ANNENBERG
BROWN UNIVERSITY

EdWorkingPaper No. 23-890

Latent Classes of Teacher Working Conditions in Virginia: Description, Teacher Preferences, and Contextual Factors

Luke C. Miller
University of Virginia

James Soland
University of Virginia

Daniel Lipscomb
University of Virginia

Daniel W. Player
University of Virginia

Rachel S. White
University of Tennessee Knoxville

Many dimensions of teacher working conditions influence both teacher and student outcomes; yet, analyses of schools' overall working conditions are challenged by high correlations among the dimensions. Our study overcame this challenge by applying latent profile analysis of Virginia teachers' perceptions of school leadership, instructional agency, professional growth opportunities, rigorous instruction, managing student behavior, family engagement, physical environment, and safety. We identified four classes of schools: Supportive (61%), Unsupportive (7%), Unstructured (22%), and Structured (11%). The patterns of these classes suggest schools may face tradeoffs between factors such as more teacher autonomy for less instructional rigor or discipline. Teacher satisfaction and their stated retention intentions were correlated with their school's working conditions classes, and school contextual factors predicted class membership. By identifying formerly unseen profiles of teacher working conditions and considering the implications of being a teacher in each, decisionmakers can provide schools with targeted supports and investments.

VERSION: December 2023

Suggested citation: Miller, Luke C., James Soland, Daniel Lipscomb, Daniel W. Player, and Rachel S. White. (2023). Latent Classes of Teacher Working Conditions in Virginia: Description, Teacher Preferences, and Contextual Factors. (EdWorkingPaper: 23-890). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/91e6-5k60

Latent Classes of Teacher Working Conditions in Virginia: Description, Teacher Preferences, and Contextual Factors

Luke C. Miller (Corresponding Author)
University of Virginia
School of Education and Human Development
405 Emmet Street
Charlottesville, VA 22904
lmiller@virginia.edu

James Soland
University of Virginia
School of Education and Human Development
405 Emmet Street
Charlottesville, VA 22904
jgs8e@virginia.edu

Daniel Lipscomb
University of Virginia
School of Education and Human Development
405 Emmet Street
Charlottesville, VA 22904
dwl7ne@virginia.edu

Daniel W. Player
University of Virginia
Frank Batten School of Leadership and Public Policy
235 McCormick Road
Charlottesville, VA 22904
dwp2g@virginia.edu

Rachel S. White
University of Tennessee Knoxville
College of Education, Health, and Human Services
335 Claxton Complex
1122 Volunteer Boulevard
Knoxville, TN 37996
rswhite@utk.edu

Acknowledgement
The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305A200106 to the University of Virginia. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

Latent Classes of Teacher Working Conditions in Virginia: Description, Teacher Preferences, and Contextual Factors

Abstract

Many dimensions of teacher working conditions influence both teacher and student outcomes; yet, analyses of schools' overall working conditions are challenged by high correlations among the dimensions. Our study overcame this challenge by applying latent profile analysis of Virginia teachers' perceptions of school leadership, instructional agency, professional growth opportunities, rigorous instruction, managing student behavior, family engagement, physical environment, and safety. We identified four classes of schools: Supportive (61%), Unsupportive (7%), Unstructured (22%), and Structured (11%). The patterns of these classes suggest schools may face tradeoffs between factors such as more teacher autonomy for less instructional rigor or discipline. Teacher satisfaction and their stated retention intentions were correlated with their school's working conditions classes, and school contextual factors predicted class membership. By identifying formerly unseen profiles of teacher working conditions and considering the implications of being a teacher in each, decisionmakers can provide schools with targeted supports and investments.

Keywords: working conditions, latent profile analysis, teachers, school improvement

In order to close persistent achievement gaps along lines of race and ethnicity and socioeconomic status, all students must be taught by an effective teacher. Teachers represent the most significant school factor related to student achievement and evidence suggests that teachers vary significantly in their effectiveness (Rivkin et al., 2005; Rockoff, 2004). However, solely focusing on what the individual teacher does in the classroom to improve teaching quality is missing something important – the school context defined by teacher working conditions (Johnson, 1990, 2019; Kennedy, 2010). Many school- and district-level working conditions influence teacher effectiveness. Most apparent, teacher skills are influenced by conditions such as the quality and availability of ongoing professional development (Kennedy, 2016), the day-to-day instructional support and mentoring they receive (Goddard et al., 2015), and a supportive professional environment (Kraft & Papay, 2014). These factors are within the control of school and district leadership and constitute important components of teacher working conditions.

Teacher surveys are a commonplace means of characterizing how teachers perceive their working conditions. Such surveys are useful for identifying the areas needing improvement, for tracking progress towards achieving improvements, and for connecting improvements to teacher and student outcomes. However, if the focus is on the higher-order construct of a school's working conditions rather than the individual component of working conditions (e.g., professional growth opportunities, school leadership), the analysis must confront the high correlations among the components. Prior research has examined individual components either in isolation (Buckley et al., 2005; Grissom, 2011), iteratively (Allensworth et al., 2009; Johnson et al., 2012), or simultaneously if a set of not-too-highly correlated components could be identified (Boyd Grossman et al., 2011; Ladd, 2011). In this paper, we apply Latent Profile Analysis (LPA) techniques that rely on the mixture modeling framework to identify working conditions classes.

The classes group schools based on response patterns across eight working conditions components such that the working conditions at schools within a given profile (or class) are more like each other than they are like schools classified into any other class (Masyn, 2013). We are unaware of any other study of working conditions that has leveraged LPA, although many of the indicators of organizational capacity analyzed by Duff and Bowers (2022) are often viewed as working conditions.

There are many advantages to the LPA approach. First, the classes reflect, in a single variable, how a complete set of working conditions components exist on the ground in schools, thereby providing a more holistic and digestible view compared to the insights gained from a series of pairwise correlations. Second, the classes do not force schools into low, medium, and high groups as does averaging the components together into a single continuous measure (Johnson et al., 2012; Kraft et al., 2021; Loeb et al., 2005). Instead, LPA is more flexible than other analytic approaches, allowing tradeoffs among components of working conditions. For example, LPA can detect a class, should it exist, that is characterized by high values on one or more working conditions components, medium values on some, and low values on others. Third, the classes do not suffer a significant limitation of averaging together components into a single continuous measure which assigns the same value to two schools with very different sets of working conditions despite having an equivalent arithmetic mean. LPA will distinguish between the two. The LPA classes also allow us to develop a more comprehensive understanding of how a full set of working conditions combine to influence teacher retention and equitable student educational outcomes.

Our analysis of teacher survey data collected in Virginia in the spring of 2021 answers the following three research questions: What are the teacher working conditions classes for

Virginia schools in the 2020-21 school year? How does teacher job satisfaction and retention intentions vary across the teacher working conditions classes? Which school and district characteristics are associated with membership in each teacher working conditions class? We demonstrate that teachers' views of their working conditions can be used to classify their schools by a set of working conditions the schools provide. Teacher job satisfaction and retention intentions vary across the working conditions classes in ways the extant literature would predict.

The paper is organized into five sections. In the next section, we provide background information on teacher working conditions, how school characteristics have been shown to be related to working conditions, and prior applications of LPA. Next, we describe our sample, measures, and analytic strategy. We present our results in the third section and discuss them in the fourth section. The fifth section concludes.

Background

Working conditions define the social context in which teachers teach and students learn. Supportive working conditions contribute to a professional culture that empowers teachers to feel and be successful (Johnson & Birkeland, 2003). When schools provide teachers with supportive working conditions, teachers are more satisfied with their jobs (Grissom, 2011; Johnson et al., 2012), more committed to their job and school (Rosenholtz & Simpson, 1990), more likely to intend to remain at their schools (Johnson et al., 2012; Kraft et al., 2021; Ladd, 2011), and more likely to continue teaching at their schools (Boyd, Grossman et al., 2011; Ingersoll, 2001; Loeb et al., 2005). Supportive working conditions also positively contribute to student achievement (Johnson et al., 2012; Kraft & Papay, 2014). Poor working conditions, on the other hand, undermine teachers' motivation and growth (Leithwood & McAdie, 2007).

Teacher working conditions are also important because they are malleable. They are,

therefore, a promising tool to address persistent teacher recruitment and retention challenges. In his seminal work, Ingersoll (2001) coined the term "revolving door" to describe the process by which new teachers were recruited only to leave within four or five years. The resulting teacher shortages were created, thus, by excessive hiring demand rather than an inadequate supply of teachers. With his analysis, Ingersoll argued for more focus on the organizational context of schools to improve teacher retention and student performance.

Improving working conditions is especially important in schools serving students from disadvantaged backgrounds and poor performing students, schools that have higher teacher turnover (Boyd et al., 2005; Hanushek et al., 2004). Rather than leaving these schools because of the students they serve, there is evidence that teachers instead are leaving because of the poor working conditions the schools provided (Horng, 2009; Simon & Johnson, 2015). Numerous analyses have found that the relationships between student body characteristics and teacher turnover diminish, and in some cases become nonsignificant, when working conditions were added to the models (e.g., Allensworth et al., 2009; Boyd, Grossman et al., 2011; Ladd, 2011; Loeb et al., 2005). Similar patterns have been found with respect to the relationship between student body characteristics and teacher job satisfaction (Johnson et al., 2012).

We included eight dimensions of teacher working conditions in our LPA: school leadership, instructional agency, professional growth opportunities, rigorous instruction, managing student behavior, family engagement, physical environment, and safety. These dimensions were drawn from the literature which is summarized below.

School Leadership

As the school leader, principals have had a significant effect on student learning (Hallinger & Heck, 2010; Heck & Hallinger, 2009), largely through their effect on teachers and

their practices (Goddard et al., 2015). Successful principals created professional cultures characterized by supportive teacher working conditions (Burkhauser, 2017; Reinhorn et al., 2017), which is why Johnson (2006) described principals as "the broker of working conditions" (p. 15). Three elements of school leadership – setting mission and goals for the school, encouraging trust and collaboration, and actively supporting instruction – have been shown to be especially important (Supovitz et al., 2010). Teachers provided with effective school leadership were more self-efficacious (Duyar et al., 2013; Johnson & Birkeland, 2003), more satisfied with their job (Duyar et al., 2013; Grissom, 2011; Johnson et al., 2012; Stockard & Lehman, 2017), and more likely to be retained at their school (Allensworth et al., 2009; Boyd, Grossman et al., 2011; Ladd, 2011; Player et al., 2017).

Instructional Agency

Teachers are professionals and want to be treated as such in schools that respect their expertise, invite them to influence school policies and programs, grant them decision-making authority over aspects of their teaching, and provide them with sufficient planning and instructional time to meet their students' needs (Johnson, 1990, 2006). Teachers in schools with greater instructional agency are more committed to their schools (Rosenholtz & Simpson, 1990), more satisfied with their jobs (Johnson et al., 2012; Stockard & Lehman, 2017; Toropova et al., 2021), and less likely to transfer jobs or leave teaching (Allensworth et al., 2009; Boyd, Grossman et al., 2011; Ingersoll, 2001; Johnson et al., 2012; Ladd, 2011).

Professional Growth Opportunities

Opportunities to grow as a professional is an essential working condition for teachers (Johnson et al., 2005). Through quality professional development, teachers update their skills and knowledge and improve their practice by learning about such things as new curriculum,

standards, assessments, pedagogy, policies and procedures, and students' needs. Unfortunately, many of the opportunities provided to teachers have not been high quality (Garet et al., 2001). Research has highlighted five critical features of high-quality professional development: a focus on subject matter content and how students learn, active rather than passive learning, coherence with teachers' knowledge and beliefs, of a sufficient duration of time to help teachers change their practice, and collective participation such that teachers learn with and from their peers (Desimone, 2009). Teachers who receive high-quality professional development reported greater increases in skills and knowledge and changes in their instructional practice than teachers receiving lower quality professional development (Desimone et al., 2002; Garet et al., 2001). Teachers with more favorable views of their professional growth opportunities felt more efficacious (Johnson & Birkeland, 2003), were more committed to their jobs (Rosenholtz & Simpson, 1990), and were less likely to turn over (Kraft et al., 2016).

Rigorous Instruction

Prior research on teacher working conditions has not explicitly isolated the degree to which the school's instructional rigor and curricular coherence contributed towards a teacher's view of their school. However, the extent to which teachers felt that they were part of a community in which they and their fellow teachers were contributing meaningfully to students' academic and social growth, their collective efficacy, has been established as an important factor in how teachers view their jobs (Goddard, 2001). Likewise, it is reasonable to expect that teachers who feel more coherence in the school's curriculum view their working conditions more favorably because of clearer expectations and a greater sense of relatedness among colleagues (Worth & Van den Brande, 2020). Our measure of rigorous instruction measures the extent to which the teachers feel they and their colleagues are meeting Virginia's standards to have all

students college, workforce, and life ready as summarized by the 5 Cs in Virginia's *Profile of a Graduate* – critical thinking, creative thinking, communication, collaboration, and citizenship.

Managing Student Behavior

Disruptive student behavior is a barrier to both teaching and learning (Figlio, 2007; Simonsen et al., 2008). And yet, many teachers report struggling to manage student behavior and cite a lack of administrative support (Marinell & Coca, 2013). Teachers are frustrated by the absence of schoolwide norms for student behavior such that rules are clear and understood, consistently enforced, and the consequences for breaking the rules are fair (Johnson & Birkeland, 2003; Osher et al., 2010). Schools with more effective structures for managing student behavior have teachers that are more satisfied (Toropova et al., 2021), more committed to their jobs (Rosenholtz & Simpson, 1990), and more likely to remain at the school (Boyd, Grossman et al., 2011; Ingersoll, 2001).

Family Engagement

Parents play a vital role in their children's education and schools. Parental involvement in education can have significant positive impacts on how children behave and perform in school (Boonk et al., 2018), especially when teachers and parents work together as partners (Hong, 2019). School structures influence parent-teacher interactions by facilitating communication and developing trust between teachers and parents (Bryk & Schneider, 2002). Teachers who reported more supportive parental involvement were more satisfied and less likely to leave (Allensworth et al., 2009).

Physical Environment

The facilities, equipment, and supplies that schools provide teachers characterize the physical environment in which teachers instruct students (Johnson et al., 2005). Unclean

classrooms, inadequate heating and cooling systems, the lack of textbooks, and poorly integrated technology all present barriers to teaching and learning (Johnson, 1990). Teachers working in physical environments that meet their instructional needs and support their students' learning are more satisfied (Johnson et al., 2012; Toropova et al., 2021) and more likely to be retained (Boyd, Grossman et al., 2011; Buckley et al., 2005; Loeb et al., 2005).

Safety

When teachers feel safe within their schools, they are able to focus on their professional practice and their students' needs. Horrific mass shootings in schools represent the most severe safety concern, but more common are physical attacks, theft, vandalism, and weapons possession (Diliberti et al., 2019). Teachers in safe schools and schools improving their safety were more satisfied (Stockard & Lehman, 2017) and less likely to turn over (Boyd, Grossman et al., 2011; Boyd, Lankford et al., 2011; Ingersoll, 2011).

Contextual Conditions Associated with Working Conditions

Our third research question seeks to understand which school and district characteristics were associated with membership in the working conditions classes. The set of contextual conditions we identified were drawn from the literature on teacher working conditions.

Supporting the argument that teacher turnover is more responsive to working conditions than student body characteristics, research has consistently shown that teachers' have less favorable views of their working conditions in schools with high concentrations of disadvantaged and high needs students compared to schools with lower concentrations (Grissom, 2011; Johnson et al., 2012). Perceptions are less favorable in schools with more minoritized students (Boyd Grossman, et al., 2011), more students with economic disadvantage (Johnson et al., 2004), more students with disabilities (Duff & Bowers, 2022; Kraft & Papay, 2014), and more English

Learners (Duff & Bowers, 2022; Kraft et al., 2016). Additionally, working conditions are perceived less favorably in larger schools (Boyd, Grossman et al., 2011; Duff & Bowers, 2022).

Prior research has highlighted how working conditions varied across other school characteristics. For example, elementary teachers viewed their working conditions more favorably than did secondary school teachers (Kraft et al, 2021). There were also differences across urban, suburban, and rural schools. Rural teachers had lower perceptions of their principal than suburban teachers (Player et al., 2017), and safety issues were more pronounced in urban than rural schools (Diliberti et al., 2019). Perceptions also varied with teachers' years of experience, although the findings have been inconsistent with some finding a negative relationship (Capp et al, 2021; Duff & Bowers, 2022) and others a positive relationship (Kraft & Papay, 2014; Kraft et al., 2021).

Schools, of course, reflect their communities, and the economic wellbeing of those communities have been linked to aspects of working conditions (Steinberg et al., 2011) and to teachers' retention decisions (Boyd, Lankford et al., 2011). Unlike characteristics of the community, however, a school's working conditions are malleable should the schools and districts make the required investment of money and resources (Ingersoll, 2017). The ability and willingness to do so may vary with district size and be correlated with current per pupil expenditures.

The COVID-19 Pandemic

We also included the district's COVID death rate among our set of school contextual conditions. As mentioned previously, our data captured teacher perceptions of their working conditions roughly one year into the COVID-19 pandemic. Virginia schools, like those in other states, offered some remote instruction. The dimensions we included in our analysis remained

relevant to teachers regardless of how they taught students. For example, school leadership still had an important role to play, and teachers still needed relevant professional development and support for engaging families. Furthermore, by the close of the survey administration, only 14% of students were being offered only remote instruction (Sachs et al., 2022).

Prior Mixture Modeling Related to Teacher Working Conditions

The mixture model framework, including LPA, applies a person-centric lens to data to identify the classes of individuals present in the data as characterized by a set of indicators. This is different from the variable-centric approach underlying regression analyses which identify the correlation between two variables observed in the data. Researchers have applied this framework to student survey data to identify classes of classroom climate (Schenke et al., 2017) and school climate (Shukla et al., 2016). Using teacher survey data, the technique has identified classes of teachers based on their views of social emotional learning (Collie et al., 2015) as well as their levels and type of stress and burnout (Pyhältö et al., 2021) and self-efficacy (Perera et al., 2019).

Our study adds to the rather small literature that applies the mixture modeling framework to teacher perceptions of their working conditions. Several studies assign teachers to classes based on a single dimension of working conditions such as parent involvement and engagement (Stormont et al., 2013) and principal leadership (Urick, 2016). Other studies, while not identifying classes of working conditions, leverage items and factors aligned to multiple dimensions of working conditions. Some of the items that compose the seven measures that Capp et al. (2021) use to assign teachers and other school staff to classes of school climate speak to how student behavior is managed, teachers' professional growth, and safety. Among the nine measures that Pas and Bradshaw (2014) use to define the classes of school environment are items that capture teacher perceptions of school leadership, physical environment, instructional agency,

and family engagement.

We leverage teacher perceptions of their working conditions differently. Instead of identifying classes of teachers, we use teacher perceptions to classify their schools. We are aware of only two studies that leverage teacher perceptions to identify classes of schools (Duff & Bowers, 2022; Williams et al., 2019). The approach in Duff & Bowers (2022) is most like that the one we take but with several important differences. Using teacher responses to the 2016 New York City school climate survey, they identify six classes of school organizational capacity. The classes are defined by 17 indicators of effective leadership, collaborative teachers, trust, rigorous instruction, supportive environment, and family-community ties. These indicators capture our dimensions of teacher working conditions with the exception of physical environment and safety.

As we detail below, our approach differs in two important ways. Duff and Bowers (2022) produced school-level indicators for their mixture model by simply averaging across items and teachers, and then dichotomizing each measure to indicate whether the school's value was above average. In contrast, we used the full variation of scores in our working conditions measures when estimating school-level classes. Finally, the NYC study was restricted to the 1,289 schools that serve students in grades 3 through 8. We identify working conditions classes among all schools.

Methods

Sample

The 2021 Virginia School Survey of Climate and Working Conditions (the Virginia School Survey) was administered from January through April 2021 in all regular Virginia public schools to teachers, teacher aides, licensed staff, and non-licensed staff as well as middle school

students. Here, we analyzed only the teacher responses.[1] All but eight eligible schools participated in the 2021 survey administration for a total of 1,847 schools (over 99%) across all school districts in the Commonwealth. There were 67,110 teacher responses, representing a response rate of 70.8%. The anonymous nature of the survey means that we did not have any information on the non-respondents. Although we could not, therefore, guarantee that the sample of survey respondents was representative of all Virginia teachers, this survey collection captured nearly every school, and represented an opportunity to understand teachers' perceptions of their working conditions in the Commonwealth.

Given our focus on schools, we restricted our analytic sample to schools with at least a 40% response rate. This excluded 126 schools with 2,339 responding teachers leaving an analytic sample of 1,721 schools (92.8% of all schools) with 64,771 teachers (68.3% of all teachers, 74.7% of teachers at the included schools). As shown in Table 1, comparisons between the teacher respondents in the schools included and excluded from our analysis found few statistically significant differences (third column, Table 1). The included teachers were more likely to be Black, less likely to teach English as a Second Language or English for Speakers of Other Languages, more likely to be a second-year teacher, and have more of their students receiving English Learner services.

Measures

Survey Measures

The teacher working conditions survey measured eight distinct constructs: school leadership, instructional agency, professional growth opportunities, rigorousness of instruction, managing student behavior, family engagement, physical environment, and whether the teacher

[1] This study was approved by the Institutional Review Board for Social & Behavioral Sciences at the University of Virginia (protocol number 3654).

felt safe. As detailed in the background section, these constructs were identified and defined based on existing literature related to teacher working conditions. All response categories were defined by six-point Likert scales, with response options ranging from strongly disagree to strongly agree (there was no impartial middle response category). Specific items can be found in Table A1 of the supplemental materials. As a rough measure of reliability, Cronbach's alpha values were also calculated, with values ranging from .782 to .960 for teacher-level item responses.

Measures Related to Longstanding School Contextual Conditions

Information on school contextual conditions came from primarily from publicly available sources. Most of the school-level measures were obtained from the Virginia Department of Education's (VDOE) website including student body characteristics (enrollment, race and ethnicity composition, and the percent of students identified as economically disadvantaged, as having a disability, and as being an English Learner) and school type (elementary or secondary). Using teacher-level data obtained from VDOE, we calculated the student-teacher ratio and the percentage of teachers with 3 or fewer years of experience. Each school's locale (city, suburb, town, or rural) was pulled from NCES's Education Demographic and Geographic Estimates data file. VDOE's website also provided information on two district-level characteristics: the number of schools in the district and per-pupil expenditures. We constructed a measure of a district's socio-economic status using principal component analysis on four district-level indicators: median household income, poverty rate, and the percent of adults with a bachelor's degree or higher obtained from the U.S. Census Bureau and the unemployment rate obtained from the U.S. Bureau of Labor Statistics. Finally, we constructed the district's COVID death rate per 100,000 persons from longitudinal data on COVID death from the Virginia Department of Health website

and population data from the U.S. Census Bureau. We assigned the death rate as of the day each teacher took the survey and then averaged these up to the school level.

We provide descriptive statistics on the 1721 schools' contextual conditions in Table 2. The small number of excluded schools were statistically and substantively different from the included schools on a number of contextual factors. The excluded schools were more likely to be suburban and less likely to be rural. They also, on average, were larger, had larger concentrations of non-White and non-Asian students and English Learners. The excluded schools were also in larger districts with higher per-pupil expenditures and socio-economic status.

Analytic Strategy

In this subsection, we detail how school-level scores were produced before enumerating methods used on a question-by-question basis to analyze those scores.

Scoring the Surveys

Producing scores by summing up the observed item responses is a common practice, yet one that often makes large, untenable assumptions that can bias subsequent analyses (Soland et al., 2022). We therefore used latent variable models that make much weaker assumptions to score the observed survey item responses. One wrinkle in producing such scores was that, while teachers responded to the survey, the inferences we wanted to make were at the school level. Thus, we used multilevel confirmatory factor analytic (CFA) models to further examine the factor structure and produce scores. All such models examined each construct individually and assumed that the construct was unidimensional at both the teacher and school levels.[2]

To ensure these models, which were stemmed from the hypothesized factor structure

[2] For the instructional agency construct, the best-fitting model included three dimensions at the teacher level, but nonetheless maintained unidimensionality at the school level. This factor structure is not out of line with prior theory on the two constructs. Additionally, no latent variable model was estimated for the feeling safe construct. Instead, we measure this construct as the arithmetic mean of two items.

based on the research, fit sufficiently, we used fit statistics including the Root Mean Squared Error of Approximation (RMSEA) and Comparative Fit Index (CFI). Sufficiency of the model fit was defined using cutoffs frequently used in the CFA literature (Hu & Bentler, 1999; Steiger, 1990), while also paying attention to some of the ways that item and model characteristics can affect the usefulness of those cutoffs (McNeish & Wolf, 2021). All eight of the models yielded sufficient fit, including at the school level, providing evidence that the hypothesized factor structure was indeed supported by the data.

After examining the multilevel structure of the data, we used the models to produce factor scores. All analyses and scoring were conducted in Mplus Version 8.4 (Muthen & Muthen, 2019). Specifically, we used a plausible values approach. As described by Asparouhov and Muthen (2010), latent variables can be thought of as observed variables that have missing data for all observations. Using MCMC Bayesian estimation, we produced 300 imputed values for each latent variable.[3] If a sufficient number of imputed values are drawn, one essentially obtains the entire posterior distribution of the latent variables. We then used those plausible values to produce a school-level score for each construct.[4] This plausible value approach to scoring has several advantages (enumerated by Asparouhov and Muthen [2010]) and has been used commonly in both CFA and item response theory (IRT) applications, including to score achievement tests like the Program for International Student Assessment (PISA).

[3] Instructional Agency used 100 imputed values at the school level factor, due in combination to the 3 additional factors at the teacher level, Mplus not having an option to suppress printing all imputed values in the output, and limitations in available file space in the output file when all imputed values are printed.

[4] Results were insensitive to whether we used the median versus the mean as the plausible values. However, simply using a measure of central tendency rather than missing data techniques can lead to the variances of the scores being understated. We nonetheless used the median because using imputation techniques in conjunction with mixture models is not straightforward, especially with such a large number of plausible values.

Identifying Teacher Working Conditions Classes

To examine how many latent classes appeared to define teacher working conditions, we used the school-level factor scores in our latent profile analysis. The multivariate normal finite mixture model assumed that the overall distribution of scores could be characterized as a weighted sum of multivariate normal distributions as shown in equation 1.

(eq. 1) $$f(y_i;\psi) = \sum_{k=1}^{K} \pi_k \phi(y_i;\mu_k,\Sigma_k)$$

Here, $\phi(y_i;\mu_k,\Sigma_k)$ represented the multivariate normal probability density function (PDF). In terms of notation, y_i was a vector of values for *p* scores for person *i*, μ_k was the vector of means for those scores within class *k*, and Σ_k was the covariance matrix of the variables within class *k*. Using Mplus, estimation was accomplished by extending the maximum likelihood estimator using the EM algorithm to allow for a vector of indicator variables, with the likelihood function based on multivariate normal PDF.

Classes were identified by fitting various specifications and assuming between one and six classes in light of theoretical considerations related to teacher working conditions. We fit five model specifications that varied in the restrictions placed on the mixture model. Given the large number of parameters of the fully unrestricted model, restricted specifications have been suggested to increase parsimony and simplify estimation (e.g., Steinley & Brusco, 2011). These more restricted specifications are common in mixture model applications (Collie et al., 2015; Perera et al., 2019; Pyhältö et al., 2021; Shukla et al., 2016). The five model specifications were (1) the fully unrestricted model (aka "free"), where all variances and covariances were freely estimated across groups; (2) the unrestricted variance model (aka "LPA"), which has variances freely estimated across groups but which does not estimate covariances; (3) the homoscedastic model (aka "Overall"), which requires equal variances and equal covariances across classes; (4)

the homoscedastic variance model (aka "LPA overall"), which constrains indicator variances across classes to be equal and which does not estimate covariances; and, (5) the proportional model, which constrains indicator variances and covariances to be proportional to one another across classes, such that the indicator variance and covariance estimates in additional classes were some fixed amount larger or smaller than those of the first class. Thus, with these five model restrictions and classes ranging from one to six, we estimated and compared 30 models in total. To identify the best fitting model, we used information criteria (AIC and BIC). We also considered information on the separation of classes (for our purposes, the Entropy Index). Finally, once a preferred model was selected, we provided descriptive statistics for each of the factor scores by class to better understand the working conditions that defined each class.

Teacher Job Satisfaction and Retention Intentions and TWC Classes

Research has consistently shown that individual teacher working conditions dimensions are associated with teacher job satisfaction and retention intentions. We assessed how the working conditions classes were related to these important teacher outcomes by leveraging two survey questions. Job satisfaction was captured by responses to the statement "overall, my school is a good place to work and learn." We examined the average score of the 6-point scale as well as the percentage of teachers most satisfied (responded "strongly agree") and the percentage of teachers dissatisfied (responded "strongly disagree", "disagree", or "somewhat disagree"). Teacher responses to the question "which of the following best describes your immediate professional plans" were mapped onto three retention intentions: stay at the current school, transfer to teach at a different school, and leave the Virginia teacher workforce. All variables were then averaged up to the school level and disaggregated by the working conditions classes.

School Contextual Factors and TWC Classes

We estimated two types of models, each with its own strengths and limitations, to assess how the longstanding school contextual factors described in the prior section vary across the working conditions classes. First, given uncertainty in class membership as reflected by our relatively low entropy, we estimated mixture models predicting class membership. Specifically, we followed the three-step approach proposed by Vermunt (2010) that prevents the inclusion of covariates from changing the composition of the classes. Vermunt's three-step approach begins with the mixture model to identify the classes (described above) and then assigns schools to classes based on posterior probabilities. In the third step, the assigned class was treated as a nominal latent class indicator in a mixture model, which helped fully account for uncertainty in the class assignment. This approach was our preferred option.

A limitation of this approach, however, was that it does not account for the multilevel nature of the covariates. Some of the covariates we wished to examine were at the district level. Our second approach, therefore, was to fit a multilevel multinomial model of assigned class membership with schools nested in districts. This approach mainly served as a robustness check. To our knowledge, there was not a straightforward way to build that multilevel structure directly into our mixture models given the levels of nesting in the mixture model did not account for clustering within districts. Of course, such an approach did not account for uncertainty in class membership directly. We thus weighted the schools by their posterior class probabilities in the multinomial model.

With both model specifications, we examined the contextual factors iteratively. The sole predictor variables models, compared to multivariate models, were better aligned with the goal of our analysis – to describe how contextual factors vary across class membership.

Results

We begin with a discussion of our results from the latent class analysis, where we identified four different classes of schools based on their teacher working conditions. We describe the broad trends among each of the eight working condition constructs for each class, and then explore how teachers' general satisfaction and intentions to continue to work in their school varies among the four classes. Finally, we describe the contextual factors that are associated with each class. While institutional characteristics such as school level, geographic locale, and teacher experience were highly predictive of class membership, student demographics were sometimes predictive but on a smaller magnitude.

Four-Class Model of Teacher Working Conditions

Based on the results of the mixture models, we chose the four-class proportional model. Table 3 presents BIC and AIC values for each of the model's fit (results using other information criteria were similar and therefore not reported). As the table shows, our preferred model had the second lowest BIC (9219.41), only slightly higher than the three-class proportional model (9216.23), and the second lowest AIC (8816.07), again only slightly higher than the three-class free model (8732.22). Beyond having a higher AIC, the primary reason for rejecting the three-class proportional model was that it assigned 83% of schools to a single class, which did not match our a priori theory about the class structure based on the working conditions and LPA literature. We rejected the three-class free model because its BIC was higher than nine other models. The entropy for the preferred model was .61. While somewhat low, models that improved on entropy often had worse fit and, given entropy is not a fit statistic, we, therefore, preferred the models with better AIC and BIC values (Curran & Bauer, 2021; Henson et al., 2007). Models with higher entropy also tended to include five classes, with one of the classes representing a very small subset of schools, which raised concerns about overfitting.

Substantively, we could see no theoretical justification based on the teacher working conditions literature for a model with that additional, very small class. Therefore, we preferred the models with the best fit, and ultimately the single model with a second lowest BIC and AIC that had the strongest theoretical justification, to the one with improved entropy. (As previously discussed, our preferred models that use covariates to describe class membership fully account for this uncertainty in class membership.)

Describing the Classes

The largest class contained 1,040 schools (61%). We named this class of schools *Supportive*. Supportive schools were consistently positive (above average) on all constructs, with mean responses above the overall average across the constructs (see Figure 1).[5] In contrast, *Unsupportive* schools, the smallest class with 120 schools (7%), were consistently negative on all constructs, and excessively negative, on two dimensions: physical environment and feeling safe (roughly -.75 SDs and -1 SD, respectively). In fact, there were no differences among the other three classes on either of these two dimensions.

The remaining two classes each had some positive (above average) and some negative (below average) dimensions of working conditions. What set *Unstructured* schools (365 schools, 22%) apart from the other classes of schools was that they were high on instructional agency. Unstructured schools were quite similar to Unsupportive schools on five other dimensions: school leadership, professional growth opportunities, rigorous instruction, managing student behavior, and family engagement. Finally, in comparison to all other classes, *Structured* schools (196 schools, 11%) were highest on the dimensions of managing student behavior, family

[5] The supplemental materials include two alternate versions of Figure 1, but with the proportion of respondents selecting strongly agree or a negative response rather than the latent variable scores on the vertical axis (Figures A1 and A2). In general, contrasts between the classes matched between the figures, providing some assurance that our understanding of the working conditions within the classes was not driven by the scoring approach.

engagement, and rigorous instruction. At the same time, Structured schools were among the lowest for instructional agency and professional growth opportunities. Thus, there appeared to be some schools that teachers rated high on discipline and instructional rigor at the expense of teacher autonomy, while other schools had higher autonomy, but lower valuations of the school's instructional rigor and student discipline procedures.

Job Satisfaction and Retention Intentions by Class

Although the survey did not explicitly ask teachers for their overall perceptions of working conditions, it did capture their job satisfaction and retention intentions, two teacher outcomes that theory suggests are influenced by their working conditions. Teachers in Supportive schools were significantly more satisfied than teachers at schools in the other three classes ($p<.05$; see Table 4). On average, 45.9% of teachers in a Supportive school strongly agreed that "overall, my school is a good place to work and learn", significantly more than in Unstructured and Unsupportive schools (36.2% and 23.6%, respectively, $p<.05$). Supportive schools also had significantly fewer dissatisfied teachers than did Structured and Unsupportive schools (6.5% versus 9.9% and 12.6%, respectively, $p<.05$). Likewise, teachers in Supportive schools were significantly more likely to remain teaching at their schools than teachers in Structured and Unsupportive schools (85.4% versus 82.7% and 77.4%, respectively, $p<.05$). Unstructured and Unsupportive schools also had more teachers intending to leave teaching than did Supportive schools (5.9% and 6.5% versus 4.9%, respectively, $p<.05$).

Contextual Factors Associated with Class Membership

Given that teachers in Supportive schools had the highest job satisfaction and retention intentions, we begin by describing the contextual factors that significantly predict schools' membership in that class. We then turn to the other three classes with lower job satisfaction and

weaker retention intentions to compare how contextual factors predict membership in those classes relative to the Supportive class.

To help make the results of our predictive models more digestible, we produced predictive probabilities of class membership varying the values of the contextual factors. We were unable to conduct this post-estimation examination using the fitted parameters from our preferred 3-step mixture model. Fortunately, the results were very comparable between the 3-step mixture model and the multilevel multinomial models (see Table A3 in the appendix).[6] Given this high correspondence, purely for the purpose of making results more digestible, we used results of the multilevel multinomial models to predict class membership probabilities when the sole continuous contextual factor was set to values at the 25th and 75th percentiles or the sole binary contextual factor was set to one versus zero. We then tested whether these two probabilities were statistically different from each other (see Table A4 in the appendix).

Supportive Schools

Among the four classes, Supportive schools were the most likely to be elementary schools (least likely to be secondary schools), most likely to be in suburban communities, and were in the largest districts by the number of schools (see Table 5). These contextual factors significantly predict Supportive class membership (see the solid line with triangles in Figure 2). Other contextual factors significantly predicting Supportive working conditions were larger student-to-teacher ratios, higher concentrations of English Learners, higher community socio-economic status, and lower COVID deaths rates (see Figure 3).

[6] There were only four instances where the relationship between a contextual variable and a relative odds ratios of class membership was significant in one model and nonsignificant in the other. In all four cases, the relationship involved the odds ratio of membership in the Unsupportive versus Supportive classes (i.e., the smallest versus largest class) and was significant in the 3-step latent approach. The odds ratios were always in the same direction between the two models and were of the same or slightly larger magnitude in the 3-step latent model.

Structured, Unstructured, and Unsupportive Schools

As was true with Supportive schools, school level was predictive of membership in the other three classes. In particular, being in an elementary school was positively predictive of Structured class membership as with Supportive schools and negatively predictive of Unsupportive class membership; and being in secondary schools was positively predictive of Unstructured class membership. School level was not predictive of Unsupportive class membership.

Geographic locale was a significant predictor for Supportive, Unsupportive, and Unstructured class membership. Being a suburban school relative to all other locales positively predicted Supportive class membership and negatively predicted Unsupportive and Unstructured membership. Town schools were less likely than others to be Supportive and more likely to be Unstructured. City schools were more likely than others to be Unsupportive and less likely to be Unstructured. Finally, rural schools were more likely than others to have Unstructured working conditions. School location was not a significant predictor of Structured class membership.

Membership in each of the four classes was significantly predicted by at least one of the six student body characteristics we examined. The concentration of disabled students was the only student body characteristic that did not predict class membership. Larger schools (in terms of student enrollment) were less likely to be Supportive and Structured, and more likely to be Unstructured. A school's concentration of students classified as English Learners positively predicted Supportive class membership and negatively predicted Unsupportive and Unstructured membership. A school's concentration of non-White and non-Asian students was not predictive of either Supportive or Structured class membership but was positively predictive of Unsupportive working conditions and negatively predictive of Unstructured working conditions.

A school's concentration of economically disadvantaged students was not predictive of Supportive or Unstructured working conditions, but positively predicted Unsupportive working conditions and negatively predicted Structured working conditions.

Student-teacher ratios positively predicted membership in Supportive and Structured classes, but negatively predicted Unstructured class membership. A concentration of novice teachers positively predicted Unsupportive class membership, but not membership in the other three classes.

With respect to district and community contextual factors, district size positively predicted Supportive and negatively predicted Unstructured class memberships. Socio-economic status positively predicted Supportive and Structured working conditions and negatively predicted Unsupportive and Unstructured working conditions. While per pupil expenditures was not a significant predictor of Supportive working conditions, it positively predicted Structured working conditions and negatively predicted Unstructured working conditions. Finally, Supportive class membership was the only class negatively predicted by COVID death rates. Higher COVID death rates positively predicted Unsupportive and Unstructured class membership.

Discussion

In this study, we examined how teachers' perceptions of their working conditions identify classes of schools with similar working conditions, how teacher job satisfaction and intentions to stay vary across those classes, and how context factors are associated with school membership in those classes. Identifying four unique classes of schools, we provided a model for a more holistic and dynamic view of working conditions. In particular, the LPA mixture models allowed for a description of each school's working conditions that was richer than "high" versus "low". Our

models allowed us to identify classes of schools such that, within a class, they could have high values on some working conditions and average or low values on others. Demonstrating a more nuanced and dynamic approach to classifying schools based on teacher perceptions of their working conditions can help education leaders and policymakers shift more attention towards improving school context rather than individual teachers. With knowledge of how dimensions of working conditions coexist within and covary across schools, decisionmakers can provide schools with targeted supports and investments.

We find it promising that many more schools fell into the Supportive class than other classes. Despite many reports of teachers' feeling unsupported in their work, a large set of Virginia schools were composed of teachers with relatively positive perceptions of their workplace. Moreover, the Unsupportive class was the smallest, which is also promising given that teachers in this class have the lowest job satisfaction and lowest retention intentions. That physical environment and feeling safe were incredibly low for Unsupportive schools—working conditions that typically require substantial financial resources such as adequate, clean learning space that is conducive to teaching and learning, and adequate security—suggests that identifying schools where teachers feel unsafe and providing targeted supports to those schools could improve job satisfaction. Such approaches could hypothetically, in turn, reduce teacher turnover—a key approach to improving student-teacher relationships and academic outcomes.

Our preferred model produced classes that suggest tradeoffs may exist among dimensions of working conditions within schools. One potential tradeoff is between instructional agency and three other dimensions—rigorous instruction, managing student behavior, and family engagement. This is clearest among Structured and Unstructured schools, which are mirror images of one another. Teachers want schools to provide them with sufficient time for and

autonomy over their classroom instruction while establishing a clear and consistent approach to managing student behavior and engaging families (Johnson, 1990 & 2019). The Unstructured schools class suggests this greater instructional agency resulted in more teachers adopting an instructional approach that does not encourage the traits that, according to Virginia's *Profile of a Graduate,* all students need for future success (as captured by the rigorous instruction dimension). Within this environment where teachers do not feel their peers are all aligning their instruction to standards, there are also inconsistent approaches to managing student behavior and engaging families. In Structured schools, where teachers had relatively more positive perceptions of their schools' work to ensure that all teachers practice rigorous instruction, manage student behavior, and engage with families, teachers feel less instructional agency.

This apparent tradeoff may connect to school leadership, as school leaders are central to establishing a unified approach to rigorous instruction, student behavior management, and family engagement. The school leadership construct was made up of survey items related to (1) trust in the school administration, (2) consistent and objective teacher evaluation, and (3) administration's clear vision for the school and high expectations for all students. Thus, high instructional agency may come at the expense of teachers feeling less trust in administration, a weaker sense of a common vision for the school, and concern that their evaluation does not fairly capture their work. Other research has suggested that as teaching has grown more collaborative, many teachers have accepted this tradeoff, indicating they wanted to work in schools that have "achieved a sensible balance between order and autonomy" (Johnson, 2019, p. 239).

These patterns were also evinced, though muted, in Supportive schools. Teachers in these schools had above average perceptions of school leadership, rigorous instruction, managing student behavior, and family engagement but only average perceptions of instructional agency. It

could be that these schools are figuring out a school-wide approach to engaging families and managing student behavior and how to support teachers in aligning their instruction with the goals of Virginia's *Profile of a Graduate* while still providing teachers with instructional agency.

Differences between Elementary and Secondary Schools

The level of a school (elementary or secondary) was strongly predictive of class membership, and this provides additional insight into working condition tradeoffs. Being a secondary school was predictive of Unstructured class membership. The nature of teaching in a middle or high school, where teachers can sometimes be the only educator teaching a specific course, may contribute to this relationship. The rigorous instruction dimension is illustrative here. It emphasizes skills that have become more controversial in recent years such as expecting students to use facts and evidence to support their ideas, encouraging students to value and search for a diversity of opinions, and providing constructive feedback to others. Scoring lower-than-average on this construct at the school level suggests that teachers in Unstructured schools may find it difficult, or perhaps more challenging in America's current social and political context, to engage in this type of instruction, especially without fear or risk of backlash from parents or school board members (e.g., Nocera, 2021). That Unstructured schools had lower than average scores on the student behavior and family engagement constructs aligns with evidence that, in secondary schools, family engagement is more limited and tends to decrease (Lawson, 2003; Noel et al., 2016) and managing student behavior becomes more complex (Obenchain & Taylor, 2005).

In contrast, that elementary schools were heavily represented among Structured and Supportive schools, both of which had relatively high scores on family engagement, instructional rigor, and student behavior management constructs, aligns with research showing relatively

higher family engagement in the lower grade levels (Noel et al., 2016), fewer major student behavior issues (Lawson, 2003), and stronger emphasis placed on cross-grade and cross-content instructional alignment (Tanenbaum et al., 2017). Teachers in Structured schools—again, primarily elementary—reported lower levels of instructional agency. A potential practical connection to this is that elementary teachers are often certified as generalists and not, as is true in Virginia, specific subjects. As such, elementary teachers often work in grade-level or content teams to develop structured and aligned curricular materials that cover required state standards.

Contextual Factors Associated with Teacher Working Conditions

While school level was highly predictive of class membership, student body characteristics, district per pupil expenditures, and geographic locale were also sometimes predictive, but often on a smaller magnitude.

The Role of Student Body Characteristics

Given that students with disabilities, students of color, students classified as English learners (ELs), and students living in low-SES households have been historically underserved by America's public school system (Kozol, 2012; Walters, 2001), it is important to interrogate the teacher working conditions within schools serving those students. We find it promising that the concentration of students classified as ELs positively predicts Supportive class membership, as it is important that teachers of ELs have the resources they need to best improve academic outcomes and English language proficiency (Santibañez & Gándara, 2018). While initially it may appear promising that the concentration of disabled students does not predict class membership, it is imperative that students with disabilities are being equitably served by the public school system and attention should be paid to supporting and investing in schools where job satisfaction and intentions to leave are high—particularly in Unsupportive schools, which

have the highest concentration of disabled students.

A school's concentration of non-White and non-Asian students and economically disadvantaged students was *not* predictive of Supportive class membership. We see this as encouraging. As summarized earlier, the higher teacher turnover in schools serving students from disadvantaged backgrounds has been attributed to the poor working conditions at these schools. Our findings showed that some schools serving these student groups have identified a way to provide teachers supportive working conditions. This, however, was not true of all schools as the concentration of non-White and non-Aisan students and economically disadvantaged students were positively predictive of Unsupportive working conditions.

A Role for School Funding

Improving teacher working conditions cannot be done on the cheap (Ingersoll, 2017). We see a role for more equitable school funding in our findings, especially that schools with a higher concentration of students from marginalized backgrounds were positively predictive of Unsupportive working conditions. The starkest difference between Unsupportive schools and other classes of schools were the very low ratings on physical environment and feeling safe. One means of improving these working conditions dimensions is through capital improvements. In Virginia, this requires districts to secure the passage of local bonds. Compared to higher-income communities, low-income communities may find it more challenging to pass bonds that tax themselves at higher rates, and, when successful, must tax themselves at a higher rate in order to garner the same amount of revenue for improved physical space and safety. State policies and approaches to funding related to capital outlay and safety in schools may need to be reexamined.

Virginia's recent analysis of its school finance formula determined that the state currently underfunds its public schools and has done so since the Great recession (JLARC,

2023). In fiscal year 2021, Virginia underestimated the actual costs of a high-quality education by $6.6 billion. This has far-reaching consequences. About two-thirds of districts rely on the state for most of their education dollars. These districts are generally less wealthy than other districts. The report faults the formula for not fully recognizing the additional costs of educating at-risk students and small districts' inability to benefit from economies of scale. Additional state funding can facilitate local investments to improve teachers' working conditions.

Teacher Working Conditions, Job Satisfaction, and Retention Intentions

Our analyses indicate that teacher job satisfaction and intentions to remain teaching were greater in schools with Supportive working conditions with the differences in job satisfaction being larger. Teachers at Supportive schools were significantly more satisfied than teachers at all three other classes of schools. With respect to retention intentions, we find no differences from Unstructured schools, but significant differences from Structured and Unsupportive schools. While intentions to leave and actual teacher attrition are not always aligned, understanding teacher intentions to leave has value on its own terms (Nguyen et al., 2022). Teachers wishing to leave are likely to be less engaged with and feel less connected to their work and school. Intentions, therefore, are important given the body of research showing that teachers who have higher self-efficacy and feel connected to the school community perform better in the classroom (Zee & Kooman, 2016).

Limitations

The results from our analysis are derived from a single year of data on Virginia schools. This presents a set of limitations that should be remembered when interpreting the findings and extrapolating beyond our sample.

Our analysis is exploratory and as such is purely descriptive. The findings from this study

represent patterns of correlation within and across schools and are not causal estimates. Our analysis included many tests of statistical significance. Since we viewed this as an exploratory study, we did not correct the statistical tests to account for the multiple comparisons. Therefore, readers should not interpret our findings causally and should be cautious about overinterpreting statistical significance alone.

Care must also be taken when generalizing the findings beyond Virginia. The survey was constructed using well-established measures of working conditions that are salient in other states, but contextual factors specific to Virginia mean that the four classes we identified are not necessarily the same classes that would be identified in other states. Similarly, changes to working conditions over time suggests that other years of data on these same schools could produce different groupings. This could be particularly true for this survey distribution since it occurred between January and March 2021, when many schools were still operating under some degree of COVID restriction. We performed an exploratory analysis of similar teacher survey response data from the Virginia Working Conditions Survey administered between January and April 2019 to determine the extent to which the results mirrored the ones presented here. The best fitting model on those data also returned a four-class structure. While data limitations do not allow us to fully confirm the same structure, we found this to be encouraging suggestive evidence that the results we present here are not driven by COVID.

The classes we identified here do not suggest that schools within a given class are homogeneous, nor that they are always completely distinct across classes. Schools were assigned to classes to which they had the strongest probability of membership, and the analyses accounted for that probability (i.e., uncertainty in class membership). This caveat is especially important here given the relatively low entropy of our preferred solution. A strength of the LPA approach

is that it allows us to generalize about groups of schools, but readers should keep in mind that delineation of the classes is not as clear as one might ideally hope for in a policy context where supports and interventions to improve working conditions might be evaluated.

Conclusion

Teachers are critical to student success, and working conditions are important contributors to the recruitment, development, and retention of effective teachers. The purpose of this analysis was to investigate patterns in teacher perceptions of their working conditions and to detect differences between classes of schools. Our findings identified patterns that painted a holistic picture of how levels of working conditions coexist within schools across Virginia.

A key advantage of our approach is that it allows working conditions to be more than just a single measure on the continuum from bad to good. Instead, we uncovered four classes of working conditions that described a much more nuanced picture. In most schools (61%), teachers described Supportive working conditions with above average scores on seven of the eight dimensions. Supportive schools, however, did not have the highest average scores across all dimensions. Teachers in Structured schools were the most positive about their level of rigorous instruction, and teachers in Unstructured schools were the most positive about their instructional agency. Teachers from a comparatively small group of schools (7%) described Unsupportive working conditions with below-average scores on all dimensions, but they were still more positive on some working conditions dimensions than were teachers in Unstructured schools. These findings indicate that teacher perceptions of the different dimensions of working conditions do not move in lockstep with each other.

Our analysis does not take a stand on which working conditions class is better or more desirable. Indeed, some teachers may prefer schools with relative strength in one area while

others prefer schools with relative strength in another. Teachers in Supportive schools were significantly more satisfied and were significantly more likely to express an intention to remain in their schools. These meaningful differences across classes likely impact students. Significant numbers of teachers in the other classes of schools, however, still reported satisfaction and the intention to stay so we cannot conclude that one class of schools is universally preferable. Future research should explore the match of teachers' preferences to sets of working conditions and the extent to which heterogeneity of these preferences is predicted by teacher characteristics.

The analysis presented here is an important step towards a fuller understanding of the working conditions experienced by public teachers in a diverse state. The results confirm that teachers view the conditions in their schools in nuanced ways and that there are important commonalities across schools within a working conditions class that may help guide policy makers and school leaders to begin to better target improvement and development approaches.

References

Allensworth, E., Ponisciak, S., & Mazzeo, C. (2009). *The Schools Teachers Leave: Teacher Mobility in Chicago Public Schools.* Consortium on Chicago School Research.

Asparouhov, T., & Muthén, B. (2010). Bayesian analysis of latent variable models using Mplus. Retrieved from www.statmodel.com/download/BayesAdvantages18.pdf

Boyd, D., Grossman, P., Ing, M., Lankford, H., Loeb, S., & Wyckoff, J. (2011). The influence of school administrators on teacher retention decisions. *American Educational Research Journal, 48*(2), 303–333. DOI: 10.3102/0002831210380788

Boyd, D., Lankford, H., Loeb, S., Ronfeldt, M., & Wyckoff, J. (2011). The effect of school neighborhoods on teacher retention decisions. In G. J. Duncan & R. J. Murnane (Eds.), *Whither Opportunity? Rising Inequality, Schools, and Children's Life Chances* (pp. 377-396). Russell Sage Foundation.

Boyd, D., Lankford, H., Loeb, S., & Wyckoff, J. (2005). Explaining the short careers of high-achieving teachers in schools with low-performing students. *The American Economic Review, 95*(2), 166-171. DOI: 10.1257/000282805774669628

Bryk, A. S., & Schneider, B. L. (2002). *Trust in schools: A core resource for school reform.* Russell Sage Foundation Publications.

Buckley, J., Schneider, M., & Shang, Y. (2005). Fix it and they might stay: School facility quality and teacher retention in Washington, D.C. *Teachers College Record, 107*(5), 1107–1123. DOI: 10.1111/j.1467-9620.2005.00506.x

Burkhauser, S. (2017). How much do school principals matter when it comes to teacher working conditions? *Educational Evaluation and Policy Analysis, 39*(1), 126-145. DOI: 10.3102/0162373716668028

Capp, G., Astor, R. A., & Gilreath, T. D. (2021). Exploring patterns of positive and negative school climate experiences among staff members in California. *Jounal of School Violence, 20*(2), 153-166. DOI: 10.1080/15388220.2020.1862673

Collie, R. J., Shapka, J. D., Perry, N. E., & Martin, A. J. (2015). Teachers' beliefs about social-emotional learning: Identifying teacher profiles and their relations with job stress and satisfaction. *Learning and Instruction, 39*, 1148-157. DOI: 10.1016/j.learninstruc.2015.06.002

Curran, P., & Bauer, D. (2021). What's the best way to determine the number of latent classes in a finite mixture analysis? CenterStat blog. Retrieved from centerstat.org/class-enumeration

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualization and measures. *Educational Researcher, 38*(3), 181-191. DOI: 10.3102/0013189X08331140

Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis, 24*(2), 81-112. DOI: 10.3102/01623737024002081

Diliberti, M., Jackson, M., Correa, S., & Padgett, Z. (2019). *Crime, violence, discipline, and safety in U.S. public schools: Findings from the School Survey on Crime and Safety: 2017–18* (NCES 2019-061). U.S. Department of Education.

Duff, M., & Bowers, A. J. (2022). Identifying a typology of New York City schools through teacher perceptions of organizational capacity: A latent class analysis. *Leadership and Policy in Schools, 21*(4), 791-815. DOI: 10.1080/15700763.2020.1854789

Duyar, I., Gumus, S., & Belligas, M. S., (2013). Multilevel analysis of teacher work attitudes:

The influence of principal leadership and teacher collaboration. *International Journal of Educational Management, 27*(7), 700-719. DOI: 10.1108/IJEM-09-2012-0107

Figlio, D. N. (2007). Boys named Sue: Disruptive children and their peers. *Education Finance and Policy, 2*(4), 376-394. DOI: 10.1162/edfp.2007.2.4.376

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945. DOI: 10.3102/00028312038004915

Goddard, R. D. (2001). Collective efficacy: A neglected construct in the study of schools and student achievement. *Journal of Educational Psychology, 93*, 467-476. DOI: 10.1037//0022-0663.93.3.467

Goddard, R., Goddard, Y., Sook Kim, E., & Miller, R. (2015). A theoretical and empirical analysis of the roles of instructional leadership, teacher collaboration, and collective efficacy beliefs in support of student learning. *American Journal of Education, 121*(4), 501–530. DOI: 10.1086/681925

Grissom, J. A. (2011). Can good principals keep teachers in disadvantaged schools? Linking principal effectiveness to teacher satisfaction and turnover in hard-to-staff environments. *Teachers College Record, 113*(1), 2552-2585. DOI: 10.1177/016146811111301102

Hallinger, P., & Heck, R. H. (2010). Collaborative leadership and school improvement: Understanding the impact on school capacity and student learning. *School Leadership and Management, 30*(2), 95-110. DOI: 10.1080/13632431003663214

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2004). Why public schools lose teachers. *The Journal of Human Resources, 39*(2), 326-354. DOI: 10.2307/3559017

Heck, R. H., & Hallinger, P. (2009). Assessing the contribution of distributed leadership to

school improvement and growth in math achievement. *American Educational Research Jounral, 46*(3), 659-689. DOI: 10.3102/0002831209340042

Henson, J. M., Reise, S. P., & Kim, K. H. (2007). Detecting mixtures from structural model differences using latent variable mixture modeling: A comparison of relative model fit statistics. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(2), 202-226. DOI: 10.1080/10705510709336744

Hong, S. (2019). *Natural allies: Hope and possibility in teacher-family partnerships.* Harvard Education Press.

Horng, E. L. (2009). Teacher tradeoffs: Disentangling teachers' preferences for working conditions and student demographics. *American Educational Research Journal, 46*(3), 690-717. DOI: 10.3102/0002831208329599

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55. DOI: 10.1080/10705519909540118

Ingersoll, R. M. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal, 38*(3), 499-534. DOI: 10.3102/00028312038003499

Ingersoll, R. M. (2017). Misdiagnosing America's teacher quality problem. In M. Akiba & G. K. LeTendre (Eds.), *International handbook of teacher quality and policy* (pp. 79-96). Routledge.

Johnson, S. M. (1990). *Teachers at work: Achieving success in our schools.* Basic Books.

Johnson, S. M. (2006). The workplace matters: Teacher quality, retention, and effectiveness (Working paper). National Education Association.

Johnson, S. M. (2019). *Where teachers thrive: Organizing schools for success.* Harvard Education Press.

Johnson, S. M., Berg, J. H., & Donaldson, M. L. (2005). *Who stays in teaching and why: A review of the literature on teacher retention.* Harvard Graduate School of Education.

Johnson, S. M., & Birkeland, S. E. (2003). Pursuing a "sense of success": New teachers explain their career decisions. *American Educational Research Journal, 40*(3), 581-617. DOI: 10.3102/00028312040003581

Johnson, S. M., Kardos, S. M., Kauffman, D., Liu, E., & Donaldson, M. L. (2004). The support gap: New teachers' early experiences in high-income and low-income schools. *Education Policy Analysis Archives, 12*(61). DOI: 10.14507/epaa.v12n61.2004

Johnson, S. M., Kraft, M., & Papay, J. P. (2012). How context matters in high-need schools: The effects of teachers' working conditions on their professional satisfaction and their students' achievement. *Teachers College Record, 114*(10), 1–39. DOI: 10.1177/016146811211401004

Joint Legislative Audit and Review Commission (2023). *Report to the Governor and the General Assembly of Virginia: Virginia's K-12 Funding Formula 2023 (JLARC Report 575)*. Author.

Kennedy, M. M. (2010). Attribution error and the quest for teacher quality. *Educational Researcher, 39*(8), 591–598. DOI: 10.3102/0013189X10390804

Kennedy, M. M. (2016). How does professional development improve teaching? *Review of Educational Research, 86*(4), 945–980. DOI: 10.3102/0034654315626800

Kozol, J. (2012). *Savage inequalities: Children in America's schools.* Crown.

Kraft, M. A., & Papay, J. P. (2014). Can professional environments in schools promote teacher development? Explaining heterogeneity in returns to teaching experience. *Educational Evaluation and Policy Analysis, 36*(4), 476–500. DOI: 10.3102/0162373713519496

Kraft, M. A., Marinell, W. H., & Yee, D. S., (2016). School organizational contexts, teacher turnover, and student achievement: Evidence from panel data. *American Educational Research Journal, 53*(5), 1411-1449. DOI: 10.3102/0002831216667478

Kraft, M. A., Simon, N. S., & Lyon, M. A. (2021). Sustaining a sense of success: The protective role of teacher working conditions during the COVID-19 pandemic. *Journal of Research on Educational Effectiveness, 14*(4), 727-769. DOI: 10.1080/19345747.2021.1938314

Ladd, H. F. (2011). Teachers' perceptions of their working conditions: How predictive of planned and actual teacher movement? *Educational Evaluation and Policy Analysis, 33*(2), 235–261. DOI: 10.3102/0162373711398128

Lawson, M. A. (2003). School-family relations in context: Parent and teacher perceptions of parent involvement. *Urban Education, 38*(1), 77-133. DOI: 10.1177/0042085902238687

Leithwood, K., & McAdie, P. (2007). Teacher working conditions that matter. *Education Canada, 47*(2), 42-45. https://www.edcan.ca/magazine

Loeb, S., Darling-Hammond, L., & Luczak, J. (2005). How teaching conditions predict teacher turnover in California schools. *Peabody Journal of Education, 80*(3), 44–70. DOI: 10.1207/s15327930pje8003_4

Marinell, W. H., & Coca, V. M. (2013). *Who stays and who leaves? Findings from a three-part study of teacher turnover in NYC middle schools.* The Research Alliance for New York City Schools.

Masyn, K. (2013). Latent class analysis and finite mixture modeling. In T. D. Little (Ed.), *The Oxford handbook of quantitative methods in psychology* (Vol. 2, pp. 551–611). Oxford University Press. DOI: 10.1093/oxfordhb/9780199934898.013.0025

McNeish, D., & Wolf, M. G. (2021). Dynamic fit index cutoffs for confirmatory factor analysis

models. *Psychological Methods, 28*(1), 61-88. DOI: 10.1037/met0000425

Muthén, L. K., & Muthén, B. (2019). *Mplus User's Guide* (Version 8.4) [Computer software].

Nguyen, T. D., Bettini, E., Redding, C., & Gilmour, A. F. (2022). Comparing turnover intentions and actual turnover in the public sector workforce: Evidence from public school teachers. *EdWorkingPapers (No. 22-537)*. Retrieved from https://www.edworkingpapers.com/sites/default/files/ai22-537.pdf

Nocera, J. (2021, June 20). Chesterfield school board joins growing backlash to critical race theory, denounces framework a year after condemning racism. *Richmond Times-Dispatch*. www.richmond.com

Noel, A., Stark, P., & Redford, J. (2016). *Parent and family involvement in education, from the National Household Education Surveys Program of 2012* (NCES 2013- 028.REV2). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Obenchain, K. M., & Taylor, S. S. (2005). Behavior management making it work in middle and secondary schools. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *79*(1), 7-11. DOI: 10.3200/TCHS.79.1.7-11

Osher, D., Bear, G. G., Sprague, J. R., & Doyle, W. (2010). How can we improve school discipline? *Educational Researcher, 39*(1), 48-58. DOI: 10.3102/0013189X09357618

Pas, E. T., & Bradshaw, C. P. (2014). What affects teacher ratings of student behaviors? The potential influence of teachers' perceptions of the school environment and experiences. *Prevention Science, 15*, 940-950. DOI: 10.1007/s11121-013-0432-4

Perera, H. N., Calkins, C., & Part, R. (2019). Teacher self-efficacy profiles: Determinants, outcomes, and generalizability across teaching level. *Contemporary Educational Psychology,*

58, 186-203. DOI: 10.1016/j.cedpsych.2019.02.006

Player, D., Youngs, P., Perrone, F., & Grogan, E. (2017). How principal leadership and person-job fit are associated with teacher mobility and attrition. *Teaching and Teacher Education, 67*, 330-339. DOI: 10.1016/j.tate.2017.06.017

Pyhältö, K., Pietarinen, J., Haverinen, K., Tikkanen, L., & Soini, T. (2021). Teacher burnout profiles and proactive strategies. *European Journal of Psychology of Education, 36*, 219-242. DOI: 10.1007/s10212-020-00465-6

Reinhorn, S. K., Johnson, S. M., & Simon, N. S. (2017). Investing in development: Six high-performing high-poverty schools implement the Massachusetts teacher evaluation policy. *Educational Evaluation and Policy Analysis, 39*(3), 383-406. DOI: 10.3102/0162373717690605

Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica, 73*(2), 417–458. DOI: 10.1111/j.1468-0262.2005.00584.x

Rockoff, J. E. (2004). The impact of individual teachers on student achievement: evidence from panel data. *American Economic Review Papers and Proceedings, 94*(2), 247–252. DOI: 10.1257/0002828041302244

Rosenholtz, S. J., & Simpson, C. (1990). Workplace conditions and the rise and fall of teachers' commitment. *Sociology of Education, 63*(4), 241-257. DOI: 10.2307/2112873

Sachs, E. N., Miller, L. C., & Schueler, B. E. (2022). *Virginia school division operations during SY 2020-21: In-person learning.* University of Virginia.

Santibañez, L., & Gándara, P. (2018). *Teachers of English language learners in secondary schools: Gaps in preparation and support*. The Civil Rights Project.

Schenke, K., Ruzek, E., Lam, A. C., Karabenick, S. A., & Eccles, J. S. (2017). Heterogeneity of

student perceptions of the classroom climate: A latent profile approach. *Learning Environments Research*, *20*(3), 289–306. DOI: 10.1007/s10984-017-9235-z

Shukla, K., Konold, T., & Cornell, D. (2016). Profiles of student perceptions of school climate: Relations with risk behaviors and academic outcomes. *American Journal of Community Psychology*, *57*(3–4), 291–307. DOI: 10.1002/ajcp.12044

Simon, N., & Johnson, S. M. (2015). Teacher turnover in high-poverty schools: What we know and can do. *Teacher College Record, 117*(3), 1-36. DOI: 10.1177/01614681151170030

Soland, J., Kuhfeld, M., & Edwards, K. (2022). How survey scoring decisions can influence your study's results: A trip through the IRT looking glass. *Psychological Methods*. Advance online publication. DOI: 10.1037/met0000506

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, *25*(2), 173-180. DOI: 10.1207/s15327906mbr2502_4

Steinberg, M. P., Allensworth, E., & Johnson, D. W. (2011). *Student and teacher safety in Chicago Public Schools: The roles of community context and school social organization.* Consortium on Chicago School Research.

Steinley, D., & Brusco, M. J. (2011). Evaluating the performance of model-based clustering: Recommendations and cautions. *Psychological Methods, 16*, 63-79. DOI: 10.1037/a0022673

Stockard, J., & Lehman, M. B. (2017). Influences on the satisfaction and retention of 1st-year teachers: The importance of effective school management. *Educational Administration Quarterly*, *40*(5), 742-771. DOI: 10.1177/0013161X04268844

Stormont, M., Herman, K. C., Reinke, W. M., David, K. B., & Goel, N. (2013). Latent profile analysis of teacher perceptions of parent contact and comfort. *School Psychology Quarterly*,

28(3), 195-209. DOI: 10.1037/spq0000004

Supovitz, J., Sirinides, P., & May, H. (2010). How principals and peers influence teaching and learning. *Educational Administration Quarterly, 46*(1), 31-56. DOI: 10.1177/1094670509353043

Tanenbaum, C., Walters, K., Freels, A., & Smith, T. (2017). *Vertically aligned curricular framework: Profile of practice brief.* U.S. Department of Education.

Toropova, A., Myrberg, E., & Johansson, S. (2021). Teacher job satisfaction: The importance of school working conditions and teacher characteristics. *Educational Review, 73*(1), 71-97. DOI: 10.1080/00131911.2019.1705247

Urick, A. (2016). The influence of typologies of school leaders on teacher retention: A multilevel latent class analysis. *Journal of Educational Administration, 54*(4), 434-468. DOI: 10.1108/JEA-08-2014-0090

Vermunt, J. K. (2010). Latent class modeling with covariates: Two improved three-step approaches. *Political Analysis, 18*(4), 450-469. DOI: 10.1093/pan/mpq025

Virginia Department of Education. (n.d). *Composite index of local ability to pay.* https://www.doe.virginia.gov

Walters, P. B. (2001). Educational access and the state: Historical continuities and discontinuities in racial inequality in American education. *Sociology of Education, 74*(Extra Issue: Current of Thought), 35-49. DOI: 10.2307/2673252

Williams, N. J., Frank, H. E., Frederick, L., Beidas, R. S., Mandell, D. S., Aarons, G. A., Green, P., & Locke, J. (2019). Organizational culture and climate profiles: Relationships with fidelity to three evidence-based practices for autism in elementary schools. *Implementation Science, 14,* 1-15. DOI: 10.1186/s13012-019-0863-9

Worth, J., & Van den Brande, J. (2020). *Teacher Autonomy: How Does It Relate to Job Satisfaction and Retention?* National Foundation for Educational Research.

Zee, M., & Koomen, H. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment and teacher well-being: A synthesis of 40 years of research. *Review of Educational Research*, *86*(4), 981-1015. DOI: 10.3102/0034654315626801

Table 1. Descriptive Statistics of Respondents to the Classroom Instructors Survey and by Inclusion in LPA

Characteristic	All	Included in LPA	Excluded from LPA
Race/Ethnicity			
American Indian or Alaska Native	0.2	0.2	0.1
Asian	1.7	1.7	2.1
Black or African American	9.8	9.9	7.2***
Hispanic or Latino	4.0	4.0	4.7^{+}
Native Hawaiian or Pacific Islander	0.1	0.1	0.1
White	79.9	79.8	81.0
Other Race	2.4	2.4	2.9^{+}
Multi-racial	2.0	2.0	2.0
Gender			
Female	80.5	80.5	81.8
Male	18.3	18.3	17.1
Non-Binary/Prefer Not to Say	1.2	1.2	1.2
Primary Subject Taught			
Career and Technical Education	4.6	4.6	4.6
Computer Science	0.4	0.4	0.2
Elementary/Early Childhood	34.1	34.1	34.5
ESL/ESOL	3.1	3.0	4.9***
English Language and Literature	8.8	8.8	8.4
Fine and Performing Arts	6.2	6.2	5.7
World Language and Literature	2.9	2.9	3.0
Physical, Health, and Safety Education	4.5	4.5	4.0
Social Studies and History	6.3	6.3	6.3
Mathematics	7.9	7.9	7.1
Life and Physical Sciences	6.3	6.3	6.1
Special, Exceptional, or Gifted and Talented Education	15.1	15.1	15.1
Years of Teaching Experience			
First Year	4.6	4.6	3.9
Second-Third Year	9.8	9.8	8.5*
Fourth-Tenth Year	28.0	27.9	29.2
Eleventh-Twentieth Year	31.5	31.5	32.1
More than Twentieth Year	26.1	26.1	26.3
Percent of Students Receiving Special Services			
% of Students Receiving EL Services	19.3	19.1	25.4***
	(29.2)	(29.1)	(30.9)

(cont.)

Table 1. Descriptive Statistics of Respondents to the Classroom Instructors Survey and by Inclusion in LPA (cont.)

Characteristic	**All**	**Included in LPA**	**Excluded from LPA**
% of Students Receiving IEP/504 Services	25.0	25.0	24.9
	(29.0)	(29.0)	(29.4)
N (Teachers)	67,110	64,771	2,339

Notes: Standard deviations in parentheses. Tests of difference from included respondents: *** p<.001, ** p<.01, * p<.05, + p<.1

Table 2. Descriptive Statistics of Schools by Inclusion in LPA

Contextual Factor	**All**	**Included in LPA**	**Excluded from LPA**
City School	22.6	22.6	23.0
Suburb School	37.6	36.7	49.2**
Town School	8.2	8.4	5.6
Rural School	31.6	32.2	22.2*
Elementary School	62.7	62.4	66.7
Enrollment	701.1 (474.8)	693.9 (466.3)	799.1* (571.2)
% Non-White and Non-Asian Students	43.7 (26.6)	43.4 (26.6)	48.9* (26.1)
% Economically Disadvantaged Students	43.1 (19.51)	43.1 (19.37)	42.5 (21.5)
% English Learners	11.6 (16.1)	11.1 (15.5)	18.5*** (20.8)
% Students with Disabilities	14.0 (6.5)	14.0 (6.6)	13.5 (3.8)
Student-to-Teacher Ratio	9.5 (4.6)	9.5 (4.7)	9.5 (3.5)
% Teachers with 1-3 Years of Experience	17.4 (11.3)	17.3 (11.4)	18.8 (9.8)
# Schools in District	56.0 (64.2)	55.2 (64.2)	67.9* (63.3)
Per-Pupil Expenditures	13,064.8 (2,326.8)	13,016.6 (2,295.5)	13,723.1** (2,641.2)
District Socio-economic Status	1.1 (2.1)	1.1 (2.0)	1.9*** (2.2)
COVID Deaths per 100,000 Population	92.9 (56.3)	92.8 (55.8)	93.7 (63.6)
N (Schools)	1,847	1,721	126

Notes: Standard deviations in parentheses. Tests of difference from included respondents: *** p<.001, ** p<.01, * p<.05, + p<.1

Table 3. BIC, AIC, and Entropy Statistics of Latent Profile Analysis Models

	# of Classes					
Model	**1**	**2**	**3**	**4**	**5**	**6**
			Model BIC			
Free	9492.61	9346.54	9462.61	-	-	-
LPA	18707.90	13997.78	12135.80	11491.34	11143.00	10906.03
LPA Overall	18707.90	14064.32	12225.59	11555.41	11118.35	10918.06
Overall	9492.61	9296.86	9266.12	9273.10	9292.06	9316.67
Proportional	9492.61	9300.33	9216.23	9219.41	-	-
			Model AIC			
Free	9252.78	8861.43	8732.22	-	-	-
LPA	18620.69	13817.91	11863.27	11126.14	10685.14	10355.51
LPA Overall	18620.69	13928.05	12040.27	11321.03	10834.91	10585.57
Overall	9252.78	9007.98	8928.18	8886.10	8856.00	8831.56
Proportional	9252.78	9006.00	8867.39	8816.07	-	-
			Model Entropy			
Free	NA	0.56	0.58	-	-	-
LPA	NA	0.86	0.87	0.88	0.85	0.82
LPA Overall	NA	0.85	0.88	0.88	0.86	0.87
Overall	NA	0.91	0.90	0.91	0.89	0.89
Proportional	NA	0.52	0.67	0.61	-	-

Note: Statistics not shown if model produced an error warning indicating the model was not supported by the data.

Table 4. School-Level Teacher Job Satisfaction and Retention Intentions by Working Conditions Classes, Means and Standard Deviations

Teacher Outcome	**Class**			
	Supportive	**Structured**	**Unstructured**	**Unsupportive**
Job Satisfaction	5.2 (0.3)	5.0 [a] (0.6)	5.0 [a] (0.3)	4.7 [a b c] (0.5)
% Most Satisfied	45.9 (17.8)	43.8 (24.0)	36.2 [a b] (14.8)	23.6 [a b c] (15.1)
% Dissatisfied	6.5 (5.6)	9.9 [a] (11.2)	7.2 [b] (5.0)	12.6 [a b c] (10.3)
% Stay	85.4 (8.6)	82.7 [a] (12.5)	84.3 (8.0)	77.4 [a b c] (11.1)
% Transfer	9.7 (7.3)	11.6 [a] (10.4)	9.8 [b] (6.5)	16.4 [a b c] (10.0)
% Leave	4.9 (4.3)	5.7 (5.4)	5.9 [a] (4.3)	6.2 [a] (4.7)

Note: All differences statistically significant at $p < .05$.
[a] Different from Supportive. [b] Different from Structured. [c] Different from Unstructured.

Table 5. School and District Characteristics by Working Conditions Class

Variable	Class				Total
	Supportive	Structured	Unstructured	Unsupportive	
City School (%)	22.2	28.4	9.9	55.3	22.7
Suburb School (%)	42.7	40.1	27.8	14.0	37.1
Town School (%)	6.3	6.5	15.5	8.4	8.5
Rural School (%)	28.8	25.1	46.7	22.3	31.7
Elementary School (%)	80.1	74.2	12.7	51.6	63.1
Secondary School (%)	18.6	19.9	87.3	42.1	35.0
Enrollment	640.2 (407.4)	610.2 (329.1)	872.4 (567.6)	631.7 (473.9)	685.5 (453.9)
% Non-White and Non-Asian Students	43.6 (25.5)	38.8 (25.0)	35.8 (24.0)	69.0 (29.0)	43.3 (26.6)
% Economically Disadvantaged Students	42.4 (19.5)	34.3 (21.4)	44.1 (15.6)	58.4 (17.0)	43.0 (19.5)
% English Learners	13.4 (17.1)	10.3 (14.2)	8.0 (12.7)	5.6 (9.0)	11.3 (15.7)
% Students with Disabilities	14.0 (5.7)	13.1 (8.7)	13.7 (3.0)	16.2 (13.1)	14.0 (6.5)
Student-to-Teacher Ratio	10.4 (3.6)	11.9 (9.2)	6.2 (2.4)	9.0 (4.5)	9.6 (4.9)
% Teachers with 1-3 Years of Experience	17.2 (11.3)	16.3 (12.3)	16.4 (9.3)	24.0 (15.8)	17.5 (11.6)
# Schools in District	69.0 (71.3)	54.5 (59.4)	28.3 (44.2)	33.0 (26.4)	56.1 (65.0)
Per-Pupil Expenditures	13,132.5 (2,331.6)	13,593.1 (2,848.6)	12,402.6 (1,793.2)	13,135.4 (1,749.8)	13,029.3 (2,281.9)
District Socio-economic Status	1.4 (2.1)	1.4 (2.1)	0.6 (1.7)	-0.5 (1.3)	1.1 (2.0)
COVID Deaths per 100,000 Population	86.2 (48.6)	90.8 (53.2)	102.8 (67.9)	114.5 (65.1)	92.3 (55.7)
N Schools	1040	196	365	120	1721

Note: Schools weighted by probability of being in their assigned class.

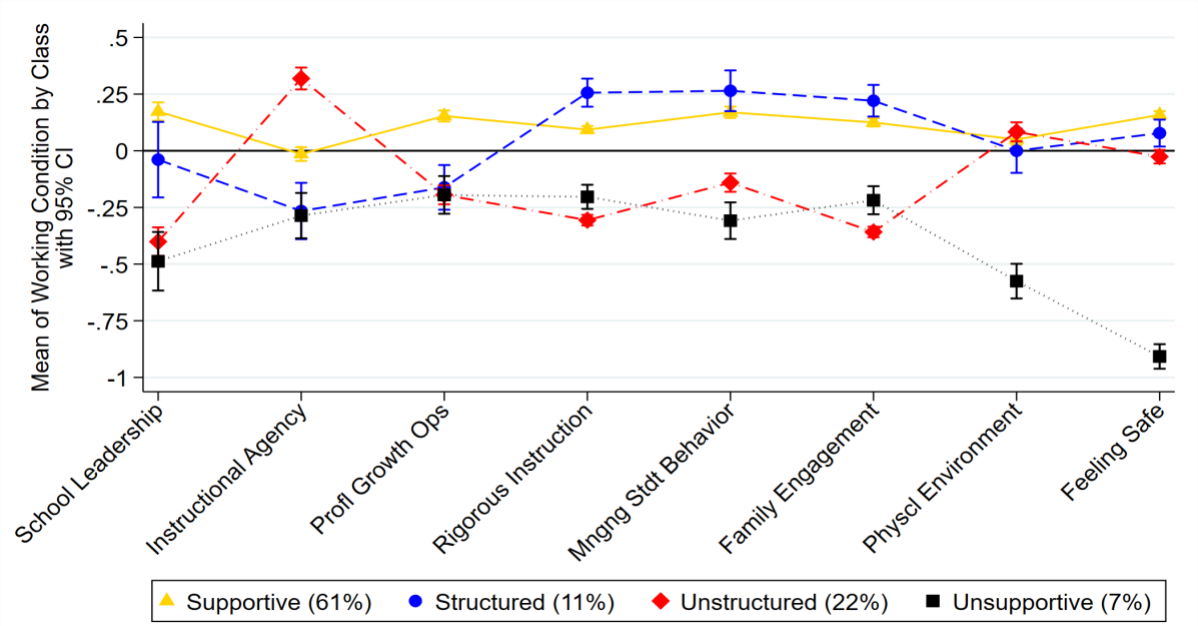

Figure 1. Dimensions of Working Conditions by Latent Class, Standardized Means and 95% Confidence Intervals

Note: Schools are weighted by the inverse of their probability of being assigned to the class. See Table A2 in the supplemental materials for latent means and variances.

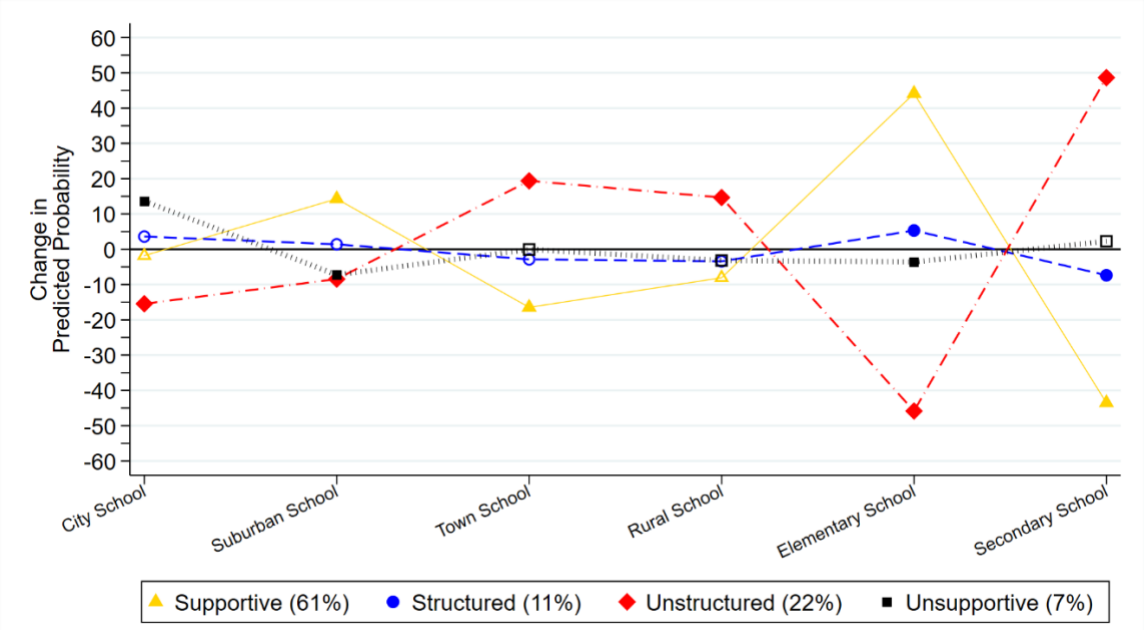

Figure 2. Change in the predicted probability of membership in teacher working conditions classes when sole binary predictor variable is set to 1 versus 0

Note: Solid markers indicate change in predicted probability statistically significant (p<.05). Hollow markers indicate insignificant change in predicted probability.

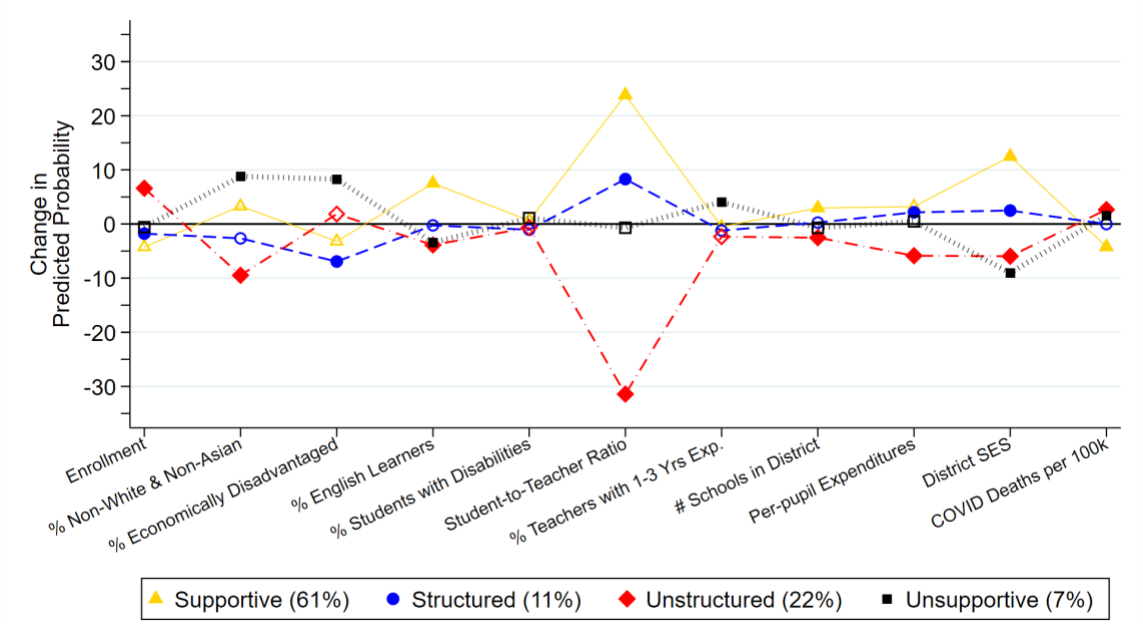

Figure 3. Change in the predicted probability of membership in teacher working conditions classes when sole continuous predictor variable set to the 75th versus the 25th percentile values
Note: Solid markers indicate change in predicted probability statistically significant ($p<.05$). Hollow markers indicate insignificant change in predicted probability.

APPENDIX: SUPPLEMENTAL MATERIALS

Table A1. Mapping of Working Conditions Dimensions to Survey Items

Dimension	Survey Items
School Leadership	(1) I feel respected by this school's administrators; (2) I feel comfortable raising issues and concerns that are important to me with school administrators; (3) I trust this school's administrators to do what they say they will do; (4) The procedures for teacher evaluation are consistent; (5) Teacher performance is assessed objectively; (6) Teachers receive feedback that can help them improve their performance; (7) This school's administrators communicate a clear vision for this school; (8) This school's administrators understand how children learn; (9) This school's administrators set high expectations for all students; and (11) Teachers and administrators have a shared vision for this school.
Instructional Agency	(1) I am trusted to make sound professional decisions about instruction; (2) I contribute to decisions about educational issues at my school; (3) I am free to be creative in my teaching approach; (4) I control how I use my scheduled class time; (5) I set the grading and student assessment practices in my classroom; (6) My role as an educator is respected under current policies; (7) Current policies are improving our education system; (8) My scheduled work day includes sufficient planning time; and (9) My scheduled work day includes sufficient instructional time to meet the needs of my students.
Professional Growth Opportunities	(1) I have sufficient resources for my professional development; (2) The professional development I receive meets my needs; (3) Professional development provides ongoing opportunities for me to work with colleagues to refine my practice; (4) I receive follow-up after professional development activities to give me additional support; and (5) Professional development enhances my ability to meet student needs.
Rigorous Instruction	(1) Teachers at this school expect students to use facts and evidence to support their ideas; (2) Teachers at this school want students to think about different ways to solve problems; (3) Teachers at this school encourage students to provide constructive feedback to others; (4) Teachers at this school encourage students to value and search for a diversity of opinions, perspectives, and abilities; and (5) Teachers at this school often connect what students are learning to life outside the classroom.
Managing Student Behavior	(1) Adults at this school understand the rules for student behavior; (2) The rules for student behavior are effective at this school; (3) We use data to evaluate and, if needed, adjust this school's student conduct policies; (4) If a student breaks a school rule, the student's behavior is addressed consistently; (5) This school's use of suspensions or expulsions to manage student behavior is effective; (6) Students know which behaviors are against school rules; (7) Students know there are consequences for breaking school rules; (8) Students are recognized for positive behavior; (9) When students are accused of doing something wrong, they get a chance to explain; (10) There are supports to help students who misbehave develop positive behavior; and (11) This school's administrators support me when I have concerns about student behavior.
Family Engagement	(1) I make an effort to know the parents/guardians of my students; (2) This school supports my efforts to have positive relationships with parents/guardians; (3) This school does a good job of encouraging parent/guardian involvement; and (4) Parents/guardians and I share common academic and behavior expectations for their children.
Physical Environment	(1) The physical environment of my classroom supports my teaching and my students' learning; (2) I have adequate space to work productively; (3) The school building is clean and comfortable; and (4) I have the support I need to incorporate technology into my instruction.
Feeling Safe	(1) I feel safe at this school; and (2) I feel there is adequate security in this school.

Table A2. Standardized Means of Measures of Working Conditions by Latent Classes

Factor	Supportive	Structured	Unstructured	Unsupportive
School Leadership	0.14***	0.01	-0.34***	-0.44***
Instructional Agency	-0.01	-0.17*	0.26***	-0.26***
Professional Growth Opportunities	0.13***	-0.07	-0.16***	-0.18***
Rigorous Instruction	0.08***	0.17***	-0.25***	-0.18***
Managing Student Behavior	0.16***	0.21***	-0.11**	-0.26***
Family Engagement	0.10***	0.16***	-0.30***	-0.19***
Physical Environment	0.04*	0.00	0.07^{+}	-0.52***
Feeling Safe	0.14***	0.07^{+}	-0.01	-0.80***
N Schools	1040	196	365	120
N Districts	120	63	116	47

Notes: Schools weighted by probability of being in class. Higher values indicate more supportive working conditions. Tests of difference from 0 (i.e., average school response): *** p<.001, ** p<.01, * p<.05, + p<.1

Table A3. Estimated Coefficients from Latent 3-Step and Multilevel Multinomial Models Predicting Schools' Working Conditions Class Membership as a Function of a Single School or District Characteristics

Variable	Class					
	Structured		Unstructured		Unsupportive	
	3-Step Latent	Multi-nomial	3-Step Latent	Multi-nomial	3-Step Latent	Multi-nomial
City School (%)	1.32	1.38	0.18***	0.38**	5.40***	4.19**
Suburb School (%)	0.90	0.90	0.42***	0.52**	0.13***	0.22**
Town School (%)	1.31	1.05	4.09***	2.72***	1.65	1.43
Rural School (%)	0.81	0.83	2.76***	2.18***	0.69	0.73
Elementary School (%)	0.41**	0.72	0.00***	0.04***	0.14***	0.27***
Secondary School (%)	1.71	1.09	6.83×10^{50}***	29.11***	5.90***	3.13***
Enrollment	1.00	0.98	1.17***	1.10**	1.01	0.99
% Non-White and Non-Asian Students	0.99*	0.99	0.98***	0.99***	1.06***	1.04***
% Economically Disadvantaged Students	0.96***	0.98***	1.00	1.01	1.06***	1.05***
% English Learners	0.98^{+}	0.99^{+}	0.96***	0.97***	0.92**	0.95**
% Students with Disabilities	0.75***	0.96	0.96^{+}	0.99	1.03**	1.03*
Student-to-Teacher Ratio	1.10**	1.05**	0.50***	0.64***	0.82***	0.90*
% Teachers with 1-3 Years of Experience	0.98	0.99	0.99	0.99	1.06***	1.04**
# Schools in District	0.99*	1.00**	0.95***	0.98*	0.99***	0.99**
Per-Pupil Expenditures	1.11*	1.08	0.77***	0.84*	1.01	1.00
District Socio-economic Status	0.99	1.00	0.74***	0.80***	0.52***	0.58***
COVID Deaths per 100,000 Population	1.04	1.02	1.09***	1.05**	1.11***	1.08**

Notes: "3-Step Latent" refers to Vermunt's (2010) 3-step approach that treats the classes as latent and fully accounts for uncertainty in class membership. "Multinomial" refers to the multilevel multinomial models that treats the classes as known and adjusts for uncertainty in class membership by using predicted class membership as weights. Reported coefficients were transformed to odds-ratios. Supportive class membership was the base outcome. N for both models is 1721 schools. Tests of difference from 0 (i.e., average school response): *** p<.001, ** p<.01, * p<.05, + p<.1

Table A4. Predicted class membership probabilities, multilevel multinomial models

Contextual Factor	Value/Stat.	Supportive	Structured	Unstructured	Unsupportive
City School	No	0.608	0.103	0.247	0.042
	Yes	0.590	0.139	0.092	0.179
	Difference	-0.018	0.036	-0.154***	0.136*
Suburb School	No	0.551	0.106	0.243	0.100
	Yes	0.694	0.120	0.159	0.028
	Difference	0.143**	0.014	-0.084*	-0.073**
Town School	No	0.618	0.113	0.195	0.073
	Yes	0.453	0.085	0.389	0.073
	Difference	-0.165**	-0.029	0.194***	-0.001
Rural School	No	0.630	0.122	0.165	0.083
	Yes	0.549	0.088	0.312	0.051
	Difference	-0.081^{+}	-0.034^{+}	0.147***	-0.032
Elementary School	No	0.326	0.077	0.501	0.096
	Yes	0.767	0.131	0.042	0.060
	Difference	0.441***	0.053**	-0.458***	-0.036*
Secondary School	No	0.757	0.137	0.041	0.065
	Yes	0.321	0.063	0.528	0.088
	Difference	-0.435***	-0.074***	0.486***	0.023
School Enrollment	25th Percentile	0.638	0.123	0.161	0.078
	75th Percentile	0.595	0.105	0.227	0.072
	Difference	-0.042^{+}	-0.018*	0.066***	-0.006
% Non-White and Non-Asian Students	25th Percentile	0.594	0.126	0.261	0.020
	75th Percentile	0.627	0.099	0.166	0.108
	Difference	0.033	-0.027	-0.095***	0.088***
% Economically Disadvantaged Students	25th Percentile	0.627	0.143	0.206	0.024
	75th Percentile	0.595	0.074	0.224	0.107
	Difference	-0.032	-0.069***	0.018	0.083***
% English Learners	25th Percentile	0.550	0.115	0.241	0.094
	75th Percentile	0.626	0.112	0.202	0.060
	Difference	0.075***	-0.003	-0.039**	-0.034**
% Students with Disabilities	25th Percentile	0.601	0.117	0.216	0.065
	75th Percentile	0.608	0.107	0.209	0.076
	Difference	0.006	-0.011	-0.007	0.011^{+}

Table A4. Predicted class membership probabilities, multilevel multinomial models (cont.)

Contextual Factor	Value/Stat.	Supportive	Structured	Unstructured	Unsupportive
Student to Teacher Ratio	25th Percentile	0.492	0.069	0.357	0.082
	75th Percentile	0.730	0.152	0.043	0.075
	Difference	0.238***	0.083***	-0.314***	-0.007
% Teachers with 3 or Less Years of Experience	25th Percentile	0.610	0.118	0.226	0.046
	75th Percentile	0.605	0.106	0.202	0.087
	Difference	-0.005	-0.012	-0.023	0.041*
# Schools in District	25th Percentile	0.493	0.108	0.299	0.100
	75th Percentile	0.523	0.111	0.274	0.093
	Difference	0.030***	0.003	-0.025*	-0.007+
Per-Pupil Expenditure	25th Percentile	0.582	0.093	0.255	0.070
	75th Percentile	0.615	0.114	0.197	0.075
	Difference	0.032	0.022*	-0.059**	0.005
District Socio-economic Status	25th Percentile	0.490	0.090	0.276	0.144
	75th Percentile	0.615	0.115	0.217	0.054
	Difference	0.125***	0.025*	-0.060*	-0.090***
COVID Deaths per 100,000 Population	25th Percentile	0.640	0.112	0.190	0.058
	75th Percentile	0.598	0.112	0.216	0.074
	Difference	-0.042***	0.000	0.027***	0.016***

Notes: Each contextual factor modeled separately. Tests of difference between predicted probability at the 75th and 25th percentiles or between yes and no: *** p<.001, ** p<.01, * p<.05, + p<.1

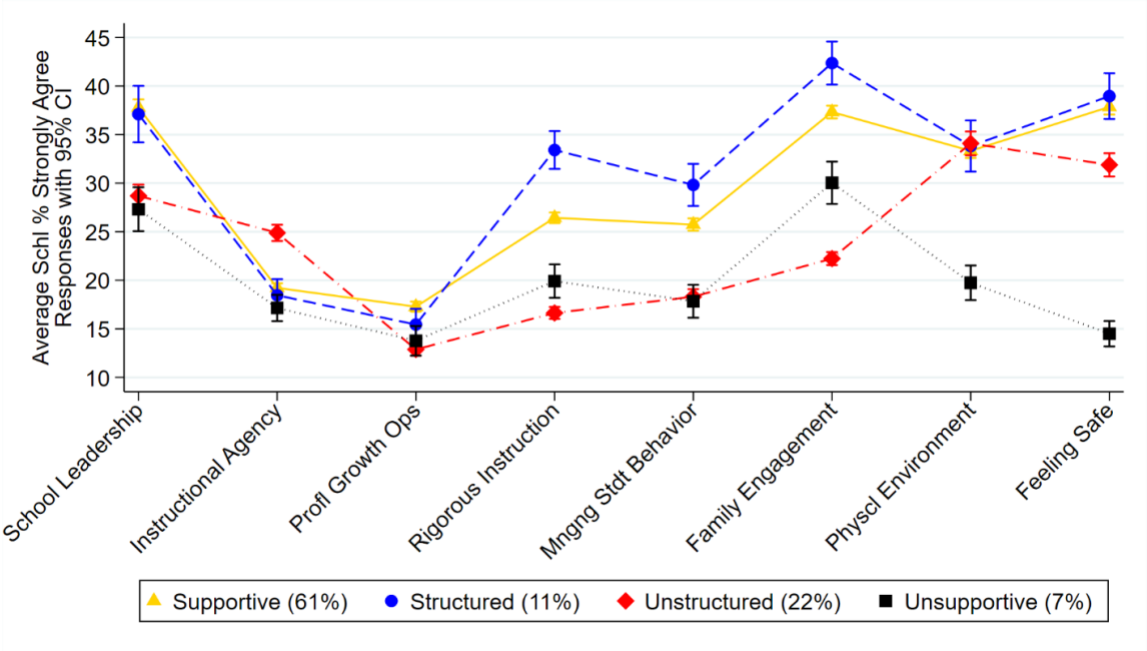

Figure A1. Average School Percent of Teachers Responding with "Strongly Agree" to the Items in a Working Conditions Dimension

Note: Schools are weighted by the inverse of their probability of being assigned to the class.

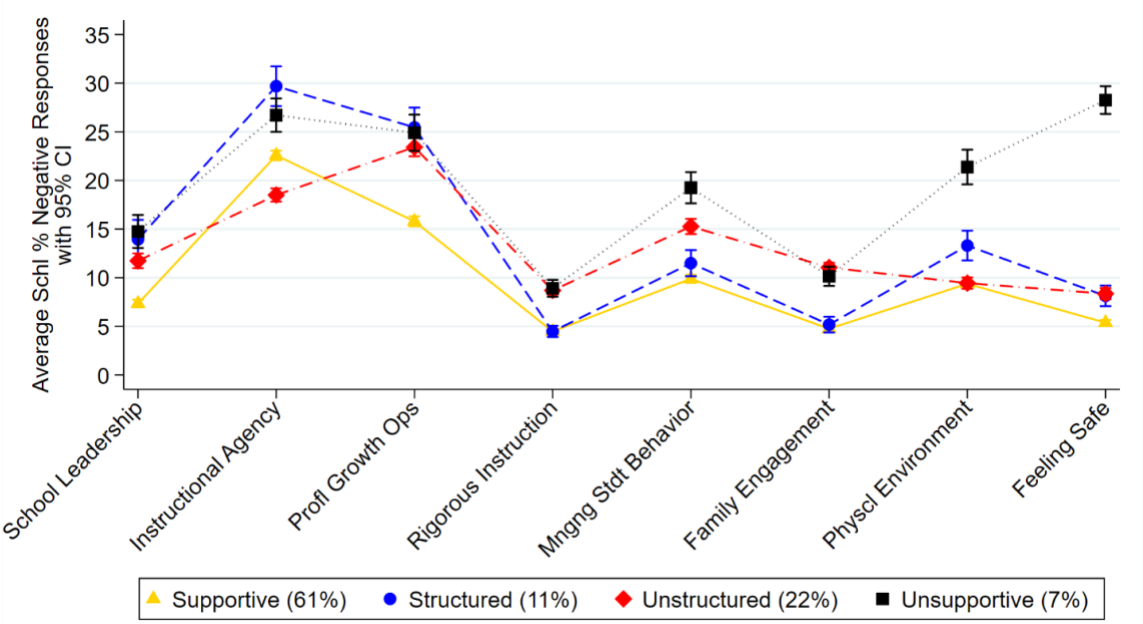

Figure A2. Average School Percent of Teachers Responding with a Negative Response to the Items in a Working Conditions Dimension

Note: Schools are weighted by the inverse of their probability of being assigned to the class.