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https://doi.org/10.15760/etd.8057

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Does Instructional Autonomy Matter?

Exploring Job Satisfaction for Math and Non-Math Teachers

in Low, Middle, and High SES Schools

by

Hannah Sean Ellefritz

A thesis submitted in partial fulfillment of the
requirements for the degree of

Master of Science
in
Sociology

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Portland State University
2022

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Abstract

Throughout the 2000s, standards-based education policies decreased the autonomy of public schools across the U.S., deprofessionalizing educators and limiting their participation in the development of curriculum and instructional policy. Many education scholars argue that, rather than professionals with specialized skills and knowledge, standards-based reforms position teachers as technicians, accountable for measurable output in accordance with externally imposed standards. This literature suggests that such education policies may have implications for teachers' job satisfaction, especially those working in schools or subject fields that are particularly susceptible to standardized curriculum and accountability procedures. Using nationally representative data from the Teaching and Learning International Survey (TALIS 2018), this thesis explores how working in a nonautonomous public school relates to 7th, 8th, and 9th grade teachers' job satisfaction, analyzing differences across math and non-math teachers in schools with distinct socioeconomic compositions. Regression analyses of 634 math teachers and 1,519 non-math teachers from 146 public schools indicate that math teachers in nonautonomous mid- and high-SES schools have significantly lower job satisfaction on average than their counterparts in autonomous schools. For math teachers in low SES schools, however, working in nonautonomous environments relates to significantly higher job satisfaction, indicating a protective interaction effect of working in schools that are both nonautonomous and low SES. No significant relationships were found for non-math teachers, supporting previous literature suggesting that deprofessionalization

processes associated with instructional standardization may be particularly salient for math educators.

Acknowledgements

Portland State University is located in Portland, Oregon, the unceded land of the Multnomah, Kathlamet, Clackamas, Tumwater, Molalla, Tualatin Kalapuya, Watlala bands of the Chinook, and other Indigenous nations of the Colombia River. Completing my master's thesis at Portland State University was possible through the sacrifices forced upon these nations. I honor with gratitude the Indigenous peoples on whose traditional and ancestral homelands I have lived, worked, and attended school throughout the duration of this research. I also extend my deep gratitude to my parents for their endless support and my friends for keeping me strong. This project has also greatly benefitted from the feedback and support of my colleagues in the Career Analysts group and the rest of my peers in Sociology Department at Portland State. Finally, I want to acknowledge my esteemed committee for their patience and trust in my process. I have immense respect and gratitude for you all.

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Chapter 1: Introduction

Teacher job satisfaction is a fundamental component of high-quality public education. Not only do satisfied teachers report better emotional and physical health than less satisfied teachers, but a satisfied teaching force facilitates smoother operations of school processes, extending benefits to schools and students as well (Benevene 2018; Ostroff 1992; Ostroff and Schmitt 1993; Skaalvik and Skaalvik 2011; Toropova, Myrberg, and Johansson 2021). The job satisfaction of teachers in the U.S. may be threatened, though, by recent shifts in federal educational policy. In an effort to advance the United States' global competitiveness, the federal government implemented multiple standards-based education policies throughout the 2000s, such as *No Child Left Behind (2001)*, *Race to the Top (2009)*, and the *Common Core State Standards (2010)*. These federal reforms established accountability procedures for public schools using standardized test scores as the primary indicator of school quality (Apple 2006; Eisenhart and Allen 2016; Hursh 2008; Oliva and Martinez 2022; Ravitch 2010). To avoid sanctions associated with low student test performance, districts and schools, particularly those serving high proportions of socioeconomically disadvantaged students, have responded to these policies by implementing narrow, top-down curriculum designs that focus primarily on the content students will encounter on standardized tests (Crocco and Costigan 2008; Nichols and Berliner 2007; Sondel 2015). Rather than professional employees with specialized skills and knowledge, many scholars argue that standards-based reforms deprofessionalize educators, successively "reprofessionalizing" them as technicians responsible for producing standardized, measurable output according to

externally imposed standards (Apple 2006; Ball 2003; Ball et al. 2010; Connell 2009; Nichols and Berliner 2007; Sondel 2015). The literature suggests that deprofessionalization compromises teachers' job satisfaction such that teachers working in schools and subject fields most affected by standards-based policies may be particularly susceptible to lower job satisfaction.

While many scholars do, indeed, acknowledge the utility of standardized tests in identifying systemic educational inequities, some research suggests that relying on standardized test scores to inform accountability processes may be particularly pernicious for educators in low SES schools (Ingersoll, Merrill, Stuckey, and Collins 2018; Oliva and Martinez 2021). A wealth of education literature explores the intersecting social, racial, economic, and structural factors that contribute to systematically lower academic achievement in low SES schools. Education scholars thus argue that standards-based policies hold teachers in low SES schools accountable for ameliorating disparate achievement outcomes that operate largely outside of teachers' own control (Farkas et al. 2002; Lareau 1987; Orfield, Frankenberg, Ee, and Kuscera 2014; Shifrer 2020).

Ultimately, the standards-based reforms of the 2000s were met with widespread pushback from schools and teachers, motivating the Obama administration to pass the *Every Student Succeeds Act (ESSA)* in 2015 (Oliva and Martinez 2022). While federal law still requires accountability policies in public schools, *ESSA (2015)* returned some autonomy to states and school districts by allowing them to include non-test score measures in their evaluations of school and teacher quality (Public Law No. 114-95, 2015). Although states vary in their timelines for implementing their revised plans, most

states' *ESSA* plans were approved and/or fully implemented in schools by the end of the 2017-2018 school year (McGrath, Young, and Webb 2018). Thus, it is an ideal point in time to investigate how potentially newfound school autonomy may relate to teachers' job satisfaction, particularly across public schools serving distinct socioeconomic compositions.

For this study, I analyze nationally representative survey data from the third round of the Teaching and Learning International Survey (TALIS 2018), which surveyed 2,560 7th, 8th, and 9th grade teachers in schools across the U.S. I use this data to investigate the following questions: 1) *How does teaching in nonautonomous public schools relate to 7th, 8th, and 9th grade teachers' job satisfaction, after accounting for related differences in the characteristics of teachers and schools?* 2) *Is this relationship moderated (i.e., differentiated) by schools' proportion of socioeconomically disadvantaged students?* 3) *Are these relationships distinct for math and non-math teachers?* This study contributes a sociological focus on the experiences and social psyches of teachers, topics that noted sociologist of education Barbara Schneider (2011) describes as understudied. This study also offers important policy implications by focusing on how these broad federal policies impact the engine of our education system: teachers.

Chapter 2: Literature Review

Education researchers have long appreciated the importance of teachers' job satisfaction for teachers' own well-being, as well as for the successful functioning of education as a social institution. Compared to teachers with low job satisfaction, teachers who are satisfied with their jobs report greater psychosocial and physical health benefits such as higher self-esteem, a greater sense of personal wellbeing and happiness, and fewer barriers associated with social, emotional, and physical health concerns (Benevene, Ittan, and Cortini 2018). Teachers with higher job satisfaction tend to regard their work environments more positively too, reporting favorable perceptions of school climate and cooperative relationships with colleagues (Benevene et al. 2018; Miller & Monge 1986; Ostroff 1992; Spector 1997). Satisfied teachers are less vulnerable to work stress and burnout, contributing to lower rates of teacher strikes and turnover (Cha and Cohen-Vogel 2011; Skaalvik and Skaalvik 2011; Toropova, Myrberg, and Johansson 2021). Compared to teachers with low job satisfaction, satisfied teachers also demonstrate greater commitment to their roles as educators, facilitating fluid school operations and the academic growth of their students (Dreeben 1970; Ostroff 1992; Ostroff & Schmitt 1993). Teachers with higher job satisfaction tend to employ higher-quality pedagogy and establish more rigorous learning environments, fostering deeper learning, higher student satisfaction, and lower dropout rates (Ostroff 1992; Toropova et al. 2021).

Some research indicates that teachers' job satisfaction may depend on the degree to which they experience autonomy related to instructional decision-making (Ingersoll 2007; Rigsby and DeMulder 2003; Skaalvik and Skaalvik 2011; Wright, Shields, Black,

Banerjee and Waxman 2018). In general, teachers in autonomous schools exercise greater control over their job duties and have more flexibility in curricular decisions, allowing them greater freedom than teachers in nonautonomous schools to tailor instruction to specific classroom needs (Ingersoll and Collins 2017; Miller and Monge 1986; Seddon 1997). Along with the practical benefits afforded by school autonomy, sociological research has explored autonomy as a key component of professionalism in one's work. Autonomy in one's job confers the symbolic capital of greater social status, eliciting greater deference and respect from others both inside and outside the work environment (Ball 2003; Connell 2009; Seddon 2006). Overall, because these professional, social, and practical advantages contribute to higher levels of job satisfaction for teachers in autonomous schooling environments (Ingersoll 2007; Toropova et al. 2021), I expect that 7th, 8th, and 9th grade teachers in nonautonomous public schools will have lower levels of job satisfaction than teachers in schools with mixed or full autonomy.

The literature on teacher job satisfaction also explores how instructors in different subject fields may experience distinct stressors that contribute to systematically different levels of job satisfaction. For example, some research indicates that math teachers may face disproportionate pressure associated with standardization and accountability policies and, thus, may be particularly dissatisfied in low autonomy teaching environments (Ingersoll and May 2012). Math teachers in may also encounter difficulties motivating students to succeed according to standards-based measures, as many students in the U.S. perceive math to be a skill requiring innate ability versus an engaging subject that can be learned through practice and hard work (Dweck 2007; Epstein, Mendick, and Moreau

2010; Ladson-Billings 1997; Mendick 2005; Rattan, Good, and Dweck 2012). Because adolescents in the U.S. generally perceive math as boring, inaccessible, and irrelevant, math teachers may experience particular difficulty motivating students to engage with standardized curriculum and succeed according to government standards. This literature suggests patterns related to job satisfaction and school autonomy may be distinct for math teachers relative to non-math teachers.

Though standards-based reforms have impacted public schools across the U.S., some research indicates that accountability pressures associated with low school autonomy may be particularly detrimental for teachers in low SES schools (i.e., schools serving high proportions of socioeconomically disadvantaged students). In general, teachers in low SES schools encounter higher workloads, higher student-teacher ratios, lower salaries, and lower job satisfaction, ultimately contributing to higher rates of teacher attrition and turnover in low SES schools (Allensworth et al. 2009; Cha and Cohen-Vogel 2002; Ingersoll and Collins 2017; Oliva and Martinez 2021). Furthermore, a wealth of literature has explored how various external factors (e.g., neighborhood poverty, racial marginalization, unstable housing, peer culture, family background, etc.) contribute to systematically lower test performance in schools serving high proportions of low SES students, such that low SES schools are disproportionately labeled as “failing” or “in need of improvement” according to federal policy standards (Gamoran and Long 2006; Hill 2016; Farkas et al. 2002; Lareau 1987; Noguera 2003; Rothstein 2004). Therefore, many scholars argue that standards-based policies may unfairly hold teachers, particularly those in low SES schools, accountable for ameliorating educational

disadvantages stemming from social, political, and economic factors operating largely outside of teachers' immediate control (Crocco and Costigan 2007; Ingersoll et al. 2018; Nichols & Berliner 2007; Oliva and Martinez 2021; Shifrer 2020). For these reasons, I hypothesize the negative relationship between teaching in a nonautonomous school and job satisfaction will be larger for teachers in lower SES schools than for teachers in higher SES schools.

Existing literature explores additional factors operating at the teacher- and school-level that may be confounded in the relationship between school autonomy and teachers' job satisfaction. Autonomous schools might attract and employ teachers with systematically higher qualifications and expertise, which are teacher qualities that also relate to teachers' job satisfaction (Crocco and Costigan 2007; Ingersoll and May 2012; Wright et al. 2018). Because nonautonomous schools may be less appealing work environments for highly qualified and experienced teachers, nonautonomous schools may face teacher shortages and may be particularly likely to hire less-qualified, short-term teachers to ameliorate staffing issues (Allensworth et al. 2009; Henry, Fortner, and Bastian 2012; Oliva and Martinez 2021). Additional research on U.S. public education suggests that nonautonomous public schools may suffer from a lack of material resources and higher student-teacher ratios more than schools with mixed or full autonomy do, such that relationships between teaching in nonautonomous schools and teachers' job satisfaction could actually reflect these school-level influences (Oliva and Martinez 2021). Thus, to reduce bias in estimates of how teaching in nonautonomous public schools relates to teachers' job satisfaction, I control on these factors.

Chapter 3: Data and Methods

For this study, I use data from the third cycle of the Teaching and Learning International Survey (TALIS), sponsored by the Organization for Economic Cooperation and Development (OECD) and administered by National Center for Education Statistics (NCES) in 2018. TALIS gathers policy-relevant data from nationally representative samples of educators around the world, collecting teachers' input on topics such as school climate, professional development, diversity practices, pedagogy, and job satisfaction. TALIS also collects school-level data through principal questionnaires, which contain demographic and contextual information about schools in the sample. So far, TALIS has been administered with different cohorts in 2008, 2013, and 2018, with plans to conduct a fourth cycle of data collection in 2024. The survey's primary target population is lower-secondary educators and principals, corresponding with grades 7, 8, and 9 in the U.S.

To analyze how working in nonautonomous public schools relates to teachers' job satisfaction, I use the U.S. TALIS (2018) data which includes 2,560 teachers from 176 schools. Because my study investigates government involvement in school policy decisions, I focus my analyses specifically on public school teachers and exclude private school teachers from my sample. The final analytic sample for this study consists of 2,321 teachers from 146 U.S. public schools, 634 of whom taught math in the 2017-2018 school year and 1,519 of whom taught only non-math subjects that year. I address missing values on independent variables with multiple imputation by the MICE system of chained equations (White, Royston, and Wood 2011), including the dependent variable

for imputation as recommended (von Hippel 2007). Tables 1.1, 1.2, and 1.3 provide descriptive statistics on all variables used in analyses.

Teacher Job Satisfaction

To measure teacher job satisfaction, I use a scale that averages eight survey items about teachers' satisfaction regarding their own work experiences and their satisfaction regarding teaching as a profession more broadly (see Appendix A for all survey items used to construct this scale). The final scale reliability coefficient for all eight items is 0.78 for public school math teachers and 0.77 for public school non-math teachers.

Nonautonomous Public Schools

TALIS 2018 includes indices of school autonomy developed through items from the principal questionnaire about stakeholder responsibility, which measures the degree of responsibility teachers, principals, other members of school management, and external bodies have in schools' decision-making processes related to instruction. The final TALIS autonomy measure includes three categories: [1] full autonomy (i.e., the government does not play significant role in school decisions), [2] mixed autonomy (i.e., the school and government share responsibility in decision-making), and [3] no autonomy (i.e., nobody from the school has significant responsibility in decision making, and policies are left up to the government). See Appendix B for more details on the survey items and method TALIS used to construct the three-category measure. Because my research investigates teachers' experiences in nonautonomous schools, I recode the three-category measure of school autonomy for instructional policies into a dichotomous measure reflecting no school autonomy.

School SES

I measure schools' SES using a categorical variable that identifies the proportion of students at each school who come from socioeconomically disadvantaged homes, which TALIS refers to as those students whose homes lack "the basic necessities or advantages of life, such as adequate housing, nutrition or medical care." These five categories include [1] None, [2] 1-10% of students disadvantaged, [3] 11-30% of students disadvantaged, [4] 31-60% of students disadvantaged, and [5] Over 60% of students disadvantaged. I combine the first and second categories to avoid small cell sizes. Exploratory analyses suggested that results were similar across categories 3 and 4, so I ultimately recode this five-category variable to reflect three distinct socioeconomic composites: [1] *High-SES schools* (1-10% of students disadvantaged), [2] *Mid-SES schools* (11-60% of students disadvantaged), and [3] *Low-SES schools* (over 60% of students disadvantaged).

Controls

To achieve less biased estimates of how working at nonautonomous schools relates to teachers' job satisfaction, I include controls for potential confounders at both the teacher-level and school-level. First, I recode a five-category variable measuring teachers' highest level of formal education into a dichotomous measure indicating whether teachers have a master's- or doctoral-level education. I also include two dichotomous measures indicating whether teachers received formal training to teach math (some non-math teachers receive this training too) and whether they received formal

training to teach in mixed-ability settings. Finally, I include a continuous measure of total years of experience in teaching.

For school-level controls, I first include a dichotomous measure of whether the school administrator reports that the school's lack of material resources impairs instructional quality. I construct this measure from a three-category index variable. This index includes four items from the school administrator survey measuring the degree to which the school's capacity to provide quality instruction is hindered by a shortage or lack of resources (see Appendix C for more details on the survey items TALIS used to construct the three-category index). The three categories indicate whether administrators report that the school's lack of resources is [1] *Not a problem*, [2] *A bit of a problem*, and [3] *A problem* in terms of instructional quality. To prevent small cell-sizes, I collapse two categories to construct a dichotomous indicator that the administrator perceives the lack of material resources as either "A bit of a problem" or "A problem." I also include a continuous measure of student-teacher ratio.

Analytic Strategy

Because the previous literature and exploratory analyses suggested distinct patterns, I estimate separate models for math teachers and non-math teachers. In the first models, I estimate a linear regression model predicting teachers' job satisfaction using just the measure of whether the school is nonautonomous. In the second regression models, I include the variable for school SES to establish the main independent effect of school SES before adding interaction effects in subsequent models. In Model 3, I investigate whether school SES moderates how working in a nonautonomous school

autonomy relates to teachers' job satisfaction by including interaction terms between these variables. In the fourth model, I include control variables. To facilitate interpretation of the statistical interactions, I post-estimate predicted means, which I present graphically. In all analyses, I apply the teacher weight included in TALIS (2018). In regression analyses, I adjust standard errors to account for the clustering of teachers within schools.

Chapter 4: Results

Descriptive Statistics

Tables 1.1 and 1.2 provide descriptive statistics for math teachers and non-math teachers. Because these math and non-math teachers work at the same 146 public schools, I provide non-stratified descriptive statistics on the schools in Table 1.3. First, math and non-math teachers report similar levels of mean job satisfaction (11.93 and 11.92, respectively). Similar proportions of math and non-math teachers in the U.S. achieve a master's level education (0.63 and 0.62, respectively) and complete formal training in mixed ability settings (0.81 and 0.84, respectively). As expected, math teachers have a higher average rate of formal training in math teaching, with 82% of math teachers having received training for math instruction compared to only 51% of non-math teachers. On average, non-math teachers have slightly more teaching experience, with a mean of 14.28 years compared to math teachers' mean of 12.95 years.

Table 1.3 provides descriptive statistics for all 146 U.S. public schools in the sample. Of these, 0.12 are nonautonomous schools, and 0.88 have mixed or full autonomy. A small minority of schools in the sample (0.09) are high SES (1-10% low SES), and the majority (0.59) are mid SES (11-60% low SES). About one-third (0.32) of these schools are low SES (Over 60% low SES). Of the principals surveyed in these 146 schools, 0.29 reported that their schools' instructional quality is inhibited by a lack of material resources. On average, the public schools in this sample enrolled 16.30 students for every teacher in the 2017-2018 school year.

Regression Analyses

Tables 2.1 and 2.2 display coefficients from linear regression models predicting the job satisfaction of math teachers and non-math teachers respectively. Models M1 and NM1 show negative yet insignificant baseline relationships between working in a nonautonomous school and job satisfaction for both math and non-math teachers. With the measure of school SES added (Models M2 and NM2), the relationships between lacking school autonomy and teacher job satisfaction remain insignificant for both math and non-math teachers. However, controlling on school autonomy, math teachers' mean job satisfaction is significantly lower at low SES schools. Compared to math teachers at high SES schools (0-10% low SES students), math teachers at mid SES schools (11-60% low SES students) have 1.10 lower job satisfaction on average ($p<0.01$). The same pattern appears for low SES schools. Compared to math teachers at high SES schools, math teachers at low SES schools (Over 60% low SES) have 1.10 lower job satisfaction on average ($p<0.01$). The relationship between school SES and teacher job satisfaction is not significant for non-math teachers, controlling on school autonomy (Model NM2).

To determine whether school SES moderates how school autonomy relates to teachers' job satisfaction, Models M3 and NM3 in Tables 2.1 and 2.2 include interaction effects between these variables. Results suggest that the estimated effect of working at a nonautonomous school is significantly different for math teachers in lower SES schools relative to math teachers in higher SES schools. Mean job satisfaction for math teachers in high SES schools lacking autonomy is -0.93 (Table 2.1, Model M3). In contrast, mean job satisfaction for math teachers in low SES schools that are nonautonomous is -0.78 [-

0.93 + (-1.23) + (1.38)]. In other words, despite negative main effects of working in a nonautonomous school (-0.93) and in a low SES school (-1.23), teachers' job satisfaction is improved by the combined effect of working in a low SES school lacking autonomy, simultaneously (1.38). Differences in school SES, in contrast, do not appear to moderate the relationship between working at a nonautonomous school and job satisfaction for non-math teachers, with none of the interaction coefficients statistically significant (Table 2.2, Model NM3).

Models M4 and NM4 include control variables to account for potential confounders in these baseline relationships. With controls, results for math teachers remain nearly identical (Model M4). Although the size of coefficients, particularly those related to school SES, is reduced for non-math teachers with the introduction of control variables, working in a nonautonomous school, school SES, and their interaction remain statistically insignificant in relation to non-math teacher's job satisfaction (Model NM4).

Graphical Representations of Predicted Mean Job Satisfaction

Figure 1.1 shows how school autonomy relates to teachers' job satisfaction for math teachers in low, middle, and high SES schools. I post-estimated these predicted means from Model M4 in Table 2.1. Of the math teachers working at high SES public schools, those working in nonautonomous schools have significantly lower job satisfaction than those working in autonomous schools, with a predicted mean job satisfaction of 12.07 compared to 13.02. A similar relationship appears for math teachers in mid-SES schools; those working in nonautonomous mid SES schools have significantly lower predicted mean job satisfaction (11.39) compared to math teachers

working in autonomous mid SES schools (11.94) which, again, reflects a significant negative relationship between working in nonautonomous schools and math teachers' job satisfaction. In low SES schools, however, this relationship is actually reversed, demonstrated by the significant positive interaction coefficient in Model M4 (1.36, $p<0.05$). Unlike math teachers in nonautonomous high and mid SES schools, those working in nonautonomous low SES schools actually have a higher predicted mean job satisfaction than math teachers in autonomous low SES schools (with predicted means of 12.29 and 11.89 respectively). Overall, Figure 1.1 provides a graphical representation of the significant negative relationship between working in nonautonomous schools and job satisfaction for math teachers in mid and high SES schools, as well as the protective effect of working in nonautonomous schools for math teachers in low SES schools.

Chapter 5: Discussion

ESSA (2015) granted greater autonomy to states and school districts, a decision motivated by part in response to teachers' ostensibly reduced job satisfaction after previous legislation reduced school autonomy. I use nationally representative data from TALIS (2018) on 7th, 8th, and 9th grade public school teachers in the U.S. to investigate how school autonomy relates to teachers' job satisfaction, and whether school SES moderates that relationship. Results indicate that math teachers in high and mid SES schools appear to report significantly higher levels of job satisfaction if their school is autonomous rather than nonautonomous. Counter to the predictions of the previous literature, math teachers in low SES schools report higher levels of job satisfaction if their school is nonautonomous rather than autonomous. Results also suggest that school autonomy does not significantly differentiate non-math teachers' job satisfaction, regardless of their school SES. These findings nuance understandings of how federal policies related to school autonomy may relate to teachers' job satisfaction.

The findings that math teachers in high and mid SES public schools report higher levels of job satisfaction if they work in autonomous rather than nonautonomous schools supports the existing literature. Specifically, this trend reflects the literature suggesting that the politicized nature of standards-based reforms and its associated limitations on public school autonomy may compromise teachers' job satisfaction, specifically that of math teachers (Ingersoll 2007; Ingersoll and May 2012; Ingersoll et al. 2018; Ostroff 1992). This may be in part because high-stakes teacher appraisals, accountability procedures, and compromised autonomy associated with standards-based reforms

contribute to the deprofessionaliation of teachers in nonautonomous high and mid SES schools, compromising how satisfied they feel with their jobs (Apple 2010; Ball 2003; Ball et al. 2010; Connell 2009; Connell 2013; Seddon 1997). These results also support the literature suggesting that, compared to teachers of non-math subjects, public school math teachers may face disproportionate stressors associated with standards-based reforms, and math teachers may be particularly susceptible to deprofessionalization processes relating to the lack of autonomy (Eisenhart and Allen 2016; Nichols and Berliner 2007).

Contrary to predictions in the previous literature, for math teachers in nonautonomous public schools, teaching in schools with higher proportions of low SES students actually provides somewhat of a protective effect for math teachers' job satisfaction. While the findings of this research still suggest a net negative relationship between working in nonautonomous public schools and math teachers' job satisfaction, math teachers in nonautonomous, low SES schools may experience a slight protective cushion from external decision making. This may ultimately protect math teachers in these environments from more substantial decreases in job satisfaction that could be associated with deprofessionalization, a process that may be more negative or salient for math teachers in mid and high SES schools. One possible explanation is that math teachers in nonautonomous, low SES schools may feel relieved of responsibility for high-stakes decision making when working with "high-risk" low-SES youth. Instead of experiencing low autonomy as an impediment to curricular flexibility and lower professionalism, math teachers in these environments may feel more satisfied with less

autonomy because they are responsible for fewer decisions, potentially feeling less culpable if students receive low test scores. This may be associated with a protective benefit for teachers' self-efficacy in low SES schools, which has a demonstrated relationship with teachers' job satisfaction (Zee and Koomen 2016; Ostroff 1992; Toropova et al. 2021). It is important to note, however, that a protective effect provided by external decision making does not necessitate governmental control over school policies. Arguably, this same protective effect could be achieved by external sources with a more intimate, nuanced understanding of schools' specific needs, such as external teacher organizations, community groups, students' families, and experts on transformative pedagogy. Finally, a growing body of literature suggests that classrooms working with marginalized groups of students, such as those in low SES schools, may

Limitations

Certain limitations warrant mention. First, while nationally representative teacher data provides strong empirical support for macro-level analyses, large-scale education research inherently oversimplifies the complicated and layered internal processes occurring daily in public schools across the nation. This research does not provide insight into the nuanced interactions that shape schools' policy decisions, nor does it account for the ways in which teachers' individual backgrounds, personalities, and experiences contribute to their job satisfaction. In addition, to protect the identification of specific public schools in the sample, TALIS includes limited information associated with students' racial and ethnic backgrounds. Therefore, despite the well-researched relationship between schools' racial composition and teachers' experiences in the

classroom, this data does not facilitate consideration of the racial composition of teachers' schools or classrooms. Thus, this dataset precludes analysis across racial subgroups, an unfortunate limitation considering the well-researched importance of race in longstanding educational inequities.

Furthermore, the dichotomous variable for nonautonomous public schools indicates that only external bodies, and no representatives affiliated with individual schools, have significant responsibility for school policy decisions. According to this measure, schools may be considered autonomous if any representative from the school, including teachers, principals, other members of school management, or the school governing board have significant responsibility in these decision making processes. Thus, it is possible that the public schools considered autonomous in this sample still limit or prevent teachers' participation in school policy decisions. While one may argue that, in such a case, teachers do not benefit from greater autonomy, research indicates that principals and school administrators are still better equipped to tailor school policy decisions to school-specific needs, compared to the efficacy of standardized policies in doing so (Heffernan 2018).

It is also important to note that the findings of this study do not negate the importance of federal oversight and school accountability efforts in tracking systematic educational inequities across states, regions, and school districts. By identifying districts and schools with disproportionately low academic performance, government bodies do, indeed, help locate certain areas where public schools may need extra assistance or support from external sources. In this way, government involvement in public education

provides an important element of protection against school- and district-level factors that may contribute to inequitable educational outcomes. However, it is also imperative to incorporate input and feedback from multiple stakeholders when it comes time to actually make and implement school policy decisions. Efforts to improve educational outcomes and instructional quality in low achieving schools will ultimately require collaboration between multiple stakeholders, including teachers and other school representatives who are familiar with the dynamics within their specific schools (Keddie 2015).

Conclusion

Overall, this study supports existing literature suggesting that the politicized nature of standards-based education policy and associated limitations on school autonomy continue to compromise teachers' job satisfaction in the U.S (Ingersoll and Collins 2017; Dreeben 1970). For math teachers in mid and high SES schools specifically, the results of this research align with extant literature suggesting that math teachers in nonautonomous schools may suffer from lower morale, lower self-related efficacy, and less satisfaction with their specific job positions, as well as lower satisfaction with the teaching profession more broadly (Ball 2003; Connell 2009; Nichols & Berliner 2007; Seddon 1997; Ostroff 1992; Ostroff and Schmitt 1993). Math teachers in these schools may potentially experience greater satisfaction with their jobs if provided meaningful opportunities to participate in their schools' decision-making processes. However, in mid and high SES schools where government bodies retain firm control over instructional policy, such opportunities for teachers' collaboration amongst stakeholders may be improbable or may occur on a superficial level. In such cases, math teachers at

these schools may at least benefit from a more overt or demonstrated effort on the part of external bodies to incorporate the input of U.S. math teachers in general when creating educational standards.

Because the COVID-19 pandemic has disrupted the implementation of states' *ESSA* (2015) plans, education scholars, policymakers, school stakeholders, and external bodies are presented with the opportunity to reevaluate educational priorities and reconsider widespread accountability practices associated with standards-based reforms. In doing so, external bodies may consider increasing opportunities for teachers, particularly math teachers, to meaningfully participate in decision-making. Now, more than ever, is an appropriate time to invest in the development of education policy that will ameliorate educational disparities amongst students of different SES backgrounds without compromising teachers' morale and job satisfaction.

Table 1.1: Descriptive Statistics of Math Teachers at U.S. Public Schools			
	Mean/Proportion	(SD)	Range
Job satisfaction	11.93	(2.41)	[3.34, 15.18]
Graduate-level education	0.63		[0,1]
Trained to teach math	0.82		[0,1]
Trained in mixed-ability settings	0.81		[0,1]
Teaching experience (years)	12.94	(8.91)	[0, 48]
Math teachers (n)		634	

Table 1.2: Descriptive Statistics of Non-Math Teachers at U.S. Public Schools			
	Mean/Proportion	(SD)	Range
Job satisfaction	11.92	(2.39)	[3.34, 15.19]
Graduate-level education	0.62		[0,1]
Trained to teach math	0.51		[0,1]
Trained in mixed-ability settings	0.84		[0,1]
Teaching experience (years)	14.28	(9.38)	[0, 47]
Non-math teachers (n)		1,519	

Table 1.3: Descriptive Statistics of U.S. Public Schools			
	Mean/Proportion	(SD)	Range
Nonautonomous school	0.12		[0,1]
School SES			
High SES (1-10% low SES students)	0.09		[0,1]
Mid SES (11-60% low SES students)	0.59		[0,1]
Low SES (Over 60% low SES students)	0.32		[0,1]
Lack of school resources compromises instruction	0.29		[0,1]
School student-teacher ratio	16.30	(4.68)	[6.37, 33.89]
U.S. public schools (n)		146	

Table 2.1: Coefficients from Linear Regression Models Predicting Job Satisfaction for 7th, 8th, and 9th Grade Math Teachers

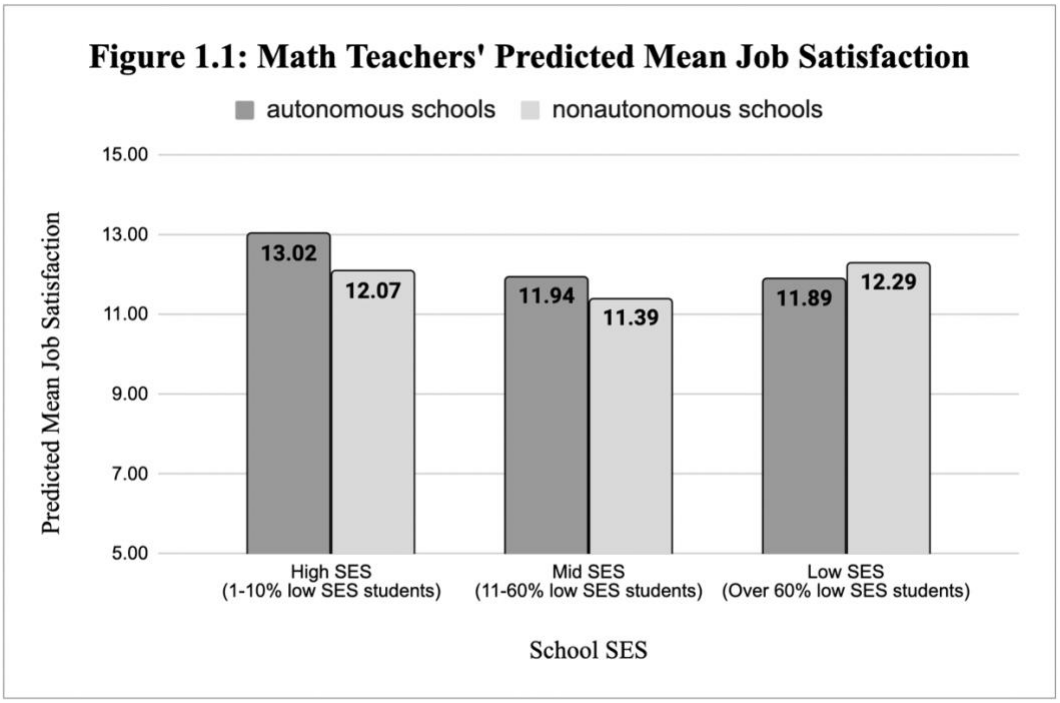
	Model M1		Model M2		Model M3		Model M4	
	B	(SE)	B	(SE)	B	(SE)	B	(SE)
Nonautonomous school	-0.06	(0.31)	-0.03	(0.32)	-0.93 **	(0.30)	-0.96 **	(0.33)
School SES								
Mid SES (11-60% low SES students)			-1.10 **	(0.34)	-1.12 **	(0.34)	-1.09 **	(0.34)
Low SES (Over 60% low SES students)			-1.10 **	(0.32)	-1.23 ***	(0.34)	-1.14 **	(0.33)
Nonautonomous school#School SES								
Nonautonomous school#Mid SES					0.42	(0.61)	0.41	(0.59)
Nonautonomous school#Low SES					1.38 **	(0.51)	1.36 *	(0.54)
Graduate-level education							-0.16	(0.31)
Trained to teach math							0.24	(0.27)
Trained for mixed ability settings							0.38	(0.36)
Teaching experience (years)							0.00	(0.02)
Lack of school resources compromises instruction							-0.31	(0.30)
School student-teacher ratio							-0.01	(0.03)

Note: Estimates based on 634 math teachers in U.S. public schools from the TALIS 2018 data
+p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001

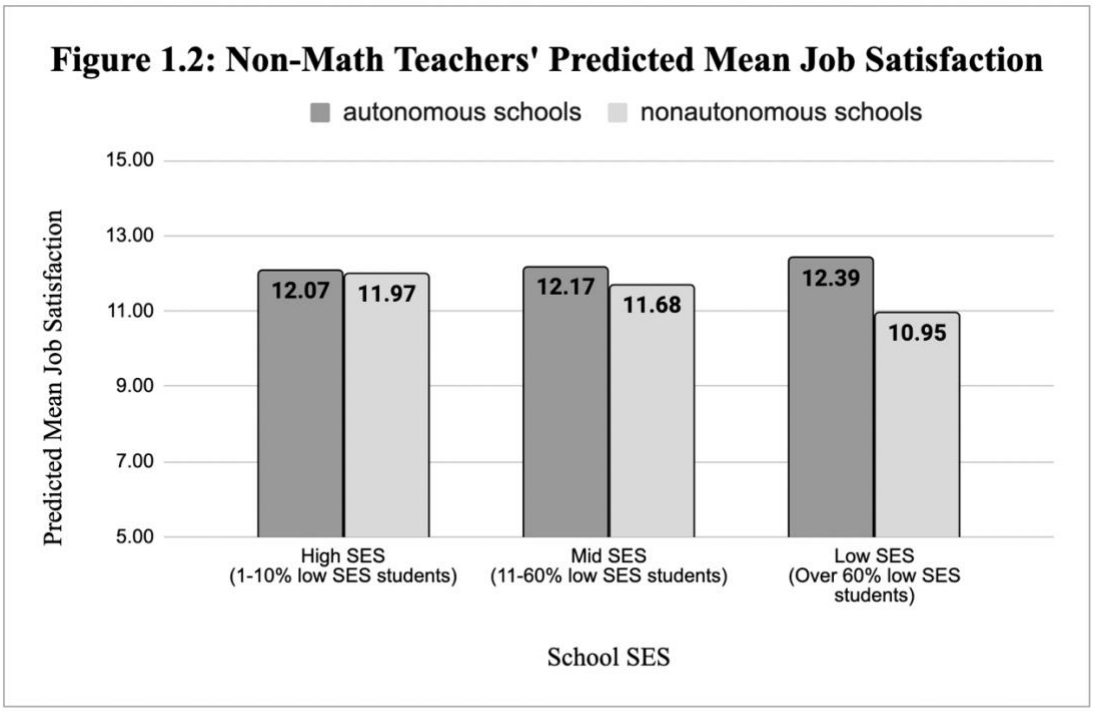
Table 2.2: Coefficients from Linear Regression Models Predicting Job Satisfaction for 7th, 8th, and 9th Grade Non-Math Teachers

	Model NM1		Model NM2		Model NM3		Model NM4	
	B	(SE)	B	(SE)	B	(SE)	B	(SE)
Nonautonomous school	-0.84	(0.50)	-0.84	(0.53)	-0.06	(0.23)	-0.09	(0.30)
School SES								
Mid SES (11-60% low SES students)			-0.01	(0.25)	-0.03	(0.26)	0.10	(0.33)
Low SES (Over 60% low SES students)			0.33	(0.48)	0.50	(0.48)	0.32	(0.39)
Nonautonomous school#School SES								
Nonautonomous school#Mid SES					-0.32	(0.30)	-0.39	(0.36)
Nonautonomous school#Low SES					-1.62	(1.16)	-1.34	(0.99)
Graduate-level education							-0.30	(0.22)
Trained to teach math							-0.23	(0.15)
Trained for mixed ability settings							0.40 *	(0.19)
Teaching experience (years)							0.02 **	(0.01)
Lack of school resources compromises instruction							0.24	(0.30)
School student-teacher ratio							-0.05	(0.03)

Note: Estimates based on 1,519 non-math teachers in U.S. public schools from the TALIS 2018 data
+p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001



Note: Predicted means are post-estimated from Model M4 in Table 2.1



Note: Predicted means are post-estimated from Model NM4 in Table 2.1. Results for non-math teachers are not statistically significant.

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Appendix A: Teacher questionnaire items used to construct scale of teacher job satisfaction

We would like to know how you generally feel about your job. How strongly do you agree or disagree with the following statements?
Response options: [1] Strongly disagree, [2] Disagree, [3] Agree, [4] Strongly agree

Job satisfaction with work environment (subscale)

- I would like to change to another school if that were possible *(reverse-coded)*
- I enjoy working at this school
- I would recommend this school as a good place to work
- All in all, I am satisfied with my job

Job satisfaction with profession (subscale)

- The advantages of being a teacher clearly outweigh the disadvantages
- If I could decide again, I would still choose to work as a teacher
- I regret that I decided to become a teacher *(reverse-coded)*
- I wonder whether it would have been better to choose another profession *(reverse-coded)*

Appendix B: Principal questionnaire items used to construct index measure of school autonomy for instructional policies

Regarding this school, who has significant responsibility for the following tasks? (A "significant responsibility" is one where an active role is played in decision making.) Please mark as many choices as appropriate in each row.
Response options (checked or not checked): [1] Principal, [2] Other members of the school management team, [3] Teachers (not part of school management), [4] School <governing board>, [5] Local, municipality/regional, state, or national authority

- Establishing student disciplinary policies and procedures
- Establishing student assessment policies, including <national/regional> assessments
- Determining course content, including <national/regional> curricula
- Deciding which courses are offered

The index was created in the following way:

1. "A new variable for each item was created (each item had five response options, one for each decision maker). If at least one of the response options was checked, the variable was coded as 0."

2. "If, for a given item, from the first four response options (describing decisionmaking as being at the school level) none were checked, and the fifth response option (indicating decision making is the responsibility of other authorities) was checked, then the new variable was coded as -1. Thus, if the principal checked only the 'other authority' response option, the task was considered to be an external responsibility (nonautonomous)."

3. "If the school principal checked response options from both groups (decision making at the school level and decision making by other authorities), the responsibility was considered to be shared, and the value remained 0 (see point 1)."

4. "If one of the first four response options (the decision making being at the school level) was checked, and the fifth response option (decision making being other authority responsibility) was not checked, the variable was coded as +1. Therefore, if the principal selected at least one of the four school-level responsibility options and no other authority option, the task was considered to be a school responsibility (autonomous)."

5. “The newly created variables were recoded: -1 was recoded to 1, 0 to 2, +1 to 3.”

6. “For each index, if more than half of the newly created variables were classified as autonomous, the school was classified as autonomous. If more than half of the corresponding tasks were classified as not autonomous, the school was classified as not autonomous. If neither criterion was met, the school was classified as mixed. The final indices were coded 1 for ‘no autonomy’, 2 for ‘mixed autonomy’, and 3 for ‘autonomy’.”

Description of index is extracted directly from TALIS 2018 Technical Report (p. 196-197)

Appendix C: Principal questionnaire items used to construct index measure of lacking material resources negatively compromises instruction

To what extent is this school's capacity to provide quality instruction currently hindered by any of the following issues?
Response options: [1] Not at all, [2] To some extent, [3] Quite a bit, [4] A lot

- Shortage or inadequacy of instructional materials (e.g. textbooks)
- Shortage or inadequacy of digital technology for instruction (e.g. software, computers tablets, smart boards)
- Insufficient internet access
- Shortage or inadequacy of library materials

The index was created in the following way:

1. "The responses were recoded so that the first two (1 – 'not at all' and 2 – 'to some extent') and the last two (3 – 'quite a bit' and 4 – 'a lot') response categories were collapsed for all the items."

2. "If all responses to the items included in the particular index were 'not at all' or 'to some extent', the index had a value of 1."

3. "If all responses to the component variables for the particular index were 'quite a bit' or 'a lot', the index had a value of 3."

4. "All other combinations were coded as 2."

"The final indices were coded 1 for 'Not a problem', 2 for 'A bit of a problem', and 3 for 'A problem'."

Description of index is extracted directly from TALIS 2018 Technical Report (p. 198)