicators. The Pearson correlations between each of the context indicators and the two outcome measures are presented in Table 4. Correlation coefficients can range from 0 to ± 1 . The higher the number, regardless of sign, the stronger the relationship is between the two variables. Values of .90 or greater indicate a near linear relationship between the two while values near zero suggest no relationship.

The strongest positive correlation, .70, is found between the percentage of students in the school served by gifted and talented programs and the absolute rating of the school. This association is not unexpected since participation in academically gifted programs is predicated upon strong academic performance. Schools with higher numbers of students participating in gifted programs would be expected to demonstrate higher overall achievement levels. Correlation is often confused with causation. A strong relationship between two variables may indicate causation, but it also can simply indicate a mere association. There is a strong relationship, for example, between the number of firemen at the scene of a fire and the size of the fire. However, the firemen did not cause the fire. In the case of gifted program participation, the relationship underlying the correlation is less clear. While programmatic efforts to improve achievement can certainly be effective in improving student achievement, the requirement that students be high achievers as a prerequisite to participation in the gifted program confuses cause and effect. A sophisticated study of program effectiveness is necessary to establish cause and effect.

A similar caveat holds for the strong negative relationship (-.76) found between the percentage of students in the school in poverty and the school's absolute rating. As the percentage of students in poverty in the school increases, there is a tendency for the absolute rating of the school to be lower and vice versa. However, It is generally agreed that it is not family income level per se that poses a challenge to high achievement but rather the constellation of circumstances associated with poverty (e.g., lower parent education levels and a less educationally rich home environment) that result in lower achievement. Also, there are many examples of children from impoverished backgrounds who reach the highest levels academic performance. Once again, correlation does not assure causation.

It is particularly intriguing that there are a large number of survey factors with moderate correlations with absolute rating. The *Home-school Relationship* factor from the teacher survey and the *Social-physical Environment* factor from the parent survey have correlations with absolute school rating of .68 and .59, respectively, almost as high as percentage of gifted students and the percentage of students in poverty. These findings suggest that the surveys can be very helpful in understanding the complex dynamics of the relationships between school-level contexts and school achievement.

Table 4 also reveals that, in general, the correlations between the percentages of AYP objectives met and the contextual measures are lower than between the contextual measures and absolute rating. The highest correlation (.46) is with average student attendance, closely followed by three survey factors, *Home-school Relationship* from the teacher survey (.44), *Social-physical Environment* from the parent survey (.43), and *Safety* (.41) from the teacher survey.

Clustering Schools

As described in the methodology section of this paper, cluster analysis is a statistical tool designed to partition observations, in this case schools, into mutually exclusive groupings based upon the similarity of the characteristics that they have in common. Because of the apparent strength of the relationship between school survey factor scores and school outcomes, the data suggested that schools could be assigned to clusters based upon the factor scores from the student and teacher surveys. Given the varying scales and formats used on the parent survey, the large number of parents marking the “don’t know” option, and the low return rates from some schools, it was decided that the data from the parent survey would not be employed in the clustering analyses. Clustering was conducted using nine factor scores (five teacher factors and four student factors) that were obtained from the final solutions for the teacher and student surveys.

Table 5 shows factor score means for a four-cluster solution. Schools in Cluster 1 had scores that illustrated positive, above average, teacher and student perceptions of climate. Cluster 2 schools had scores that were at the average for all schools in the state. The schools in Cluster 3 had student and teacher climate scores below the average and the fourth cluster had the lowest average factor scores for the teacher factors. School climate, as measured by the student and teacher factor scores, was most positive in Cluster 1 schools and least positive in Cluster 4 schools.

Cluster 1, comprising 173 schools, had mean factor scores ranging from .13 (*Expectations of Others* for students) to .54 (*Home-school Relationship* for teachers) while Cluster 4 had factor scores between -.20 (*Learning Environment* for students) and -1.00 (*Home-school Relationship* for teachers). It is interesting that the teacher factor for *Home-school Relationship* showed the highest value in Cluster 1 of all factor scores (.54), and the lowest of all factor scores (-1.00) in Cluster 4 schools. The other factor score with large variation from

Cluster 1 to Cluster 4 was the teachers' *Physical Environment* factor which ranged from .37 (Cluster 1) to -.88 (Cluster 4).

When the report card indicators were averaged by cluster, consistent relationships were found between cluster membership and the indicators. Schools in Cluster 1 had, on average, 56% of the students in poverty. The comparable percentage for Cluster 4 was just over 89%. Changes in the other variable values across clusters (shown in the lower portion of Table 11) tend to be consistent with the changes observed for the poverty variable. For example, schools in Cluster 1 tend to have higher student enrollments, higher attendance for students and teachers, higher percentages of gifted students, more experienced principals and teachers, etc. Cluster 4 schools tend to have greater poverty, a larger percentage of retained students, a greater percentage of overage students, more teachers on provisional or emergency certificates, etc.

The strong relationship between overall school climate, as indicated by cluster location, and student achievement, as measured by PACT is depicted in Figure 1. For two PACT performance levels (basic and above as well as proficient and above), the scores of 4th and 5th grade students for English language arts and math are shown by cluster. The relationship between school climate and student PACT performance is evident across all skill areas, grade levels, and criteria for performance (basic and above versus proficient and above). Students perform at higher levels in schools with more positive school climate, and the schools with the least favorable climate (Cluster 4) have students with the lowest PACT performance.

The stair-step effect depicted in Figure 1 is also present when the criterion is the percentage of schools meeting AYP standards. Figure 2 shows that schools with the most favorable ratings of school climate met 84.4% of their AYP objectives, while schools with the

lowest school climate scores met only 31.2% of their AYP objectives. Comparable figures for Clusters 2 and 3 were 71% and 53% respectively.

Figure 3 shows a similar relationship between cluster membership and the annual school ratings from South Carolina's 2005 school report cards. Schools can earn an absolute rating of *excellent*, *good*, *average*, *below average*, or *unsatisfactory* based on student achievement and other factors. Schools rated *excellent* most frequently occur in Cluster 1 schools with positive school climate, and the highest percentages of schools rated *below average* or *unsatisfactory* are in schools with the lowest ratings of school climate.

Discussion

The primary goal of this study was to examine report card indicators and school climate survey data gathered from students, parents, and teachers for elementary-level schools in an effort to ascertain how school climate data related to report card indicators and student achievement. The analyses included contextual measures and outcome measures aggregated at the school-level for the 2004-2005 school year. The resulting dataset included more than 500 schools with exit grades of four, five, or six.

The study found moderate to strong relationships between a variety of achievement indicators and school climate, as measured by the surveys of teachers, students, and parents. The strongest of these were between those items measuring home-school relationship on the teacher survey and absolute rating. The second strongest relationship was between social-physical environment on the parent survey and school absolute rating.

Similarly, more AYP objectives were met by schools with the most favorable school climates. Schools with more positive climates met 84.4 % of their AYP objectives, while schools with the lowest climate ratings met only 31% of their AYP objectives. The relationship

between student PACT performance and school climate followed a similar pattern. Students performed at higher levels in schools with more positive climate, and students' performance was lowest in schools with the least favorable climate ratings

The results of this study are consistent with other research, particularly school climate research from the Consortium on Chicago School Research (CCSR). CCSR used information from principals, teachers, and students across over 200 schools to identify "five essential supports for school improvement" (Sebring et al., 2006). The CCSR found the important supports to be: leadership, professional capacity (e.g., knowledge, skills, and disposition of faculty), parent-community ties, climate, and instruction. The five supports identified by the CCSR mirror findings from the (2002) compared 100 schools in Chicago that made the greatest improvement on achievement tests (reading and math) between 1991 and 1996 with 100 schools that made little or no improvement. They discovered that schools with high levels of trust at the beginning of reform efforts had a 1 in 2 chance of making significant improvements in reading and math achievement, while schools with low levels of trust had a 1 in 7 chance of making achievement gains. The findings from Chicago are important, illustrating that climate factors are potentially changeable and positively impacting these factors can lead to school level increases in student achievement. Thus, the information gained from the analysis of the SC survey data could be used to inspire a greater number of schools currently lower on the parent, teacher, and student factors to make positive changes. These changes may impact both school climate and also student achievement, and inspire a greater number of SC schools to meet goals set by NCLB.

The present study has demonstrated a strong association between positive school climate and student achievement. The development of a school-climate report, designed expressly for

school administrators and school improvement councils, should be considered. Such a report, with greater detail than provided currently, would group items into their relevant dimensions and could be used to identify needed professional development and programmatic initiatives to improve school climate.

One characteristic that warrants noting is that there may be district level effects which were not included in the study. Meaning, districts may vary widely depending on their climate perspective and this perspective may carry over into the survey data. The role of district characteristics and support in improving school outcomes could be further explored through additional analyses, such as Hierarchical Linear Modeling. Additionally, survey items designed to address this dimension could be added to the current survey instrumentation.

The survey data provide a window to aid in understanding how school performance is related to key achievement indicators and to other contextual variables at the elementary level. Similar follow-up studies should be conducted with data for middle and high schools to examine relationships between school climate dimensions and student achievement, attendance, and graduation rate. Additionally, though the sample sizes were large, the analyses in this study were limited to data from a single school year, 2004-2005. Analyses should be conducted with more recent data in order to determine whether there is consistency in the trends identified for 2004-2005.

In conclusion, this study was able to identify dimensions of school climate and use the information to create and report on a statewide typology for school climate. This typology can be used to understand different type of schools within a state and to target relative needs for distinct groups of schools. The typology can be used to make policy decisions, such as distribution of funds or targeting monies for intervention programs, tailored to school needs. The results

provided information about the relationships between climate and accountability measures to provide greater understanding of the associations. Finally, many components of state accountability systems are beyond the power of a school to affect (e.g., poverty, enrollment). School climate represents a tangible factor that impacts achievement and is within a school's ability to change. This is important, given that the high stakes world of accountability and NCLB, many of the contextual variables are outside of a school's control. Perhaps greater importance on the role of climate and its effect on student achievement can help schools become a place which is more positive and fosters higher achievement.