TN EDUCATION RESEARCH ALLIANCE

Push or Pull: School-Level Factors That Influence Teacher Mobility in Turnaround Schools

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Abstract

Recruiting and retaining teachers can be challenging for many schools, especially in low-performing urban schools in which teachers turn over at higher rates. In this study, we examine three types of school-level attributes that may influence teachers' decisions to enter or transfer schools: malleable school processes, structural features of employment, and school characteristics. Using adaptive conjoint analysis survey design with a sample of teachers from low-performing, urban, turnaround schools in Tennessee, we find that five of the seven most highly valued features of schools are malleable processes: consistent administrative support, consistent enforcement of discipline, school safety, small class sizes, and availability of high-quality professional development. In particular, teachers rated as effective are more likely to prefer performance-based pay than teachers rated ineffective. We validate our results using administrative data from Tennessee on teachers' actual mobility patterns.

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Introduction

Recruiting and retaining highly effective teachers has become a high-stakes endeavor for schools across the U.S. The increasingly high volumes of entries, exits, and transfers in teacher labor markets have rendered the market dynamics difficult to understand and manage. For example, Ingersoll and Merrill (2010) found that the modal year of teacher experience in the U.S. dropped from 15 years in 1987-88 to only one year in 2007-08, indicating the rapid entry and exit of teachers into the workforce. Furthermore, from 1988-89 to 2007-08, the percentage of teachers who left the profession rose from five to eight percent of the workforce, an increase of over 50 percent (Arnold, Choy, & Bobbitt, 1993; Keigher, 2010). More recently, Redding and Henry (2018) show that prior estimates of end-of-year turnover attenuate to 77.5 percent of their true value after accounting for within-year turnover, suggesting that a substantial number of teacher exits occur during the school year. Three factors have transformed teaching from a relatively stable profession into a "revolving door": (a) the lower cost of entry into public school teaching as a result of loosening the qualification criteria for novice teachers in most states, (b) the correspondingly low cost of exit from the profession (Henry et al., 2013), and (c) the expansion of teaching programs with limited terms of service through organizations like Teach for America (Redding & Henry, 2018).

Moreover, teachers leave high poverty, high minority, and low-performing schools at much higher rates than other schools (Borman & Dowling, 2008; Guarino, Santibanez, & Daley, 2006; Hanushek, Kain, & Rivkin, 2004; Hughes, 2012; Ingersoll, 2001; Ladd, 2011; Lankford, Loeb, & Wyckoff, 2002; Loeb, Darling-Hammond, & Luczak, 2005; Redding & Henry, 2018). When considering turnaround schools, many reform models require a partial or complete turnover of all school staff at least in the first year of turnaround although some evidence

indicates that high turnover can continue after the initial year of turnaround implementation (Henry, Zimmer, Kho, & Pham, 2017; Rice & Malen, 2003; Strunk, Marsh, Hashim, Bush-Mecenas, & Weinstein, 2016). The revolving classroom door spins faster for the lowest performing schools, which have the greatest need for a stable and effective teaching staff.

In this study, we analyze the dynamics of the teacher labor force in some of the lowest achieving schools in Tennessee, specifically schools that were chosen for takeover by the state-run Achievement School District (Henry, Zimmer, Attridge, Kho, & Viano, 2014). Focusing on turnaround schools specifically is relevant in the current policy environment because the federal Every Student Succeeds Act (ESSA) still requires districts to implement a turnaround strategy in low-performing schools (Every Student Succeeds Act, 2018). In addition, the teachers who actually work in these schools may have concerns distinctly different from those who have not had experiences in these types of environments. To better understand which factors are the most important to teachers who have this experience, we focus on three types of school-level factors that could inform teachers' mobility decisions: school characteristics, structural features of employment, and malleable school factors. School characteristics are defined as relatively fixed school attributes that change slowly over time, including student composition and commuting times. Structural features of employment are usually set at the district or state level, including salary and tenure protections. Malleable school factors, which include working conditions such as consistent enforcement of disciplinary policies or administrators' support, can be altered in the short run with concerted effort by school administrators at each school site so are arguably the factors that school leaders can influence the most. We use an innovative survey method, adaptive conjoint analysis, to explore which factors are more important to teachers at low-performing schools with high teacher turnover.

In addition to identifying the factors that attract or repel teachers in turnaround schools, we examine the extent to which these factors differ for three groups of teachers. First, we examine sub-populations of teachers based on experience. Experience is one of the few qualifications that reliably predict teachers' effectiveness (Clotfelter, Ladd, & Vigdor, 2007, 2010; Harris & Sass, 2011; Henry, Bastian, & Fortner, 2011; Henry, Fortner, & Bastian, 2012; Rockoff, 2004). Second, we examine sub-populations of teachers based on self-identified race or ethnicity. One of the most vexing problems with the teacher labor force is that public school teachers remain largely white while the student body is composed of increasing numbers students of color. Given the need to diversify the educator workforce, especially in low-performing, urban schools, we examine differences between white and Black and/or Hispanic teachers. Finally, we investigate sub-populations of teachers based on effectiveness, as measured by value-added scores. This analysis provides insights into what factors may support attracting and retaining highly effective teachers in low-performing schools selected for turnaround.

Tennessee's Achievement School District

The ASD is an arm of the Tennessee Department of Education that was established by legislation aimed at implementing a portfolio approach to school turnaround and initially funded through federal Race to the Top funds. In 2012, Tennessee identified the five percent of its schools that had been the lowest achieving when performance was averaged across the preceding three years, labeling them *priority schools*. Priority schools faced a number of possible interventions, the boldest of which was removal from the school's local district and takeover by the state-run ASD. Schools designated for takeover were then either directly managed by the

ASD or an authorized external operator, mainly charter management organizations (Henry et al., 2014, 2017; U.S. Department of Education, 2012; Zimmer, Kho, Henry, & Viano, 2015).

Examining factors that influence teachers' employment decisions in ASD schools is especially important given the rise in similar school reform strategies throughout the country, such as the Recovery School District in New Orleans, the Public School Choice Initiative in Los Angeles, and the School Redesign Grants in Massachusetts (Aragon & Workman, 2015). Moreover, the turnaround model under the national School Improvement Grants (SIG) program utilized similar strategic staffing practices which included replacing at least half of all staff ("SIG," 2018). These models all rest on the theory that more effective teachers are needed to turnaround low-performing schools. However, the question remains as to how low-performing schools, which are often challenging work environments, can successfully attract and retain effective teachers. Therefore, a closer examination of factors influencing the employment decisions of ASD teachers, who may have concerns stemming from experience in challenging urban schools, is an important contribution to understanding the factors that persistently low-performing schools can leverage to successfully attract and retain teachers.

Conceptual Framework: A Typology for Understanding Teacher Preferences

Variables that may attract individuals into or repel them away from teaching need to be carefully considered. In the past, data limitations, such as relying exclusively on administrative data, have constrained the conceptualization and therefore the analysis of variables influencing teacher labor market decisions. We propose a conceptual framework which defines three types of school-level forces that may affect these decisions: (1) malleable school processes; (2) structural features of teachers' employment; and (3) school characteristics. Malleable school processes are those for which the locus of control is expected to be within schools and are factors

that can be changed in the short term (e.g., consistent enforcement of student discipline policies). Structural features include salary, tenure, and performance-based pay and are generally set for longer periods by organizations that manage schools such as traditional districts, states, or charter management organizations. These are often subject to regulations and are likely applied to all schools managed by the same organization. School characteristics include less readily altered features, such as student composition or commute times, can only be changed by management organizations over a longer time frame by changing attendance zones or altering student/parent choice mechanisms, including converting a school into a magnet or charter. Prior research has also shown that individual factors are highly predictive of teacher mobility, in particular age, gender, race, and family characteristics (Grissom, Viano, & Selin, 2016), but this study seeks to address school-level conditions that influence teachers' mobility decisions.

Prior studies of factors correlated with teacher mobility heavily influence our typology. Multiple studies agree that certain school characteristics like student race, socio-economic status, and achievement predict teacher mobility patterns (Borman & Dowling, 2008; Grissom, 2011; Guarino et al., 2006; Hanushek et al., 2004; Hughes, 2012; Ingersoll, 2001; Johnson, Kraft, & Papay, 2012; Ladd, 2011; Lankford et al., 2002; Loeb et al., 2005). Schools with higher populations of minority students, students with lower socio-economic status, and lower student achievement experience higher rates of both actual and intended teacher turnover. Many of the cited studies find that these school characteristics are highly correlated with other important variables affecting teaching in the school and the higher teacher mobility rate might be better explained by differences in the malleable school processes that are distributed inequitably across schools (see Grissom, 2011; Loeb et al., 2005; C. Redding & Henry, 2018). Another school characteristic that is correlated with teacher preferences for a school placement is commute time

between home and school. While teacher turnover studies have likely lacked necessary data to correlate teacher turnover and commute time, a study of job applications in Chicago and job preferences among California teachers both found that teachers appear to have a strong preference for shorter commutes (Engel, Jacob, & Curran, 2014; Horng, 2009).

Among structural features of teachers' employment, salary has garnered the most attention from the research community and the policy world writ large. Correspondingly, many studies have found that higher teaching salaries are associated with lower probabilities of teachers turnover (Borman & Dowling, 2008; Clotfelter, Glennie, Ladd, & Vigdor, 2008; Hanushek et al., 2004; Hendricks, 2014; Johnson & Birkeland, 2003; Loeb et al., 2005; Podgursky, Monroe, & Watson, 2004; Stockard, 2004). Performance-based pay is a popular reform strategy based on the principle that teachers will be motivated to improve their performance and/or stay teaching in a low-performing urban school if there is a financial reward for doing so. Some evidence suggests that rewarding teachers for high performance improves retention (Springer, Swain, & Rodriguez, 2016) while other evidence on performance based bonuses has found that teachers who are awarded bonuses do not have different mobility patterns than teachers who are ineligible for bonuses (Dee & Wyckoff, 2013).

Another structural feature of employment, tenure, is often discussed by the media and critics of teachers' union. Few empirical studies have explicitly evaluated the association between teacher tenure policies and teacher preferences or teacher turnover (although such an effect is simulated in Rothstein (2014)), but many in the education research community have hypothesized that tenure is an important lever for attracting and retaining teachers (Education Deans, Professors, and Scholars, 2015; Rothstein, 2014). A recent study on the effect of tenure reform in Louisiana found that the removal of tenure protection is associated with increased

teacher turnover, especially concentrated among teachers in the lowest-performing schools (Strunk, Barrett, & Lincove, 2017), showing the potential for tenure to be particularly important to teachers in turnaround schools.

Research on malleable school processes has shown that teachers' turnover decisions are likely to be highly responsive to the day-to-day conditions in the school (malleable school processes include what are often termed *working conditions* at the school). For instance, Johnson and Birkeland (2003) found that faculty collegiality, student disciplinary policies, professional development quality, expectations for working outside of the school day, and support from school administrators were all correlated with teachers' mobility decisions. The positive association between higher levels of administrator support and lower rates of teacher turnover has been replicated across many studies and confirmed by a meta-analysis of 34 teacher mobility studies (Borman & Dowling, 2008; Ingersoll, 2001; Johnson et al., 2012; Kukla-Acevedo, 2009; Tickle, Chang, & Kim, 2011). Other studies have also confirmed that school expectations for working outside of the school day (Ladd, 2011) and collegiality among teachers (Borman & Dowling, 2008) are correlated with teacher intention to turnover and actual teacher mobility. Another malleable school process that has been shown to have some import to teachers is autonomy in their classroom, including autonomy to choose instructional materials, methods, and assessments (Achinstein, Ogawa, Sexton, & Freitas, 2010; Firestone & Pennell, 1993; Guarino et al., 2006; Ingersoll, 2001; Ingersoll & May, 2012; Johnson, 2006; Weiss, 1999). Across these studies, more teacher autonomy is associated with lower rates of teacher turnover. Previous research also suggests that class size and school safety are malleable factors that are either important to teachers or correlated with teacher turnover (Horng, 2009; Loeb et al., 2005).

Situating the variables within these three categories leads to a more comprehensive conceptual framework for understanding of the forces attracting and repelling teachers and provides the opportunity to examine relative weights for each category. This may reduce bias, specifically omitted variable bias, which could come from investigating only one of these types of forces, such as studies relying exclusively on teachers' surveys for examinations of working conditions or studies relying exclusively on administrative data to examine school compositional effects.

Addressing these concerns, we investigate the relationship between 16 attributes[1] (divided into the three categories described above) and teachers' school preferences. In contrast to many survey-based studies that ask teachers to rate or rank the importance of certain working conditions, our survey required them to reveal the trade-offs that they would make between the variables (Horng, 2009). For example, they were asked whether they would choose a school with high achievement and no performance bonus or a school with low achievement and an opportunity to earn an $8,000 performance bonus. By using a sample of teachers with experience in turnaround schools, we can rank the importance of these push and pull forces for an important sub-population of teachers who work in urban schools with especially high teacher mobility rates.

Methods

Adaptive Conjoint Analysis Survey

[1] While we would ideally consider more than 16 attributes since the relationship between school-level attributes and teacher preferences is quite complex, our method prohibits us from including a longer list of attributes. In cognitive interviews with teachers (described later in the paper), we asked if we were missing attributes that would be extremely important to include and revised our list based on their feedback.

The factors that predict teacher mobility decisions are traditionally studied using surveys asking teachers to rate their preferences or through qualitative methods. These methods can result in less distinct differences between factors if the teacher can rate multiple, if not all, factors as highly important. Adaptive Conjoint Analysis (ACA) survey design has recently been borrowed from the marketing literature in studies of teacher mobility decision-making, because ACA has several distinct advantages (Horng, 2009; Robinson, 2012). First, the ACA format asks respondents to choose between different attributes of a job profile such that they must reveal relative preferences. This process clarifies how teachers weigh different trade-offs between positions and shows which factors are more important than others. This benefit is especially noteworthy because, with traditional surveys, teachers often choose all or a large proportion of the attributes as equally "important." Second, ACA has been frequently tested by researchers within the marketing community, showing that this method has high internal validity (Green, Krieger, & Agarwal, 1991; Tumbusch, 1991). Third, this analysis quantifies the likelihood that teachers will choose jobs with particular attributes or sets of attributes, an attractive metric to researchers interested in more refined data on teacher mobility decision making.

Survey Design

We utilized Sawtooth Software (*Sawtooth Software*, n.d.) to construct the online ACA survey for this study. For this survey, we chose a set of 16 *attributes* that may affect teachers' labor market decision making process[2], and assign two to three *levels* within each attribute. For example, class size is an attribute which has two levels: fewer than 20 students and more than 25

students.[3] Altogether, the 16 attributes contain 36 levels, listed in an abbreviated form, in Table 1. We developed these attributes and levels based on our review of the literature on predictors of teacher mobility, findings from a previous ACA survey study conducted by Horng (2009) on teacher job attribute preferences, and the reasons provided to us by ASD leadership on why teachers would seek an ASD school as a place of employment. We expand on findings from Horng (2009) by focusing on a highly salient, yet understudied segment of teachers (those in turnaround schools) as well as expanding the number of attributes and levels and including a richer set of covariates.

Table 1 displays each factor, its type, and the research base that supports its inclusion in the survey. With the ACA design, increasing the number of attributes exponentially increases the number of survey items. While prior research would lead us to include many more attributes than 16 in order to comprehensively assess teacher preferences, limiting the number of attributes was necessary to make the survey short enough for the sample of full time teachers to complete the survey in a timely fashion and for us to obtain an acceptable response rate.

After initial survey development, we conducted cognitive interviews with nine current teachers who do not and have not worked for ASD schools (to avoid contamination of the survey sample) but have experience in schools that are similar to ASD schools. The cognitive interviews were conducted using a Think-Aloud framework where participants continually updated the interviewers about their interpretation of each attribute, level, and question on the survey. The teachers were asked during the interview if any attributes were missing from the survey. The survey was then finalized based on suggestions made by multiple interviewees.

[3] These numbers were chosen for the levels initially by the research team based on their knowledge of the typical conditions in ASD schools as well as through review of the Horng (2009) study. During the cognitive interviews (described later in this section) we validated the cutoff numbers and made updates accordingly based on teacher feedback on the plausibility of these differences.

Survey Implementation and Analysis

The ACA survey has four key stages: (1) respondents rank the set of attribute levels in order of desirability; (2) respondents indicate how important the difference between two levels of the same attribute would be in their decision making process; (3) respondents are given two different, increasingly dimensional job profiles and are asked to select along a continuum between the two job profiles which one they would be more likely to select; (4) respondents enter a number between 0 and 100 indicating their likelihood of choosing to work at a school with given attributes.

In the first stage, respondents rate each level of each attribute separately on a scale of *Not Desirable* to *Extremely Desirable* to establish the respondents' preferences on which level they prefer. The respondent is only asked to rate the desirability of the attribute levels where the preference for each level cannot be assumed (e.g., respondents were not asked about the desirability of working in a school where they would have a higher salary because it is assumed all teachers would prefer a higher salary, all else equal).

The purpose of the second stage is to establish how important it is for the respondent to be at a school with one attribute level versus other the level(s) of the same attribute. The respondents are asked how important is the difference between two specific attribute levels on a scale of *Not Important* to *Extremely Important.* The next section of the survey focuses on the attributes where the difference between levels was more important. For example, the respondent was given a choice between teaching at a school where there are opportunities for high quality professional development versus a school where there are no opportunities for high quality professional development. If the respondent answers that the difference between these two schools is *Not Important* then the next section of the survey is less likely to feature this attribute,

but if the respondent identifies the difference as *Extremely Important* then the next section of the survey would likely to feature this attribute.

In the third stage, respondents are asked to choose between two job profiles, where each set of profiles is designed to be equally desirable based on the respondents' answers on the first two survey sections. The two job profiles are placed on the page such that one job profile is listed on the left while the other is on the right side of the page. Respondents are asked on a scale of *Strongly Prefer Left* for the profile listed on the left to *Strongly Prefer Right* for the profile listed on the right with *Indifferent* in the middle of the scale. When respondents choose between these two job profiles, the software obtains more information on the respondents' preferences for the attributes and attribute levels. The profiles become increasingly complicated as the software gathers more information. In the last section of the survey, respondents are given a full job profile and asked, on a scale of 0 to 100, to rate their likelihood of working in a school that profile. This section is used for calibration in the market simulation analyses (Orme, 2014).

After survey completion, each attribute is assigned an individual importance score, representing the respondent's *relative* importance of each attribute relative to the other attributes, not the importance of that attribute overall in their labor market decision-making process. Utility values are calculated by comparing the rankings of each attribute in the survey such that there is an implicit rank order of preferences between the levels of every attribute.

The utility values used in this study come from a Hierarchical Bayes analysis where individual utilities are estimated by borrowing information (i.e., means of the utilities of all respondents as well as variances and covariances of the distribution of utilities) from other respondents ("priors"), improving the stability of the results. The Sawtooth Software conducts a Monte Carlo Markov Chain for 5,000 preliminary iterations before convergence is assumed,

followed by 10,000 further iterations after convergence is assumed (Sawtooth Software, 2006). Then, results are saved for analysis (i.e., the survey results that we will explore in this paper). The calibration section (fourth section) of the ACA survey is utilized to scale each respondent's part-worth utilities in the market simulation (see below for an explanation).

The importance values represent the difference each attribute could make in the total utility of a job preference. If each attribute were equally important, then the importance values would be 6.25 percent for each of the 16 attributes in our study (100 divided by 16). Importance values are calculated at the individual level and then averaged to the aggregate level by dividing the range in part-worth utility values of each attribute by the total of all of the utility ranges combined. Importance values are ratio measures but can be interpreted as relative to other attributes included in the survey. Also, importance values do not provide information on the preference of one attribute level over another and relay information only on the importance of each attribute regardless of the attribute levels.

Another important tool available using ACA surveys are market simulation estimates. Market simulations are conducted by comparing a set of job profiles where each attribute is set to a specified level. Each job profile will have an associated utility value based on each individual's preferences. We conduct a first choice simulation where each respondent is predicted to choose the job profile that maximizes their individual utility. The results from a first choice simulation indicate what percent of the respondents are predicted to choose each job profile (i.e., schools with certain attributes) over the others. For instance, in a simulation where there are two schools (School A and School B), if School A has a first choice simulation result of 25 percent then this indicates a quarter of respondents would choose School A over School B (75 percent would choose School B). We perform two types of first choice market simulations. First, we perform a

market sensitivity analysis. This type of analysis involves creating job profiles within each simulation where 15 of the attributes are set to the same level and only the values on one attribute are changed. For instance, the salary attribute has three levels: $0 additional salary, $4,000 additional salary, and $8,000 additional salary (see Table 1). A market sensitivity first choice simulation would create three job profiles where the other 15 attributes are set to identical values, but each profile has a different salary level. The results then indicate what percent of respondents would choose a job at each salary level, holding all other attributes equal. The second type of first choice market simulation we conduct compared specific job profiles with differences in multiple job attributes, predicting what percent of respondents would select each of the job profiles. For this type of first choice market simulation, we utilized information from school performance reviews conducted at all ASD schools during the 2014-15 school year to construct the job profiles.

Sample

Our target population for the survey includes current teachers who can be categorized into one of three groups: (1) teachers at an ASD school in the 2014-15 school year (the time of survey administration), (2) teachers who had worked at an ASD school prior to the 2014-15 school year, and (3) teachers who worked in a school that was eventually taken over by the ASD, but left the school before takeover. Therefore, each set of teachers has intimate knowledge of teaching in a low-performing urban school. We identified our target population of teachers using a combination of personnel data provided directly by the ASD and state-wide longitudinal data compiled by the Tennessee Education Research Alliance (TERA). The final sample included 811 teachers: all 2014-15 ASD teachers (N=565) and a random sample of the other two groups of teachers (N=246). To reflect the sampling strategy, all estimates in this paper include a

probability selection weight where the responses from the 2014-15 ASD teachers are given a weight of one, because they were all included in the sample. The other two groups of teachers' responses are given a probability weight of approximately 1.62.

Teachers were given approximately six weeks to take the online survey in the spring of 2015, and teachers who completed the survey were sent a gift card. Survey reminders were emailed on a weekly basis to non-responders. The final response rate was 63.5 percent, with current ASD teachers having a higher response rate (68.8 percent) than the response rate of teachers who no longer worked at ASD schools (52.5 percent).

Measures

We include several measures to analyze the results by teacher subgroups. First, teachers were asked how many years they have been teaching, including the current school year. On average, teachers in our sample had more years of experience than the average for ASD teachers, likely because our sample includes former teachers in ASD schools who moved to other Tennessee schools. We took this continuous measure of teacher experience and created two categories: teachers with one to two years of teaching experience and teachers with six or more years of experience. We did not include teachers with three to five years of experience in our subgroup analysis. Second, teachers were asked to describe their race/ethnicity and were allowed to select more than one option between Caucasian, Black, Latino/a or Hispanic, Asian or Pacific Islander, Native American or Alaskan Native, Mixed racial background, Other, and Decline to Answer. The majority of our sample is either Caucasian (35 percent) or Black (52 percent), comparable percentages to other low-performing schools in Tennessee (2 percent of the sample identifies as Hispanic). We compare teachers who selected only Caucasian to teachers who selected Black and/or Hispanic as their race/ethnicity. The third variable we analyzed measures

teacher effectiveness as assessed during the 2014-15 school year. As a measure of teacher effectiveness, we utilized a value-added score from the Tennessee Value-Added Assessment System (TVAAS), which reflects student growth and takes multiple years of prior achievement into account. Teachers in tested subjects are assigned a TVAAS score from 1 (least effective) to 5 (most effective). We compare teachers who received a TVAAS score of 1 or 2 (ratings of "below expectations") with teachers who received a score of 4 or 5 (ratings of "above expectations"). We note that our analysis comparing teachers rated as above and below expectations is based on a restricted subsample of respondents who had a TVAAS score in Tennessee's statewide administrative data. For teachers in tested grades and subjects, Tennessee's teacher evaluation system requires that 50 percent of teachers' evaluation score be based on student achievement data. Of the 50 percent, 35 percent is based on TVAAS and 15 percent is based on alternative measures of student achievement. Therefore, only teachers in tested grades and subjects are assigned a TVAAS score.

Results

Attribute Importance Levels

Among surveyed teachers, the most important attribute out of the 16 we tested is enforcement of a student discipline policy followed by salary, administrator support, and school safety, as shown on Figure 2. The importance of administrative support and school safety is consistent with Horng (2009) who found clean and safe school facilities, administrator support, and class size to be the most important attributes[4]. The least important attribute in our study is student race followed by the student income, involvement in establishing a school, student achievement, time spent working outside of the school day, and commute time. Since importance

[4] Findings from different ACA surveys should be interpreted carefully since all comparisons are between attributes included on each survey.

percentages are ratio measures, the most important attributes in this study are two to three times more important to our sample of teachers than the least important attributes. For instance, the importance percentage for commute time is 4.76, and the importance percentage for discipline is 9.47. Therefore, discipline is almost two times (9.47/4.76=1.99) as important as commute time. Generally, attributes categorized as school characteristics are clustered at the lower end of importance percentages while attributes categorized as structural and malleable characteristics are dispersed throughout the ranking of important characteristics.

Sensitivity-Test Market Simulations

Next we conducted sensitivity-test first choice market simulations for all sixteen attributes separately, finding the percent of respondents who would select each job profile for each of the levels of each attribute holding the other 15 attributes constant. The results are displayed in Figure 3. For six of the malleable attributes, the respondents are highly sensitive to the difference between levels such that 95 to 100 percent of respondents are projected to select a school with consistent administrator support, consistently-enforced student discipline, safety as a minor concern, small class size, supportive teacher relationships, and available high quality professional development (PD) over a school with the alternative for each attribute. For the structural conditions attributes, the only one that had over 95 percent of the first choices was the ability to make $8,000 more per year (which had 100 percent of first choices). The first choice percentages are less stark for school characteristics, with commute time as the exception. Respondents are less resolute on which level of the other school characteristics attributes (student race, student income, establishing a school, and prior achievement) they would prefer when deciding to work at a certain school.

The ASD has made special efforts to recruit and retain teachers with more experience, teachers who are racially congruent with the student body (i.e., Black and/or Hispanic teachers), and more effective teachers. In order to see if the factors that affect recruiting and retaining teachers in these sub-populations differ based on these three characteristics, we repeated the sensitivity-test first choice market simulations, comparing the results for teachers with 1-2 years of experience to teachers with 6 or more years of experience, teachers who are Caucasian to teachers who are Black and/or Hispanic, and teachers who are rated "above expectations" to teachers rated as "below expectations" as measured by TVAAS scores. We only report on differences in first choice market simulations where the differences in first choice percentages within an attribute between subgroups are significantly different.

Fifty-one percent of teachers with less than three years of experience are predicted to choose a majority low-income school compared with 40 percent of teachers with six or more years of experience. A somewhat larger difference exists in terms of a higher percentage of less experienced teachers preferring a minority white school over a majority white school (98 percent) when compared to experienced teachers (83 percent). With expectations for work outside of the school day, 32 percent of more experienced teachers preferred a demanding work schedule, working regularly on evenings and weekends, over a less demanding work schedule while 17 percent of less experienced teachers would choose more demanding work expectations. On the same attribute, 32 percent of Black and/or Hispanic teachers would choose a demanding work schedule over a less demanding work schedule while 15 percent of Caucasian teachers would choose a more demanding work schedule.

The only significant difference between teachers rated as above expectations and below expectations (i.e., effective versus non-effective teachers) is on preferences for performance-

based pay. For teachers performing below expectations, four percent would choose a school with $1,000 or less of performance based pay while 11 percent of teachers performing above expectations would choose a school with $1,000 or less of performance based pay. There is no difference between high performing teachers and low-performing teachers on their preference for schools with $5,000 or more of performance based pay (both 81%).

Market Simulation based on Conditions in ASD Schools

We were interested in how current ASD schools would fare if teachers were hypothetically choosing between existing ASD schools. In the fall of 2014-15, the ASD and CMO staff conducted a school performance review (SPR) at each ASD school, and the summaries were made available to the research team. The SPR summaries were created using the same template, each addressing five of the attributes included in our ACA survey. In particular, each SPR summary allowed us to ascertain if (a) high quality PD was available, (b) teacher relationships were supportive, (c) the discipline policy was consistently enforced, (d) safety was a minor or serious concern, and (e) administrators were consistently supportive of teachers. As expected, the SPR only included malleable attributes because school administrators can directly influence these areas.

We coded each SPR to determine the levels of these five attributes for each school. In particular, we found that many schools had the preferable level (according to the sensitivity-test first choice market simulation) on all of the attributes except for one.[5] To see how teachers would pick between four schools that had the more preferred level on four of the five attributes and the least preferred level on the fifth attribute, we conducted a market simulation with results shown in Figure 4. Among these five malleable factors, more teachers would go to a school that did not

[5] There were no schools that had the preferable level on all of the attributes except teacher relationships. Since no school had this particular profile, it was not included in this market simulation.

have high quality PD but had other preferable attributes (i.e., consistent discipline, safety is a minor concern, and supportive administration). The attribute that was strongest in deterring teachers from choosing a school as their first choice was inconsistent administrative support, followed by inconsistently enforced discipline and then safety as a serious concern. The least potent deterrent was not having high quality PD available. About 60 percent of teachers would choose a school without high quality PD as their first choice, compared to about 30 percent of teachers choosing a school where safety is a serious concern, seven percent who would choose a school with inconsistent disciplinary enforcement, and less than 5 percent choosing schools with inconsistent administrator support. These results help order the attributes in terms of their impact on the schools teachers choose and allow more precise distinctions to be made than the original importance percentages for the factors in Figure 2.

Validation Checks

While the ACA design theoretically offers a substantial improvement over traditional survey designs when assessing teacher preferences for school-level conditions, it is possible that teacher's expressed preferences do not determine the kinds of schools where they actually work. The ACA survey results are only useful to the extent that they predict the actual behavior of teachers in the labor market. To this end, we perform a series of validity checks using administrative data from TERA to assess if the expressed preferences from the survey are indicative of the teachers' revealed preferences. We are somewhat limited in our ability to do a comprehensive set of validity checks for several reasons. First, out of our 16 attributes, we are only able to find 11 approximate matches to those attributes using administrative data. Second, the approximations we use do not always directly correspond to our survey data because the administrative data is not structured in the same manner as the survey. Lastly, we can only truly

assess revealed preferences for teachers who have moved to another school in Tennessee. We cannot assess revealed preferences of teachers who stayed in their school since they have not had an opportunity to select another school based on their most recent preferences (i.e., their preferences might have changed since they selected their current school). We also cannot assess revealed preferences of teachers who go to teach in another state or a private school. This leaves us with a small sample size of teachers. Regardless, exploring whether revealed preferences match expressed preferences to the extent possible is a useful exercise to assess the validity of our results.

We created 11 proxies for the attributes and attribute levels utilized in the ACA survey which are compiled at the school-level for all schools that the respondents transferred into. We have information on school demographics, class size, teacher salary, student discipline, and student achievement. We also have results from the Tennessee Educator Survey[6] which contains several scales and items on classroom autonomy, administrative support, discipline policy, professional development, and teacher collegiality. More information on these data sources are included in an online appendix. We approximate the attribute levels for each school using the same values stated on the ACA survey (i.e., for demographics, salary, test scores, and class size), or by assessing if a school is above or below the mean value for the corresponding scale/item.

We have several options for categorizing expressed preferences from the ACA survey including importance values and results from the market simulations. Our preferred strategy is to use results from the market simulations that indicate the respondents' share of preference for one attribute level over the other. This value represents the probability a respondent will choose a school with one attribute level over the other attribute level. In the spirit of only including

[6] The Tennessee Educator Survey is an online survey that is distributed on an annual basis to all teachers in Tennessee public schools. We utilize the 2016 and 2017 surveys for this analysis. More information is available here: https://www.tn.gov/education/data/educator-survey.html.

respondents who show a strong expressed preference (i.e., excluding respondents with only a slight preference who might not actually make decisions based on that attribute), we include respondents who express a share of preference of at least 90 percent. We also include other tests using importance values (in their top five or their number one attribute according to the importance value) and looking only at higher versus lower share of preference. These results are in the online appendix and are generally consistent with the results discussed here.

The results of this exercise exploring revealed and expressed preferences are listed in Table 2. The first column lists the 11 attributes we were able to test. The second column indicates the number (and percent) of respondents who moved to a school whose actual conditions matched the preferences they expressed on the survey. The third column is the number (and percent) of respondents whose revealed preferences (the conditions at their new school) did not match their expressed preferences on the survey. Seven of the 11 attributes have the same number or more teachers whose revealed preferences match their expressed preferences. The match rates for four of the expressed and revealed preferences are between 90 and 100 percent: schools with less than 10 percent White students; schools with opportunities for high quality PD; schools with class size less than 20 students; and schools in which disciplinary policy is consistently enforced. A particularly interesting high rate of match is schools with less than 10 percent While students. A skeptic may have assumed that respondents' preferences for minority white schools was driven by social desirability, but the validity check would suggest otherwise, at least for this sub-population of teachers.

Of the remaining four, we might expect that teachers have less flexibility on salary when they are moving within the same state's public school system. Moreover, how we measure the safety attribute might not be an accurate representation of the actual safety of the school because

we use reports of safety-related disciplinary incidents. Having a higher number of disciplinary incidents does not necessarily mean the school is less safe, because schools may not accurately report these numbers or may not discipline these behaviors (e.g., teacher harassment). Across the board, teachers' ability to transfer to a school with the attributes they prefer will depend on whether their desirable characteristics are available within the geographic area in which they consider working. Overall, we find that the revealed preferences of teachers mostly match their expressed preferences from the survey, leading to evidence that the survey results are showing true teacher preferences for school working conditions.

Conclusions

Our findings suggest that malleable school processes are likely to have the greatest influence on teachers' decisions to change schools, at least in low-performing, urban schools. These processes include consistent enforcement of discipline, consistent administrative support, school safety, small class sizes, and availability of high quality PD. These results are encouraging in that the attributes most important to teachers may be more directly influenced by school administrators. Therefore, these findings could be used to attract a larger pool of teachers into lower performing, high minority schools, where turnover is a significant problem. In light of recent research which finds that turnover harms student achievement (Hanushek, Rivkin, & Schiman, 2016; Henry & Redding, 2018; Ronfeldt, Loeb, & Wyckoff, 2013), these five factors should be considered as important for the management, and ultimately, reduction of teacher turnover. Teachers who are willing to teach in high poverty, low achieving schools, such as in our study sample, are unlikely to choose moving to these schools without all of these processes in place. The validity check shows that these teachers have indeed been able to realize their preferences for three of these.

Effective teachers and ineffective teachers, as measured through Tennessee's teacher evaluation system, have statistically indistinguishable preferences in all but one area. Among the teachers who had a TVAAS score, more effective teachers reported a greater preference for working in schools with some level of performance-based pay ($1,000 or less) while a higher percentage of ineffective teachers would prefer a school with no performance-based pay. This suggests that school districts may want to consider the compositional benefits from implementing performance-based pay in terms of recruiting and retaining more effective teachers when deciding on whether or not to invest in an alternative salary system.

Teachers with more experience and Black and/or Hispanic teachers were more likely to prefer a school where teachers are expected to work regularly on evenings and weekends than teachers with less experience and Caucasian teachers, respectively. Partly, this could come about because teachers in low-performing schools may already be working longer hours and those who have been in the system for longer tend to stay because they prefer a more demanding work environment. The demanding hours may also be associated with an *esprit de corps* that the teachers have experienced in such schools and affective attachment to those types of schools and the students and families they serve.

Perhaps surprising in this analysis is the relatively low importance of structural features or even school characteristics. The responses of individuals when asked about preferred school characteristics might be biased by social desirability, but we are less concerned about this threat with this sample and the ACA survey design, especially for those preferences that passed the validity check, such as racial composition of the schools. Teachers who work at high-poverty, high-minority, low-achieving schools might feel pressure to select a preference for those school attributes, but these teachers showed less preference for any of the school attribute levels when

asked to make paired tradeoff comparisons during the ACA survey. The survey design forces teachers to go beyond their initial responses on the desirability of working in certain settings to ascertain a rank order of the relative importance of many factors when selecting a school. It does seem revealing that more experienced teachers are more likely to choose schools with more affluent and higher performing students than less experienced teachers. This is consistent with the pattern of teacher migration out of these types of schools that has been documented by previous research.

Teachers seem to value malleable school factors more highly when deciding on where to work. This finding cautions against reliance on administrative data alone to investigate how school characteristics affect teacher mobility, because administrative data often contain the correlates rather than actual measures of the characteristics that seem to be most important to teachers willing to work in the lowest performing schools. These findings suggest that omitted variable bias (a concern raised in previous studies) is likely to occur and may distort findings when compared to results based on a more fully conceptualized set of measures.

Our results may not generalize to all teachers, including those who do not have experience in the lowest performing schools or teachers choosing their first school who may not be aware of these variations. Also, structural elements such as salaries, tenure and bonuses could be more important than the malleable school characteristics earlier in the teacher labor supply decision, especially when they choose to enter the teaching profession. Future work should examine how structural features and school characteristics influence decisions to entertain and/or accept an offer to teach with a sample of eligible individuals, perhaps among teacher preparation program graduates, since many of them do not enter teaching ("UNC Educator Quality Dashboard Job Placement Rates," n.d.). Our findings suggest that preferences may change with

experience or, alternatively, as a function of selection into higher levels of experience (i.e., for teachers who choose to continue teaching for more years). Exploring this issue further may have serious implications for the retention of more experienced teachers in the lowest performing schools and provide solutions for stabilizing the teaching workforce.

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Table 1. Attributes and levels of the ACA survey.

Attribute	Category	Levels	Reason for Inclusion
Student Race	School Characteristic	-More than 50% white -10% or less white	Borman & Dowling, 2008; Grissom, 2011; Johnson, Kraft, and Papay, 2012; Ladd, 2011; Loeb, Darling-Hammond, & Luczak, 2005
Student Income	School Characteristic	-Most students from low-income families -Most students from middle-income families -Most students from high-income families	Borman and Dowling, 2008; Guarino, Santibañez, and Daley, 2006; Hanushek, Kain, and Rivkin, 2004; Hughes, 2012; Ingersoll, 2001; Ladd, 2011; Lankford, Loeb, and Wyckoff, 2002; Loeb, Darling-Hammond, and Luczak, 2005
Prior Achievement	School Characteristic	-Less than 20% of students scored proficient last year -More than 50% of students scored proficient last year	Borman & Dowling, 2008; Hanushek, Kain, & Rivkin, 2004
Commute	School Characteristic	-15 minutes or less -More than 30 minutes	Engel, Jacob, & Curran, 2013; **Horng, 2009**
Involvement in Establishing School	School Characteristic	-Teachers play a key role in establishing culture and structure -Structure and culture already well-established	(a key characteristic of ASD schools)
Salary	Structural	-$0 additional salary -$4,000 additional salary -$8,000 additional salary	Borman and Dowling, 2008; Clotfelter, Ladd, and Vigdor, 2011; Hanushek, Kain, and Rivkin, 2004; Johnson & Birkeland, 2003; Podgursky, Monroe, and Watson, 2004; Stockard and Lehman 2004; Hendricks, 2014; Loeb, Darling-Hammond, & Luczak, 2005
Tenure	Structural	-No guarantee of future employment -Future employment guaranteed based on performance	Education Deans, Professors, and Scholars, 2015; Rothstein, 2014; Strunk, Barrett, and Lincove, 2017
Performance-Based Pay	Structural	-No performance-based pay -Eligible for bonuses of 1K or less -Eligible for bonuses of 5K or more	Springer, Swain, & Rodriguez, 2016

Attribute	Category	Level	Reason for Inclusion
School Safety	Malleable	-Safety is a minor problem -Safety is a serious problem	**Horng, 2009**
Class Size	Malleable	-Less than 20 students -More than 25 students	**Horng, 2009**; Loeb, Darling-Hammond, & Luczak, 2005
Classroom Autonomy	Malleable	-Use provided materials -Access to materials but flexibility on use -I find or develop own materials	Achinstein et al., 2010; Firestone and Pennell, 1993; Guarino, Santibañez, and Daley, 2006; Ingersoll, 2001; Ingersoll and May, 2012; Johnson, 2006; Weiss, 1999 (a key characteristic of ASD schools)
Administrator Support	Malleable	-Not consistent in supporting faculty -Consistent in supporting faculty	Borman and Dowling, 2008; ; **Horng 2009**; Ingersoll 2001; Johnson & Birkeland, 2003; Johnson, Kraft, and Papay 2012; Kukla-Acevedo 2009; Tickle, Chang, and Kim 2011
Student Discipline Policy	Malleable	-Administrators and teachers do not consistently enforce discipline -Administrators and teachers do consistently enforce discipline	Johnson & Birkeland, 2003
Professional Development (PD)	Malleable	-No opportunities for high quality PD -Opportunities for high quality PD	Johnson & Birkeland, 2003
Time	Malleable	-Culture of teachers doing some work after school and on weekends -Teachers work regularly almost every evening/weekend	Johnson & Birkeland, 2003; Ladd 2011
Teacher Relationships	Malleable	-Teachers are respectful but rarely interact -Community of teachers that support one another	Borman & Dowling, 2008; Johnson & Birkeland, 2003

Note. Citations from Horng, 2009 are in bold because this study uses the same survey design as the current study.

Table 2. Validation tests exploring revealed versus expressed preferences.

	Revealed Preferences Matches Expressed	Revealed Preferences Do Not Match Expressed
School with <10% White students	5 (100.00)	0 (0.00)
School with mostly high income students	1 (50.00)	1 (50.00)
Schools with at least 50% of students scoring proficient to advanced	2 (66.67)	1 (33.33)
$8000 additional salary	2 (22.22)	7 (77.77)
Safety is a minor concern	5 (10.64)	42 (89.36)
Class size is less than 20	47 (95.92)	2 (4.08)
Classroom autonomy is flexible	1 (25.00)	3 (75.00)
Administrator support is consistent	7 (41.18)	10 (58.82)
Discipline policy is consistently enforced	16 (94.12)	1 (5.88)
Opportunities for high-quality PD	14 (100.00)	0 (0.00)
Teachers are supportive of each other	6 (50.00)	6 (50.00)

Note. Sample for each row represents the teachers who responded to the survey and changed schools after that school year whose personal share of preference for that attribute level is above 90 percent according to market sensitivity tests. Row percentage is listed under each count.

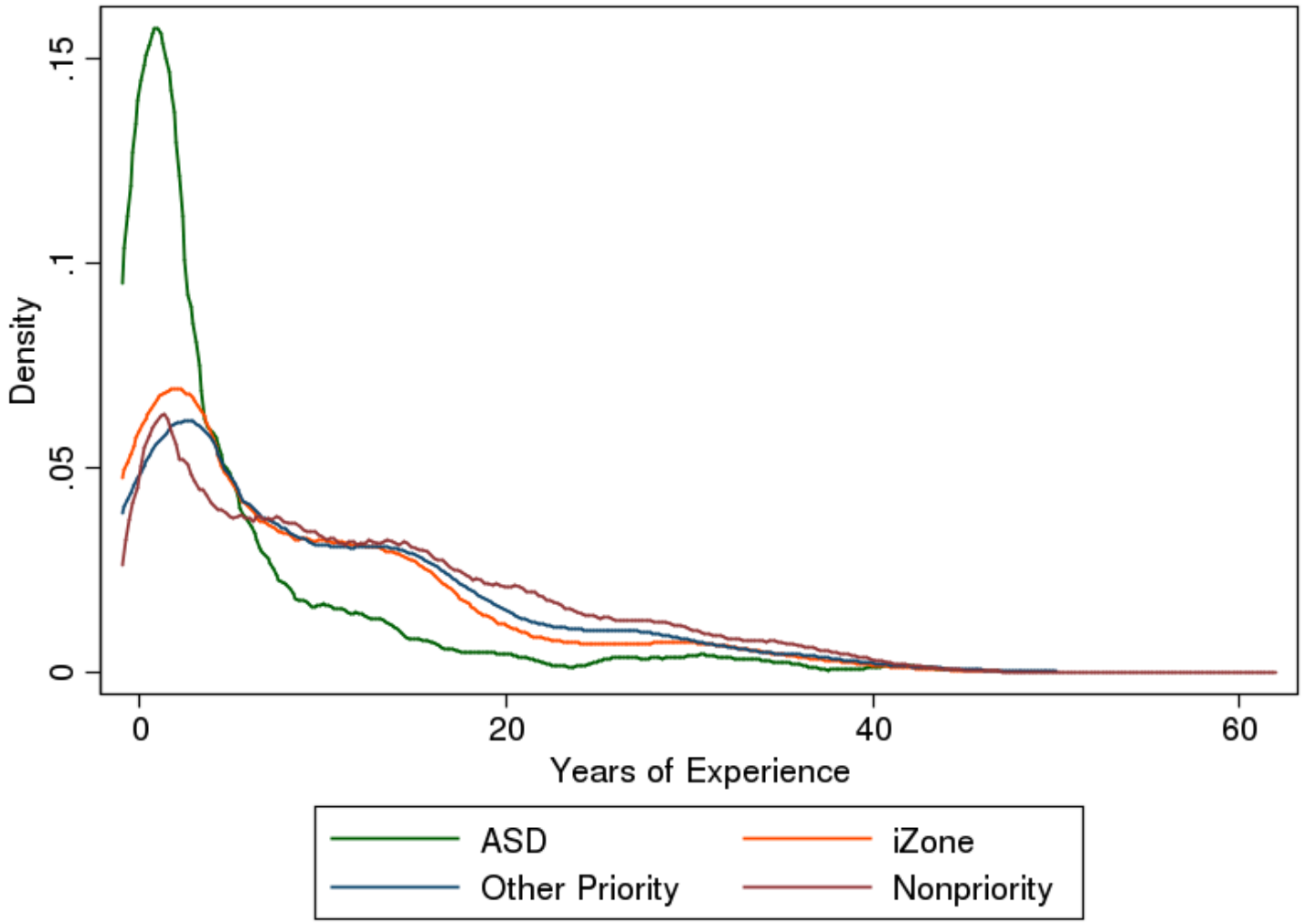

Figure 1. Years of experience kernel density plot by school type for 2014-15 school year.

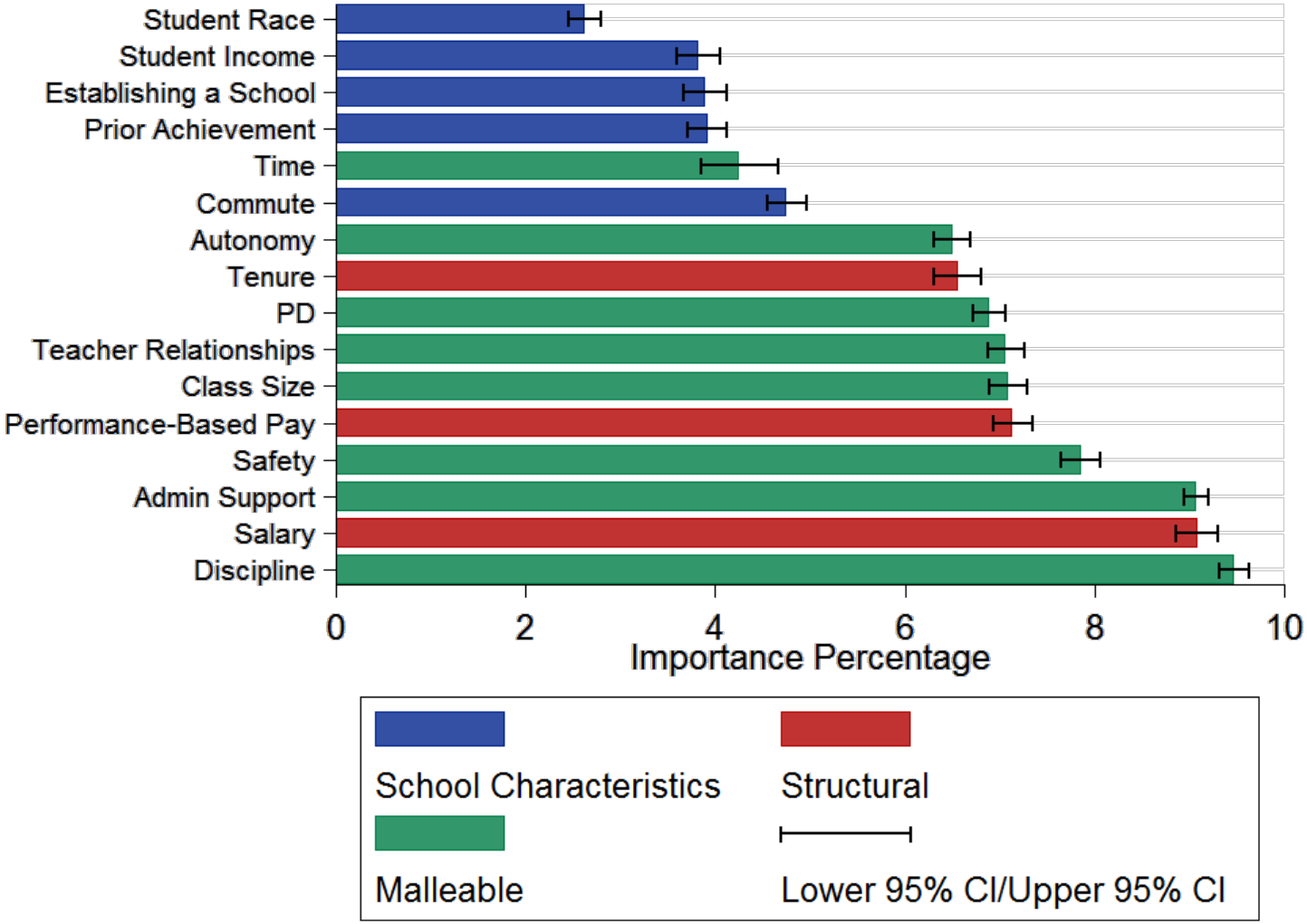

Figure 2. Attribute importance levels. All estimates calculated using probability weights to account for the random selection of the non 14-15 ASD teachers into the sample.

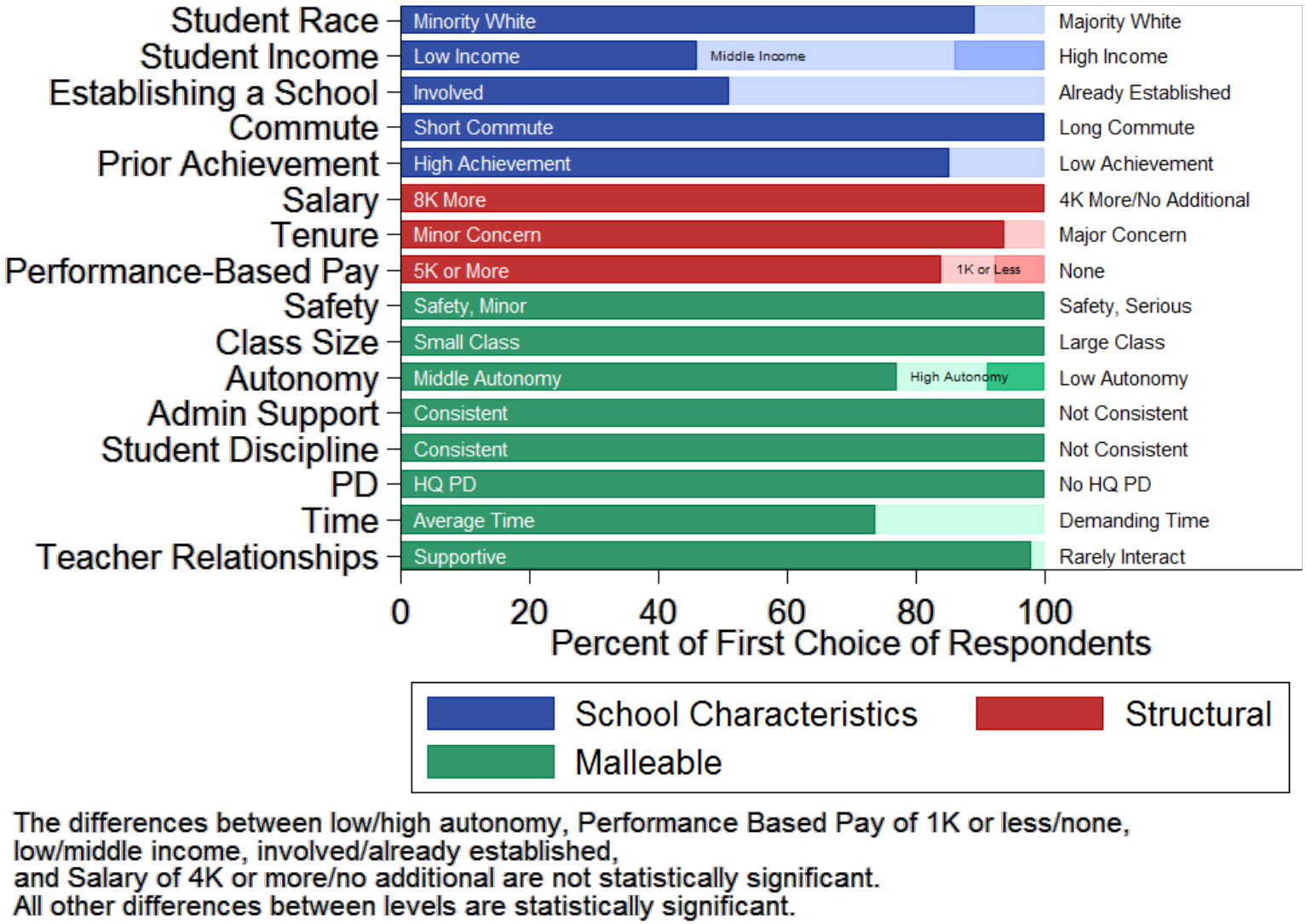

Figure 3. Results from market simulation sensitivity tests for each attribute holding the other 15 attributes constant.

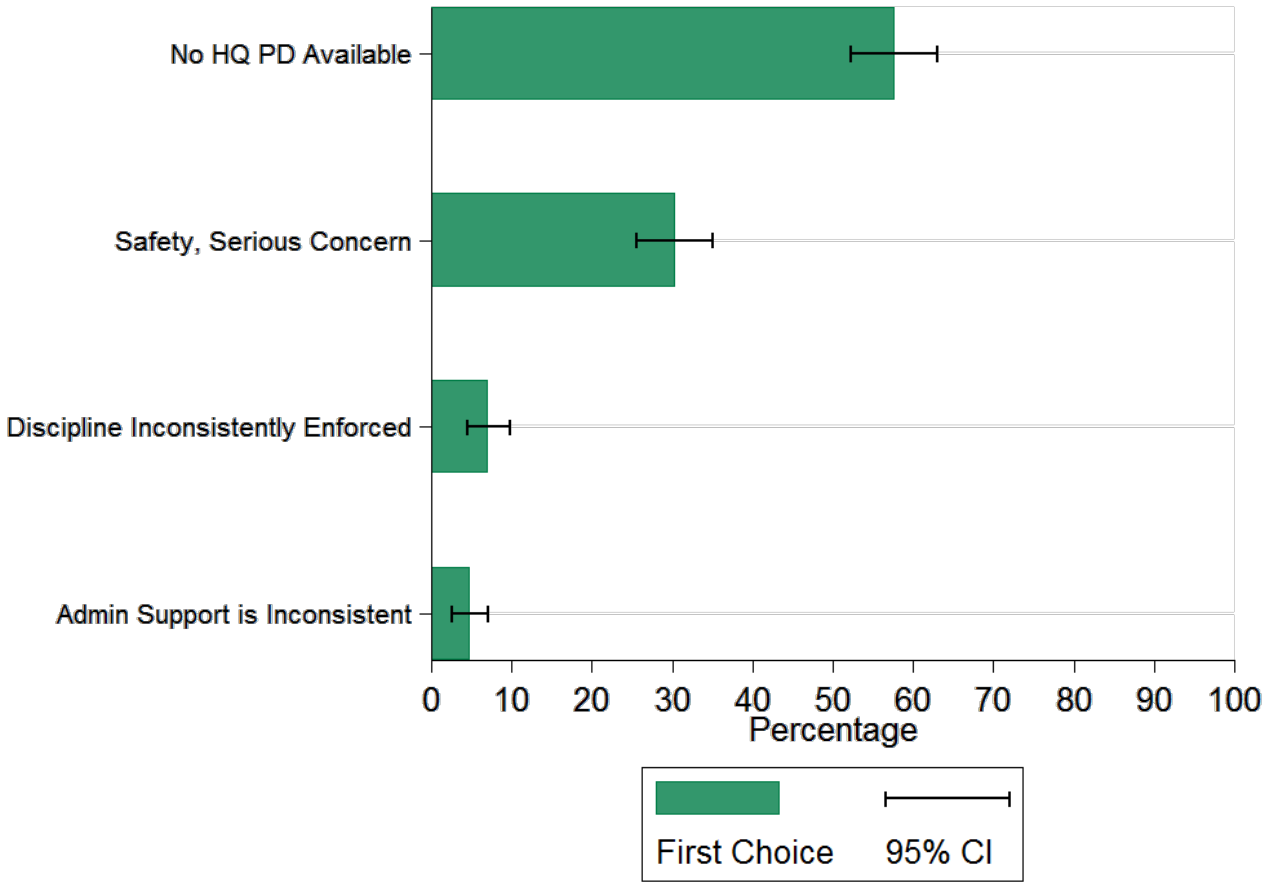

Figure 4. Market simulation based on ASD school performance review profiles.