Teacher Attrition and Opportunity Gaps for Multilingual Learners

by

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DEDICATION

This work is dedicated to teachers. Although the challenges facing public education are complex and entrenched, every day millions of teachers work to provide positive experiences and meaningful opportunities to the students in their care. I am deeply indebted to the many teachers who supported my learning and growth, and I am deeply grateful for those who continue to devote their time and energy to educating the next generation. I hope to contribute in my own small way toward making that work more sustainable, more inclusive, and more liberatory for all learners—as well as for all teachers who are committed to a more just vision of the world.

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ABSTRACT

Studies document how teachers disproportionately exit schools with high poverty rates and higher enrollment of marginalized groups, including multilingual learners. Chronically high attrition is associated with reduced average teacher experience level and lower academic outcomes. Patterns in teacher attrition may therefore contribute to opportunity gaps between schools by reducing access to high-quality instruction for emergent bilinguals. This dissertation examines 15 years of evidence in statewide teacher attrition patterns and longitudinal student outcomes to document how emergent bilingual students in Wisconsin are disproportionately exposed to higher teacher attrition and chronic staff instability at the school level.

Additionally, despite their significant linguistic, cultural, and academic assets, emergent bilingual students are also disproportionately assigned to lower academic classes, often taught by teachers who are underprepared to support their needs. High teacher attrition may therefore further disadvantage these students, even relative to peers in the same school. This dissertation therefore examines whether teacher attrition is associated with English acquisition for emergent bilingual students. Leveraging a multilevel model with school and district-by-year fixed effects, I find that increasing a school's teacher retention rate from 0% to 100% is associated with a 0.22 SD increase in student gain scores on the annual English language proficiency assessment used to determine whether emergent bilingual students reclassify as Fully English Proficient. Results are statistically significant at the $p < 0.01$ level. These findings suggest that increasing teacher retention rates may improve within-school equality in access to instruction for emergent bilinguals in Wisconsin, a frequently disadvantaged subgroup of students.

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LIST OF ABBREVIATIONS

ACCESS	Assessing Comprehension and Communication in English State-to-State
CSS	Composite Scale Score
DPI	Department of Public Instruction
EL	English learner
ELA	English Language Arts
ELD	English Language Development
ESL	English as a Second Language
ESSA	Every Student Succeeds Act
IEP	Individualized Educational Program
FEP	Fluent English Proficient
FTE	Full-Time Equivalency
LEA	Local Education Agency
LIEP	Language Instruction Educational Program
LTEL	Long-Term English Learner
NCES	National Center for Educational Statistics
OCR	Office for Civil Rights
SEA	State Education Agency
SES	Socio-Economic Status
SEDA	Stanford Educational Data Archive

CHAPTER ONE: INTRODUCTION

Every school day, more than 5 million emergent bilingual students bring into classrooms around the United States a highly diverse range of unique linguistic, cultural, and academic assets (National Center for Education Statistics [NCES], 2020). Federal law identifies these students as English learners (ELs)[1] and requires that school districts provide them equal access to educational opportunity. In theory, equal access to educational opportunity for English learners is protected by Title VI of the Civil Rights Act of 1964 and the Constitution's 14th Amendment, as it applies the Equal Protection Clause to the various ways that state constitutions enshrine individual rights to education for all students.[2] In practice, however, despite their many strengths, EL students face significant, disproportionate disadvantages in pursuing their right to equal educational opportunity.

These disadvantages threaten a commonly shared vision of public education as the key to socioeconomic mobility in America (Democratic National Committee, 2022). In fact, substantial evidence suggests that K-12 education rarely realizes the kind of mobility it is assumed to. Student demographic characteristics like EL status, socioeconomic status, race, and even Zip code remain highly predictive of persistent disparities in standardized test performance and long-term outcomes (Sahakyan & Ryan, 2018; Chetty & Hendren, 2018; Chetty, Friedman & Rockoff, 2014). These so-called achievement gaps can be credibly explained as products of cumulative disadvantage, where small differences in opportunity or investment accumulate over time into larger inequalities (DiPrete & Eirich, 2006). Because educational disadvantages are often rooted in long-standing histories of systemic injustice based on students' marginalized identities, the resultant inequalities

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[1] Although I prefer asset-forward language in referring to emergent bilingual students, such as multilingual learners or plurilingual learners, throughout this dissertation I use the federal classification "English learner" to highlight the significant roles that laws and policies play in how many students access educational resources and opportunities.
[2] The Wisconsin state constitution, for example, guarantees "an equal opportunity for a sound basic education" as a fundamental right for all students (Vincent v. Voight, 2000).

compromise the legitimacy of public education as a (supposedly) meritocratic system. Moreover, as disadvantages accumulate for marginalized students, corresponding advantages accumulate for more privileged students, perpetuating systemic injustices. Scholars therefore emphasize shifting focus from the “achievement” gap to the opportunity gap, identifying sources of disadvantage that contribute to inequalities in educational opportunity (Milner, 2012; Ladson-Billings, 2006).

For ELs and other marginalized students, one critical component of the opportunity gap is unequal access to high-quality teachers. Researchers broadly agree that teachers are the most significant school-based factor in students’ academic outcomes (Clotfelter, Ladd & Vigdor, 2010). Access to high-quality teachers is highly unequal for students of different racialized identities and socioeconomic backgrounds, however. The most experienced and effective teachers are frequently concentrated in schools that serve higher-income populations where the majority of students are racialized as white (Knight, 2019). Schools that serve lower-income populations, which often have higher EL enrollment and larger proportions of students from racially marginalized identities—Black students in particular, especially in urban areas—are typically less able to attract and retain experienced and effective teachers (Jacob, 2007). In examining predictors of attrition, researchers point to limited resources, challenging work environments, burnout, and attrition itself as reasons teachers disproportionately exit such schools (Ingersoll, 2001; Clotfelter, Ladd & Vigdor, 2011; Hopkins, Bjorklund Jr. & Spillane, 2017; Madigan & Kim, 2021). In many disadvantaged schools, attrition rates are so high year after year that researchers describe a “revolving door” problem (Ingersoll, 2001), and more recent work conceptualizes chronically high teacher attrition in the same language as long-term exposure to poverty (Holme, Jabbar, Germain & Dinning, 2018).

These patterns have received much attention in the academy (Borman & Dowling, 2008). Importantly, studies have begun to identify how the “revolving door” also exacerbates opportunity gaps between schools. Several trends contribute to this trend: 1. Teachers tend to be less effective during their first few years, due to their relative inexperience (Rivkin, Hanushek & Kain, 2005); 2. Less experienced teachers have the highest attrition rates (Ingersoll, Merrill & Stuckey, 2014); 3. Higher-poverty and lower-performing schools are, as already noted, less able to attract and retain effective teachers (Jacob, 2007); 4. Teachers—and highly effective teachers, especially—transfer disproportionately from high-poverty, low-performing schools into schools with, on average, more resources and more advantaged students (Boyd, Grossman, Lankford, Loeb & Wyckoff, 2008). Collectively, these patterns reduce the average levels of experience, organizational cohesion, and stability for teachers, creating a negative feedback loop—especially within disadvantaged schools, relative to more advantaged schools (Ronfeldt, Loeb & Wyckoff, 2013).

There is little to no empirical work, however, analyzing whether the teacher attrition trends that disadvantage many schools also exacerbate the disadvantages that marginalized students face within those schools. This dissertation therefore explores the extent to which teacher attrition may widen opportunity gaps for English learners, who may face disadvantages in public schools due to marginalized linguistic backgrounds. While empirical research is limited in what deeper insight it can offer in understanding the mechanisms of cumulative disadvantage, quantitative research can document disparities in educational opportunity and, ideally, identify the potential sources of disadvantage that produce them. I therefore draw the theory of cumulative disadvantage to pursue the following research questions:

1) To what extent are English learner students in Wisconsin exposed to different annual teacher retention rates at the school level, on average, relative to their never-EL peers?
2) To what extent are English learner students in Wisconsin disproportionately exposed to chronically high staff instability at the school level?
3) To what extent are teacher retention rates at the school level correlated with individual-level growth in academic English proficiency, as measured by ACCESS gain scores?

I focus on ELs for several reasons. First, the population of ELs in American public schools has increased dramatically over the last two decades, from 3.8 million students in the year 2000 (8.1% of the K-12 public school population) to 5.1 million in 2020, over 10.4% of the population (NCES, 2020). The academic experiences of this growing subgroup are intrinsically important: emergent bilingual students may have unique needs in addition to their unique assets and strengths, but the state is responsible for providing *all* students equal access to educational opportunity. All too often, however, EL-identified students experience linguistic marginalization, unequal access to instruction, and disproportionate barriers within public education. ELs are also concentrated in disadvantaged schools: 61% attend schools where ELs comprise a high proportion of enrollment (NCES, 2015). In part due to historic and ongoing patterns of segregation, these schools tend to be disproportionately disadvantaged with higher poverty rates, lower average teacher experience, and higher teacher attrition rates (Orfield & Lee, 2005; Sass, Hannaway, Xu, Figlio & Feng, 2012). In examining sources of educational disadvantage, it is therefore critical to understand how teacher attrition patterns may contribute to deeper inequalities for ELs and other students. Whether due to between-school differences in exposure or within-school differences in intensity, small negative effects of teacher attrition may accumulate to exacerbate existing opportunity gaps, expanding educational and socioeconomic inequality. The multi-layer impact of teacher attrition is therefore highly salient to educational policy, especially for those of us who are concerned with emergent bilingual students' equal access to educational opportunity.

That same concern is foundational for why I focus on EL students in Wisconsin—not only because it is the state where I have access to the data necessary for a deeper investigation of these research questions, but also because Wisconsin regularly produces some of the nation's largest disparities between racialized groups. The 2019 report "Race in the Heartland" highlights—among other dramatic disparities in infant mortality, child poverty, incarceration, unemployment, income, home ownership, and voter participation—extreme disparities in educational outcomes between students racialized as Black or white, including the largest gap of any state in grade 8 math scores (Dresser, 2019). Moreover, ELs in Wisconsin regularly exhibit the lowest scores of any subgroup, including low-income and racially minoritized students (Wisconsin Policy Forum, 2019). These persistent disparities call for more critical research into the disadvantages that EL students face in accessing educational opportunities. The goal of this dissertation is therefore to develop a more complete understanding of the role teacher attrition may play in exacerbating opportunity gaps for emergent bilingual students, with the express aim of reducing those disadvantages. To begin, the next subsection outlines the organization of the dissertation.

Organization of Chapters

Chapter Two first summarizes existing research on differential teacher attrition, grounding the hypothesis that high teacher attrition may expand opportunity gaps within schools, as well as between them. I then provide an overview of EL education in the United States, including a brief history of policies and contexts that shape how ELs face disadvantages in accessing high-quality instruction, both historically across the country and currently in Wisconsin. I explain how teacher attrition may exacerbate those disadvantages, identifying gaps in the literature that could clarify whether teacher attrition contributes to disparities within schools. After laying this groundwork, Chapter Three summarizes the epistemological frameworks that informed my research approach. Chapter Four describes the data and methods used to explore my three primary research questions. I document my findings in Chapter Five (exposure to teacher attrition) and Chapter Six (correlating school-level teacher retention with English acquisition rates). Chapter Seven discusses limitations, future directions, and implications for policy and practice. Chapter Eight concludes.

CHAPTER TWO: LITERATURE REVIEW

Teacher Attrition

There are more than 3.3 million full-time teachers in United States K-12 public schools; each year, one in six leave the school where they teach (Nguyen, Pham, Springer & Crouch, 2019). Half leave teaching altogether, either to retire or to seek alternative employment, while the rest transfer to other schools (Carver-Thomas & Darling-Hammond, 2017). Both attrition and transfer rates are higher in teaching than in many other professions, dramatically so for early-career employees (Ingersoll et al., 2014). High attrition and transfer rates contribute to staff shortages, especially in certain subjects and in certain schools (Ingersoll, 2001). Even when departing teachers are replaced by new ones, though, the frequency of changes in a school's staff—and the changes themselves—can significantly affect students' educational experiences: nearly everyone agrees that teachers are, by far, the most significant school-based factor influencing student' outcomes (Clotfelter et al., 2010). When superintendents surveyed in 2018 were asked to anticipate challenges for the coming school year, the item most often selected with strong agreement was the recruitment and retention of talented teachers (Gallup, 2018). Since the start of the COVID-19 pandemic, these challenges have become even more difficult for schools (Bleiberg & Kraft, 2023).

Retention is particularly important for at least four reasons. First, teachers often tend to be least effective at the start of their careers. Many improve quickly as they gain experience, but over 40% of novice teachers leave the profession within five years, meaning they quit before developing into skilled educators (Perda, 2013). Although it is not always clear whether a teacher who leaves would have become highly effective if they had stayed, it is clear that retention plays a significant role in developing teachers' skills (Henry, Bastian & Fortner, 2011). A second and closely related reason that retention matters is that early-career teachers are more likely than veterans to leave, so teachers who do exit are more likely to be replaced by a novice than by a more experienced teacher (Kane, Rockoff & Staiger, 2008). Because effectiveness is correlated with experience, retention helps administrators maintain a high-quality staff by avoiding the need to keep hiring and training new teachers. Further, retention can ensure the stability and continuity conducive to staff cohesion and peer learning between teachers (McLeskey & Billingsley, 2008; Jackson & Bruegmann, 2009; Papay, Taylor, Tyler & Laski, 2016). Finally, we lack reliable metrics to predict novice teacher effectiveness, making recruitment a relatively uncertain proposition (Kane et al., 2008; Rockoff, Jacob, Kane & Staiger, 2011; see contradicting evidence from Vagi, Pivovarova & Barnard, 2019). Administrators may therefore find it either more efficient or otherwise desirable to mentor and retain effective teachers, rather than to try and recruit new ones.

Administrators, however, are not only concerned with retention because it helps them meet staffing needs. They also know that teachers are the most influential school-based factor affecting academic outcomes, with influence that endures well into students' adult lives (Rockoff, 2004; Rivkin et al., 2005; Hanushek & Rivkin, 2006; Chetty et al., 2014). Teacher retention therefore has significant implications for educators concerned about educational quality: higher attrition can decrease student achievement even when teachers who leave are replaced by other teachers of similar quality (Ronfeldt et al., 2011). Furthermore, to the extent retention affects the distribution of teachers across schools, it also factors into the equitable distribution of educational opportunity. Because of its importance along multiple dimensions, a great deal of research has been dedicated to studying teacher retention and attrition (Borman & Dowling, 2008; Nguyen et al., 2019).

The usual caveat about teacher attrition is that *some* turnover is likely to benefit students—for example, if teachers who leave are replaced by ones who are more effective, or perhaps better matched to the school (Jackson, 2013). This refrain in the attrition literature obscures at least three problems for students, only one of which receives much attention. The first problem, the one which researchers have thoroughly explored, is that not all turnover is equivalent: there are systematic differences in both the kinds of attrition that schools experience and the rates at which they occur. Collectively these patterns produce *differential* teacher attrition, which tends to disproportionately disadvantage schools with higher proportions of low-income students, students with disabilities, English learners, students of color, and Black students especially, often in urban areas. Differential attrition is therefore closely linked to issues of school segregation; the next section of this literature review will focus on these patterns and their implications for disadvantaged students.

The second problem is the disproportionate effect that teacher attrition may have on certain subgroups of students within the same school. Because few studies have explored whether teacher attrition systematically disadvantages some students more than others within the same school, this problem remains underexamined. The third section of this literature review will probe the reasons differential teacher attrition may disproportionately affect EL students, grounding that hypothesis in the evidence we have about EL education. The third problem, also largely unaddressed within the literature, is the role teacher turnover may play in cumulative disadvantage. Reducing students' access to high-quality instruction in early grades, even with small negative effects from attrition (both between and within schools), may have significant longer-term consequences for students' opportunity to learn. I return to this problem in Chapter Three, explaining how differential teacher attrition may contribute to cumulative disadvantage, especially for emergent bilingual students. I begin, however, by examining how differential teacher attrition patterns operate between schools.

Differential Teacher Attrition

In addition to higher attrition rates among teachers generally, the literature also documents evidence that attrition patterns disproportionately disadvantage certain schools, relative to others.

First, attrition rates tend to be higher in schools with low average test scores, high proportions of racially marginalized students, and high proportions of students in special education and/or English language development services—especially in high-poverty schools, most often in urbanized areas (Carver-Thomas & Darling-Hammond, 2017). Second, schools in areas with higher poverty rates and lower test scores are, on average, less able to recruit and retain experienced, effective teachers (Clotfelter et al., 2010). Third, teachers—and more effective teachers, especially—tend to transfer disproportionately from higher-poverty and lower-performing schools into schools that have more resources, more advantaged students, and higher test scores (Boyd et al., 2008; Ingersoll, 2001; Ingersoll & May, 2012; Lankford, Loeb & Wyckoff, 2002).

Together these trends reduce the average level of experience and continuity among teachers in disadvantaged schools, relative to more advantaged schools. This pattern may also interfere with teachers' ability to support students—especially when that requires coordination between multiple staff members (Ronfeldt, Farmer, McQueen & Grissom, 2015). Because instructional cohesion depends on relationships among staff, and because that organizational capital must be recreated when teachers leave, schools with high attrition may be less able to maintain the stability conducive to effective instruction (McLeskey & Billingsley, 2008). In turn, lower staff stability and cohesion may lead to school environments where teachers are more likely to leave (Sorensen & Ladd, 2020).

Similarly, high attrition rates may disrupt the professional development and learning that occurs among teachers (Jackson & Bruegmann, 2009; Papay et al., 2016). Exacerbating that trend, as noted, more effective teachers may be more likely to leave (Boyd et al., 2013). Disadvantaged schools then become even less able to recruit and retain effective teachers (Jacob, 2007). Teachers who remain in such schools are also deprived of opportunities to learn from more experienced staff before they exit (Kraft & Papay, 2014). I reiterate these points not only because they are important from an administrative perspective, but also because they are materially relevant to the quality of instruction that students receive. Therefore, differential attrition may disproportionately harm both teaching and learning in disadvantaged schools, even when teachers who leave are replaced by others of similar quality (Ronfeldt et al., 2011).

Of course, schools are not always able to hire replacement teachers of similar quality. One factor is attrition itself: if teachers are more likely to leave a disadvantaged school, then that school may become a “revolving door” for teachers who leave before gaining the benefit of experience (Hanushek, Kain, & Rivkin, 2004). As a result, in disadvantaged schools especially, teachers tend to have less experience (Rockoff, 2004; Rivkin et al., 2005; Kane et al., 2008). Because experience is correlated with effectiveness—again, especially for early career teachers—differential attrition likely reduces the overall effectiveness of teachers in disadvantaged schools (Boyd et al., 2008). These trends shift the distribution of quality teachers away from disadvantaged schools.

Asymmetric patterns of teacher attrition therefore disadvantage schools that already face, on average, more significant challenges (Boyd et al., 2008). For example, many schools with high concentrations of EL students must manage additional costs associated with supporting them, often without sufficient supplemental funding to cover the increased costs of bilingual instruction (or English as a second language [ESL], a common English-only alternative). High attrition then puts additional constraints on more disadvantaged schools as they divert time and resources to hire and integrate new teachers, who themselves are likely to be less experienced, contributing to a vicious cycle. Differential teacher attrition is therefore one of the patterns that likely contributes to large and persistent opportunity gaps between schools through reductions in the quality of instruction at schools with racially marginalized students, socioeconomically disadvantaged families, lower test scores, and high proportions of students in special education and/or English language services.

We use euphemisms like "underfunded" to describe such schools, and it is true that many schools serving marginalized communities, especially in urban areas, continue to receive far less funding per pupil than schools with whiter, higher-income populations, even after legislative and court-mandated school finance reforms (Condron, 2017). While finance reforms have somewhat mitigated historic school funding disparities, segregation continues to play a significant role in educational inequality, and students in higher-poverty areas remain disadvantaged relative to peers in higher-income areas (Jackson, Johnson & Persico, 2016; Owens & Candipan, 2019). These trends also remain associated with racial segregation, even net of socioeconomic segregation, and studies show that supposedly "race-neutral" policies intended to compensate for inequality are often insufficiently compensatory (Weathers & Sosina, 2022; Bischoff & Owens, 2019). Teacher attrition likely contributes to this problem, and compensation-based incentives have proven largely ineffective in addressing asymmetric patterns of mobility (Clotfelter et al., 2010).

Meanwhile, students in more advantaged schools benefit from the disproportionate influx of more experienced teachers, who are also more likely to stay once they arrive. As Owens (2018) points out, children in "advantaged families accumulate additional resources in segregated places because their families can access the most advantaged contexts." Owens notes that the differences contribute to inequality not only by further disadvantaging marginalized groups, but also because opportunity hoarding and increased access to resources further benefit already advantaged groups. Given that teachers are one of the most significant factors in students' educational experiences and outcomes, differential attrition likely widens the opportunity gap on both sides, reducing access to quality instruction in disadvantaged schools while simultaneously benefitting schools that already have access to more advantages for students. In short, disadvantaged schools are more likely to face higher levels of teacher attrition, and the attrition they do face is more likely to harm students, even compared to similar attrition rates in more advantaged schools. I refer to these independent but closely related issues as “exposure” and “intensity,” both of which are likely to be worse for students in disadvantaged schools.

Students are not likely to experience uniformly higher exposure to teacher attrition, though, nor are they likely to be equally affected by its intensity. Even if some of the effects of attrition do operate at a school level—e.g., indirect effects of increased hiring costs—some of the effects will fall more frequently, more intensely, on certain students. ELs, for example, are disproportionately placed into lower-level classes with lower-quality instruction, often due to perceptions about the relationship between English proficiency and academic ability (Katz, 1999). If those classes are taught by less experienced teachers—the ones more likely to leave—then turnover may be higher among teachers who work with ELs. In fact, studies do find that “placement of under-prepared teachers in challenging ESL/ELD positions frequently results in a high rate of teacher turnover,” (Callahan, 2005). The next section considers whether EL students in particular may be at higher risk of experiencing the problematic effects of teacher turnover, due to the disadvantages they face.

English Learners

Each year, more than 5 million English learners attend K-12 public schools (NCES, 2020). While each state establishes its own policies for identifying ELs, generally they are students with a primary home language other than English who also do not meet English proficiency criteria at first enrollment. Federal law requires local education agencies (LEAs) to support EL students via Language Instruction Educational Programs (LIEPs) until students meet state-established criteria for reclassification as Fluent English Proficient (FEP). Exit from English support services typically involves attaining high scores on annual assessments, though states may allow flexibility in how reclassification decisions are made. States and LEAs must adhere to federal guidelines, however, by including ELs in school accountability systems intended to ensure that “every student succeeds” (Every Student Succeeds Act [ESSA], 2015). Indeed, many ELs attain high levels of proficiency, both in assessments of English language proficiency and other academic content (Brooks, 2018).

Recognizing the many skills and strengths they bring as emergently multilingual learners, ELs nonetheless face persistent disparities in access to high-quality educational opportunities and, on average, lower academic outcomes relative to their non-EL peers (Ream, Ryan & Yang, 2017). Many are limited to English-only instruction in ESL programs that devalue their home languages. These patterns have roots in a long history of discrimination against non-English speakers in the United States (Castellanos, 1983). Many of the policies currently in place to support EL education were developed only through decades of critical organizing for civil rights and equal educational opportunity, but many students continue to face barriers (Gándara & Orfield, 2012). Because this history has fundamentally shaped the EL policy landscape, one in which significant disparities continue to affect educators and students, the next section summarizes some of the historical and political background relevant to the disadvantages faced by emergent bilingual students.

Historical Context of English Learner Education

Although public education has been at least nominally open to children of diverse linguistic backgrounds for many decades, students who would now be referred to as English learners have long faced persistent marginalization in schools and unequal opportunities to learn (Zehm, 1973). Immigrant children were forced to repeatedly repeat grades (Deschenes, Cuban & Tyack, 2001), and discrimination led to dramatically lower rates of high school entry (Olneck & Lazerson, 2017). In 1960, the Texas Education Association observed that “Solely because of the language barrier, approximately 80 percent of the non-English-speaking children have had to spend two years in the first grade before advancing to the second” (Sánchez, 1997, p.27).

Even considering only the last fifty years of public education in the United States, many decades of evidence point to continued marginalization and inequitable academic outcomes for emergent bilingual students. Though the Bilingual Education Act of 1968 established some federal policies and funding for educating students who spoke languages other than English, the equal civil rights of students from those minoritized linguistic backgrounds were first recognized by the Supreme Court in *Lau v. Nichols* (1974). *Lau* held that the lack of accommodations for EL students denied them a meaningful education and therefore violated Title VI of the Civil Rights Act (1964). *Lau* did expand the kind of constitutional protections against "separate but equal" education that were first promised by the Supreme Court decision in *Brown v. Board of Education* (1964), but—as in *Brown*—those promised protections were ultimately weakened by subsequent judicial action (Gándara, Moran & Garcia, 2004).

Despite having certain provisions from the *Lau* decision codified into legislation by the Equal Educational Opportunities Act of 1974, and those provisions clarified by the Fifth Circuit in *Castañeda v. Pickard* (1981), the courts subsequently limited *Lau* to cases where discrimination was shown to be "intentional" and constrained enforcement mechanisms primarily to actions by the Office of Civil Rights (OCR). Social and economic pressures meanwhile reduced the emphasis on students' native languages as schools faced both budget cuts and increasing public resistance to spending taxpayer money on education for immigrant and refugee families (Castellanos, 1983). Subsequent amendments to the Bilingual Education Act therefore emphasized local control while judicial retreat and shifts in legislative focus carved out more room for English-only programs in the accountability era that followed (Gándara, Moran & Garcia, 2004).

Reauthorizations of the Elementary and Secondary Education Act, including No Child Left Behind (NCLB) in 2001, reinforced this English-first perspective by stripping the term "bilingual" from agency names and program titles in favor of deficit phrases like “limited English proficient” (Acosta et al., 2019). Initiatives to support students’ use of native languages were also removed, privileging English proficiency while increasing the emphasis on standardized test performance. Throughout the NCLB era, in fact, language support policies arguably became increasingly ad hoc byproducts of accountability policies (Menken, 2008). Even as state and LEA implementation of federal policy varied widely, the top-down emphasis on English proficiency very much reinforced deficit-based views of EL education (Giles, Yazan & Keles, 2020).

Meanwhile, reviewers have identified serious issues with high-stakes standardized tests for ELs, concluding that such tests are not representative of ELs’ true abilities (Solórzano, 2008). This results in tension between the efforts to support ELs and the institutional accountability measures aimed at ensuring that schools are making those efforts. ESSA, the most recent reauthorization of federal education legislation in 2015, now requires schools to report on the academic outcomes of ELs with disabilities and to report how many ELs continue to receive English language services after five years—the de facto federal definition of “long-term” English learner, a label increasingly prevalent in discussions of EL student outcomes. This emphasis on standardized assessments and measurable progress according to pre-set expectations can contribute to deficit-based views of EL students, especially when it results in labels that obscure how the school may not be providing services adequately aligned with students’ needs (Kibler & Valdés, 2016). While requirements to disaggregate and report student academic progress are well-intentioned, the next section describes some of the current challenges prevalent in EL education and how such policies contribute to them.

Current Issues in English Learner Education

Despite the emphasis in federal legislation on standardized tests and consistently applied expectations, there is dramatic variation in how states and LEAs identify, serve, and reclassify ELs

(Linquanti & Cook, 2013; Estrada & Wang, 2018; Hopkins, Lowenhaupt & Sweet, 2015). States, districts and schools also vary widely in the number and proportion of ELs they enroll, as well as the linguistic and demographic backgrounds of their diverse EL populations. States and LEAs also do not share much consistency in how they classify the types of support programs available to ELs (U.S. Department of Education, 2015). Although states typically establish exit criteria based on specific performance thresholds in standardized tests of English proficiency, they often allow for local flexibility in additional or alternative criteria for reclassification. Furthermore, substantial between-district heterogeneity exists in the effect of reclassification on student outcomes, such as academic achievement and graduation (Cimpian, Thompson & Makowski, 2017). This evidence implies that, even when LEAs apply uniform standards to students across districts, differences in local context can lead to substantially different student experiences.

Given the highly contextual nature of EL education, it is difficult to make generalizations about the kinds of barriers these students face. The challenge of identifying larger trends is further complicated by the fact that, frequently, EL students (and their academic outcomes) are no longer counted as part of the EL population after exit; idiosyncratic reporting policies can obscure both the successful academic progress of reclassified ELs as well as challenges that subgroups of ELs face while learning English (Saunders & Macelletti, 2013; Thompson, Umansky & Rew, 2022). Also, while recent updates to federal education policy do require disaggregated reporting for some subgroups, such as ELs with disabilities, these policies still depend on standardized test results that do not accurately represent ELs' true abilities. Not only do such tests consistently underestimate students' content knowledge, pressure associated with standardized test-based accountability can shift instructional priorities away from higher-order learning strategies in favor of more basic skills for students learning English (Solórzano, 2008; Acosta et al., 2019).

These shifts compromise ELs' opportunities to learn, exacerbating concerns over students' access to challenging curricular content and more rigorous instruction. Especially when educators conflate English skills with academic ability, limited content access can present greater barriers to academic success than low English proficiency (Callahan, 2005; Olsen, 1997). Access issues can therefore lead to a self-reinforcing cycle of under-preparation that limits ELs to lower academic tracks, with effects that accumulate over time and can culminate in identification as a "long-term" English learner, or LTEL (Callahan, 2005). The risk is especially high for ELs with disabilities, who often face "a number of mutually reinforcing institutional and perceptual factors" that lead educators to restrict them to lower academic tracks (Kangas & Cook, 2020). Studies show that ELs who do not reclassify in elementary school are less likely to reclassify at all (Thompson, 2017).

The LTEL label is intended to help educators identify and provide support that ELs need, keeping schools accountable for all ELs (Hopkins, Thompson, Linquanti, Hakuta & August, 2013; Kibler & Valdés, 2016). The label has received significant criticism, however. Researchers voice concerns that it emphasizes perceived linguistic or academic deficits in individual students, rather than focusing on how support systems may be misaligned with their needs (Kibler et al., 2018; Thompson, 2015; Flores, Kleyn, & Menken, 2015; Flores, Batalova, & Fix, 2012; Olsen, 2010; Rosa, 2010). Studies find, for example, that barriers to reclassification often include inadequate instruction, inconsistent programming, reduced access to academic content, linguistic isolation, and errors in bureaucratic processes—even delayed diagnosis of learning disabilities (Olsen, 2014; Menken & Kleyn, 2010; Callahan, 2005; Slama, 2014; Brooks, 2018). Indeed, prolonged EL status is often attributable to inadequate special education services, sometimes due to delayed diagnosis by the school or failure to identify ELs' disabilities altogether (Buenrostro & Maxwell-Jolly, 2021; Clark-Gareca, Short, Lukes & Sharp-Ross, 2019).

Dual-Identified Students

The overlap between EL and disability status is especially important in thinking about the educational opportunity gap.[3] One reason is that English learners are more likely than average to be identified as having a disability (NCES, 2020).[4] These "dual-identified" students are entitled to additional protections under the Individuals with Disabilities Education Act (IDEA), including—in addition to their LIEP—an Individualized Education Program (IEP) tailored to their specific disability and unique needs. Despite legal requirements, though, schools often fail to meet those dual-identified students' needs, even prioritizing disability services over English language services (Kangas, 2018). Concerns about disparities prompted the Departments of Justice and Education to issue a "Dear Colleague" letter in 2015 stressing legal obligations for LEAs to provide appropriate and adequate services for ELs, underscoring specific supports for ELs with identified disabilities (U.S. Departments of Justice and Education, 2015).

Timely and accurate identification of disabilities for ELs can be challenging, however, as English proficiency may obscure evidence of a disability, while disability may obscure a student's English proficiency (Abedi, 2014; Sullivan, 2011; Shifrer, Muller & Callahan, 2011). Meanwhile, there exists tremendous variation in how dual-identified students are identified, supported, and reclassified, as each process is determined by a complex combination of federal, state, district, and school policies, plus student-level factors like individual disability or home language. For example, recent regression discontinuity analysis suggests that home language may also play a role in how ELs are evaluated for special education (Murphy & Johnson, 2020). This is also likely to vary depending on school and district-level factors—e.g., a district with a high concentration of Hmong

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[3] This subsection draws on both Sahakyan & Poole (2023) and Sahakyan & Poole (2021) on dual-identified students.
[4] Disproportionality in disability identification for English learner students depends on age, grade level, context, and the specific type of disability in question; for a more thorough discussion, see Umansky, Thompson & Diaz (2017).

families may be better prepared to evaluate Hmong speakers for disabilities. Whether that leads to better learning conditions, however, depends on the supports actually available (Garver, 2020).

We do know that many ELs do not receive the supports they need when they need them, as schools often fail to recognize signs of disability in young ELs (Burr, Haas & Ferriere, 2015; Sánchez, Parker, Akbayin & McTigue, 2010; Shore & Sabatini, 2009). Furthermore, even when students' needs are accurately identified, schools often struggle to provide the appropriate services (Kangas, 2018; 2017; 2014). Research suggests that the balance between disability and language-focused support is often determined by factors like scheduling, time constraints, teacher expertise, and the resources available—rather than the students' abilities and needs (Kangas & Cook, 2020; Slama, Molefe, Gerdeman, Herrera, de los Reyes, August & Cavazos, 2017; Kangas, 2014). While educators are often doing their best amidst challenging circumstances, ELs may be disadvantaged if they are assigned to services misaligned with their specific needs (Burr, Haas & Ferriere, 2015; Hamayan, Marler, Sanchez-Lopez & Damico, 2013). These challenges may be exacerbated by teacher attrition, which is typically highest for both ELD teachers and special education teachers; reductions in stability and continuity among staff could make it harder to identify and coordinate the most appropriate services for a student's unique circumstances.

Ultimately, dual-identified students on average develop English proficiency more slowly, demonstrate lower performance on standardized content tests, and reclassify at much lower rates, relative to ELs without IEPs (Sahakyan & Poole, 2021; Shin, 2020). These disparities likely drive long-observed trends in how ELs with disabilities are disproportionately captured by the LTEL label (Sahakyan & Ryan, 2018; Slama, et al., 2017; Kieffer & Parker, 2016). Furthermore, these disparities are not merely the result of failing to accurately identify (and meet) EL students' needs when they are young. Despite finding evidence that English learners do receive delayed diagnoses and are likely under-identified for special education overall, Umansky, Thompson and Diaz (2017) argue that ELs receiving English services are nonetheless over-represented in special education, especially in later grades. They suggest that patterns of delayed reclassification likely drive the disproportionate accumulation of dual-identified students at the secondary level, consistent with research on ELs with disabilities (Kangas & Schissel, 2021; Schissel & Kangas, 2018). In turn, delays in English acquisition likely contribute to further disparities between ELs and their peers in content proficiency on state standardized tests (Sahakyan & Poole, 2022).

Overall, these findings are consistent across many studies in different educational contexts. Evidence suggests that ELs face barriers to English acquisition and academic content proficiency often stemming from inadequate or misaligned services. The problems are partly related to school finance issues: although federal funding for EL programs expanded with NCLB and ESSA, large increases in the EL population have meant that funding per student has actually decreased overall. Advocates argued that $664 million in Title III funds was inadequate to support a population of around 4 million ELs in 2002, but we now serve more than 5 million ELs with only $737 million, representing a decrease from $166 per student to $147 per student (NCES, 2018). Budget cuts have put pressure on schools to cut services. In Texas, for example, while EL enrollment rose overall, the proportion of ELs in special education dropped as schools struggled to manage the higher costs associated with fully supporting dual-identified students (Isensee, 2017). The challenge of fully supporting ELs in underfunded schools is by no means unique to Texas, though. A 2013 study of financial incentives for both bilingual/ESL and special education teacher recruitment in California found that districts with increases in the proportion of students with disabilities were more likely to eliminate bilingual/ESL incentives (Strunk & Zeehandelaar, 2015). Advocates also argue that EL education and special education are both underfunded in Wisconsin, a context I turn to now.

English Learner Education in Wisconsin

Over the two decades from 2001 to 2019, the population of English learners in Wisconsin increased dramatically from about 30,000 students to over 50,000 (Hahn, 2021). During that time, however, state funding for Bilingual-Bicultural (BLBC) education remained flat: the legislature last raised BLBC funding in 2007, budgeting $9.9 million in categorical aid. After that, despite continued increases in the EL population, funding for ELs' "equal" access to education was cut in both the 2009-2011 and 2011-2013 budget cycles, remaining stagnant at $8.6 million until 2021.[5] BLBC funding is also distributed to schools only if they meet certain thresholds of EL enrollment. By statute, a school must enroll at least 10 students with the same home language in grades K-3, 20 students in grades 4-8, or 20 students in grades 9-12 for the district to qualify for BLBC funding. As a result, only about 12% of districts qualify for state aid, meaning almost half of Wisconsin's EL students are enrolled in schools that receive no state funding whatsoever for BLBC programs.

Even when a district does qualify for state funding, BLBC program costs are significantly higher than what the state will reimburse. Between population increases and budget cuts, the state's reimbursement rate for EL education costs fell from 32% in 1995 to just 8% in 2020 (Hahn, 2021). Furthermore, the $7.5 million in Title III funding that Wisconsin receives as federal aid for EL instruction must be used to supplement existing programs that districts are required to provide, and it therefore does little to overcome the fiscal challenges many districts face in supporting emergent bilingual students. Ultimately, less than 25% of the state's English learner students are enrolled in true bilingual education programs. About a quarter of Wisconsin ELs are enrolled in programs that supplement bilingual education with English as a Second Language (ESL), and half of the state's

[5] The administration of current Wisconsin governor Tony Evers has advocated for substantial increases in categorical aid for Bilingual-Bicultural programs, as well as other funding to support English language acquisition and biliteracy in the state's 2023-2025 budget cycle. These recommendations have not yet been adopted by the legislature, however.

EL population is supported through ESL alone. As a result, while districts and schools vary in how programs operate, most Wisconsin ELs do not receive any instruction or support in their native languages—even though native language support can be beneficial for emergent bilingual students as they learn academic content while developing English proficiency (Menken & Klein, 2010) and evidence favors bilingual approaches over ESL programs (U.S. Department of Education, 2012).

Many schools do not have sufficient staff to support EL students in their native languages, however, especially given the diversity of languages represented in Wisconsin's EL population. While over half speak Spanish, many others speak Hmong, Chinese, Arabic, Somali, or one of the over 200 additional languages reported across the state. Because of state law and policy, however, including persistent underfunding of BLBC education, native Spanish speakers are dramatically overrepresented in BLBC programs. Despite representing almost half of the state's EL population, emergent bilingual students who speak languages other than Spanish comprise less than 12% of students enrolled in BLBC programs. Districts and schools across the state are expected to provide equal access to a sound basic education for all students, regardless of their native language, but in many cases lack the resources to follow best practices in fully supporting ELs. Even setting aside disproportionality in BLBC enrollment, many schools struggle to hire and retain teachers who are qualified to differentiate content instruction, help ELs succeed academically, and fulfill the state's promise of equal educational opportunity. In light of these persistent funding and staffing issues, the next section considers how teacher attrition patterns may exacerbate disparities and contribute to cumulative disadvantage for emergent bilingual students.

Teacher Attrition and English Learners

Compromises between funding and EL services often do come down to staff: schools need personnel to perform the various education, evaluation, and coordination-related responsibilities involved in providing support services to ELs. Unfortunately, schools with high EL enrollment are more likely to have under-prepared teachers and, often, the most severe resource constraints. Even when schools have the resources to hire new teachers and support staff, however, high teacher attrition can lead to further staff instability: "placement of under-prepared teachers in challenging ESL/ELD positions frequently results in a high rate of teacher turnover" (Callahan, 2005). Because most ELs attend schools where ELs represent a high proportion of enrollment, these challenges likely combine to exacerbate existing disparities.

In outlining the research on differential teacher attrition, I described how its harmful effects disproportionately affect higher-poverty and lower-performing schools, often in urban areas with relatively high proportions of marginalized groups. Evidence shows that these schools, relative to schools with more resources and more advantaged students, experience much higher attrition rates (exposure) and corresponding decreases in student outcomes (intensity). Few studies consider the possibility of differential within-school effects, however. One exception is Baron (2018) who links increases in teacher turnover to a 20% decrease in statewide test scores, largely driven by declines in the test scores of students and schools within the lower deciles of the achievement distribution.

English learners, in addition to being disproportionately concentrated within disadvantaged schools, are often overrepresented in the lower deciles of standardized test achievement. ELs are also overrepresented in lower-level classes, often due to perceptions about the relationship between English proficiency and academic ability (Katz, 1999). These classes are frequently taught by less experienced teachers, meaning EL students are more likely to receive lower quality instruction—especially when teachers are less able to differentiate instruction, as early career teachers are often underprepared to serve EL students in particular (Santibañez & Gándara, 2018). Because ELs are disproportionately assigned to lower tracks, school-level reductions in experienced teachers may disproportionately expose ELs to the negative effects of teacher attrition. In other words, even when attrition reduces student access to high-quality instruction for an entire school, that reduction could be more disadvantageous for English learners.

Furthermore, attrition rates are often highest for teachers working with ELs, especially in under-resourced schools (Carver-Thomas & Darling-Hammond, 2017). Heineke (2016) notes that ELD positions are notoriously difficult to staff because they are “least attractive” for teachers, and under-preparedness likely contributes to burnout and higher attrition rates. Then, as teachers exit, schools continue to hire less experienced candidates to replace the ones who left, contributing to the revolving door problem—especially in disadvantaged schools, where attrition is often highest. Higher teacher attrition and lower average teacher experience likely combine to disproportionately disadvantage English learners, compared to their never-EL peers. For these reasons, ELs may be exposed to attrition at both higher rates and greater intensities, even compared to their never-EL peers in the same school.

I highlight the difference in exposure to attrition and the intensity of its effects because, as I have explained, teacher attrition at the school level may also harm students who are taught by retained teachers. For example, after a high-departure year, a school may reallocate resources to hiring and training new staff; regardless of whether students are assigned to a new teacher, they may have reduced access to programming due to budget cuts. Resource constraints seem likely to affect all students similarly across the school, but there is at least one way in which disadvantaged students might be disproportionately exposed to the indirect effects of attrition. In the case of ELs, instructional staff must work with other teachers to support ELs across their classes; because ELs depend on more teacher coordination, they may be at higher risk of exposure to reduced cohesion following teacher attrition (Ronfeldt et al., 2015). This could exacerbate disadvantages for ELs, whether they are taught by newer, less experienced teachers or not. Higher attrition rates may also reduce the organizational capacity for key EL support processes, such as disability identification.

Relatedly, educators and families alike point to the value of relational trust in supporting marginalized students' educational experiences via meaningful interaction between teachers and the students' families (Delgado-Gaitan, 2004). Higher relative attrition rates for ELD teachers may therefore disproportionately harm English learners, and not only because schools lose institutional knowledge and relationships cultivated among teachers. Families would also be more likely to lose relational trust and connections to the school—particularly if those relationships are more difficult for families of EL students to form in the first place, due to the prevalence of linguistic or cultural communication gaps (Good, Masewicz & Vogel, 2010). If disproportionately higher attrition rates impede the relational trust between teachers and families (McWayne, Hyun, Diez & Mistry, 2022), this could count as an example of both disproportionate exposure *and* disproportionate intensity in how attrition affects English learners.

Furthermore, in addition to an increased risk of exposure to attrition *and* its harmful effects, English learners may also experience those harmful effects more intensely. ELs already face other disadvantages at disproportionately higher rates, including lower average socioeconomic status, limited formal schooling, limited parental education, lack of access to consistent and effective language support, limited practice developing and using academic English, instability associated with family mobility, and increased personal responsibilities both within and outside of the school, such as working one or more jobs, caring for siblings, or translating for family members.[6] To the

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[6] Although English learners do disproportionately face such challenges (Hernandez, Takanishi & Marotz, 2009), it is important to consider how the dominant narratives in English learner research often reinforce deficit models, rather than focusing on student strengths and students' agency in navigating what are often deficit-based educational systems (Wassell, Fernández Harylak & LaVan, 2010). Similar issues exist respecting racism in educational research, as seen in the dominant narratives about "achievement gaps" (Kuchirko & Nayfeld, 2021).

extent that any of these factors might affect whether a student can endure the negative effects of teacher attrition, these disadvantages are likely to be compounded. Whereas students who have access to resources and support are more likely to thrive despite any challenges they face, students without those advantages may be more affected by disadvantages in school, including attrition. It is therefore likely that, even holding equal levels of exposure, English learners may nonetheless experience greater disadvantages related to teacher attrition than their peers in the same school.

Summary

Therefore, in service of identifying sources of disadvantage for English learners, I explore the relationship between teacher attrition and EL student outcomes, paying special attention to the different layers of disadvantage that teacher attrition may exacerbate within schools. Specifically, I document in Chapter Five how English learners in Wisconsin are disproportionately exposed to higher annual teacher attrition rates and chronically high staff instability at the school level. I also provide empirical evidence in Chapter Six that teacher retention rates significantly correlate with individual-level growth in academic English proficiency. Findings from these statistical analyses contribute to our understanding of school-level teacher attrition as a potential factor exacerbating inequalities for an already-disadvantaged subgroup. Recognizing the substantive implications for multilingual learners' equal access to educational opportunity, this dissertation therefore draws on the theory of cumulative disadvantage in addition to philosophical perspectives on educational justice and non-ideal theory to inform its approach. I next describe those underlying conceptual frameworks and relevant assumptions before articulating, in Chapter Four, the methodological decisions informed by those perspectives.

CHAPTER THREE: CONCEPTUAL FRAMEWORKS

Introduction

This dissertation, as a bounded exploration of specific research questions, relies on a wide range of ontological, epistemological, and axiological assumptions. I endeavor in this section to describe those assumptions explicitly, not only because I value clarity and transparency, but also to assist the reader in evaluating my research on its own terms. Not all readers will share the many philosophical commitments underlying this project—indeed, I expect my own thinking to evolve over time as a stubbornly inquisitive scholar and citizen. When others inevitably doubt the data, criticize the methods, or question the conclusions, they should do so with a full understanding of the foundational assumptions that helped shape those many decisions. I therefore briefly describe the conceptual frameworks that informed my work in writing this dissertation. Those frameworks include cumulative disadvantage, democratic equality based on fair opportunity in education, and non-ideal theory as it applies to policies aimed at promoting educational justice.

Cumulative Disadvantage

One task of quantitative research in education is to quantify disparities and, ideally, identify sources of disadvantage that produce them. DiPrete & Eirich (2006) argue, however, that we have an underdeveloped understanding of how advantages or disadvantages accrue for individuals, and especially how differences accumulate over time. Although the statistical models presented in this dissertation do not claim to be causal in nature, the underlying hypotheses draw on this concept of cumulative disadvantage. I consider how differential teacher attrition patterns may contribute to disadvantages not only between schools, but also within them. The evidence I present is aimed at filling this gap in our understanding of underlying mechanisms of cumulative disadvantage—how differences in teacher attrition rates may operate on multiple levels to exacerbate inequalities in access to educational opportunity. In conceptualizing this phenomenon, I examine how differential teacher attrition may be a "group-neutral" process that exacerbates differences between groups.[7] To help articulate how I conceive of teacher attrition as a potentially systematic factor contributing to disadvantages faced by English learners, I now elaborate the reasoning that helped me to develop this hypothesis.

One key text in developing this hypothesis of how teacher attrition might contribute to cumulative disadvantage for ELs (and others) is *Despite the Best Intentions: How Racial Inequality Thrives in Good Schools* (Lewis & Diamond, 2017). The authors point to purportedly race-neutral policies and practices in exclusionary discipline and academic tracking that contribute to racialized disparities in educational achievement, even in "good" schools with diverse student populations.[8] Although I had already begun to theorize about teacher attrition as a mechanism of disadvantage, this work helped clarify my understanding of supposedly group-neutral processes, and especially how they operate in subtle ways over time. Lewis & Diamond also point out how the subtlety and supposed group-neutrality of these processes combine to make them appear more diffuse, more difficult to identify, and easier to ignore—especially for more advantaged individuals, who may also benefit from apathy while ascribing persistent inequalities to "inherent group differences" (Anderson, 2010). Therefore, discussing "disparate impacts needs to be combined with evidence about what led to the outcomes" to "shift the conversation away from individual blame […] and toward a discussion of interventions and solutions" (Lewis, & Diamond, 2017, p.169-170).

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[7] I write "group-neutral" in quotes because of the many reasons to suspect that racism contributes to differential teacher attrition, as noted in the literature review. Even race-neutral attrition trends could amplify opportunity gaps, however.
[8] Although I highlight how disproportionate placement of EL students into lower academic tracks may contribute to disparities in access to educational opportunity—and how higher teacher attrition rates may exacerbate those trends—it is also worth pointing out that EL status in some states is associated with higher rates of exclusionary discipline, which may also negatively affect EL students through disproportionate exposure (higher suspension rates) and also disproportionate intensity, as time out of school is likely to further impede ELs' ability to develop English proficiency (Whitford., Katsiyannis, Counts, Carrero & Couvillon, 2019).

This dissertation is an attempt to shine a light not only on persistent disparities in access to educational opportunity, but also on new evidence of one plausible "mechanism of disadvantage" (Lewis & Diamond, 2017). Namely, I explore the collective impact of teachers' individual choices as one of the subtle processes contributing to cumulative disadvantage—not only between schools, but also within them. I focus on the overall impact of school-level teacher attrition, rather than the individual teachers themselves or the determinants of their labor market choices, because it is the overall system that contributes to persistent inequality. From the perspective of individual teachers, decisions about where to work are deeply personal. There are many reasons for any given teacher to leave the profession or transfer from one school to another. I do not interrogate whether these personal decisions are justified, nor what criteria might be relevant for making that determination. For example, a teacher might desire to transfer to a school more aligned with their desired teaching practices or target student population. A teacher experiencing burnout might leave the profession for a career that is less stressful, more supported, better paid, or otherwise more aligned with their career preferences. At the same time, that individual teacher's decision might generate substantial costs for their school, both directly and indirectly. There are likely also costs for the students they otherwise could have supported—especially if they teach in a rural area or work with a vulnerable population. In short, there may be multiple values in conflict and reasons both for and against each alternative in a teacher's individual decision about where to work. Beyond these considerations, overall patterns in attrition point to disproportionality in which schools are perceived as more or less desirable for teachers—perceptions that are intertwined with segregation and disadvantage.

My present goal is not to conclude that individual teachers are morally responsible for those patterns, nor do I assert here that they have an obligation to correct them. I leave these questions to future work in the philosophy of education. Instead, my present goal is to establish evidence of whether teachers' employment decisions collectively are correlated with disparities in access to educational opportunity. Educators ought to understand how incentive structures, policies and practices contribute to systematic disparities for students in disadvantaged schools, especially in ways that intersect with larger patterns of disadvantage. If teacher attrition does in fact operate as a mechanism of disadvantage, it is important to quantify the extent to which this "group-neutral" phenomenon contributes to inequalities in access to educational opportunity.

The theory of cumulative disadvantage helps us conceptualize how those systems operate over time to produce larger inequalities, even from small differences in advantage or opportunity. In this dissertation, I document how English learner students are disproportionately exposed to the differential teacher attrition patterns associated with inequality in access to high-quality teachers, pointing to inequality in educational opportunity. I also point out how ELs are disproportionately exposed to *chronically* high teacher attrition rates, where disadvantages accumulate over time like chronic exposure to poverty (Holme et al., 2018). The disadvantages that accumulate for ELs are likely intersectional and multilayered, however. First, EL students disproportionately come from socioeconomically disadvantaged backgrounds and communities that experience racialized and linguistic marginalization. These disadvantages may impede their access to resources and supports outside of school. In part due to patterns of racialized and socioeconomic segregation, the schools where most English learners are enrolled tend to have more limited resources due to lower average property values that largely determine school funding. Because such schools disproportionately enroll student populations that reflect concentrated poverty, the overall composition of the school also tends to be disadvantaged—and lower peer ability is associated with lower average outcomes. Even when schools are more racially and socioeconomically integrated in terms of enrollment, they may nonetheless be highly segregated at the classroom level. English learners, as noted, face an especially high risk of being relegated to lower academic tracks. Due to within-school teacher sorting, these patterns likely reduce on average their access to experienced and effective teachers, especially because inexperienced teachers are often underprepared to support ELs.

Because ELs are at high risk of being relegated to lower academic tracks, due to cycles of “mutually reinforcing institutional and perceptual factors” (Kangas & Cook, 2020), the negative effects of teacher attrition may exacerbate that cycle. Reduced access to high-quality instruction is one of the barriers to EL reclassification, so getting stuck in lower-level classes with inadequately prepared teachers could contribute to delayed reclassification, further reducing EL access to more advanced content. This pattern may also be worse for “long-term” English learners, as secondary schools are more likely to assign students to relatively rigid academic tracks and ELs are frequently overrepresented in lower-level classes (Umansky, 2016). Tracking can be especially problematic in math, a subject where more advanced skills tend to build on prior knowledge, making it more difficult for students to access more advanced work (Abedi, Courtney, Leon, Kao & Azzam, 2006). EL students who continue to receive language support past middle school may therefore find it difficult to recover from disadvantages and delayed English acquisition in earlier grades.

Given the issues discussed above in how schools often fail to meet the needs of ELs with disabilities, high teacher attrition rates may also disproportionately affect dual-identified students. While I do not in this work specifically focus on dual-identification, I do consider in the discussion parallels between special education and EL education. Not only are teacher attrition rates high for both specializations, support for students with IEPs and support for ELs both require coordination between educators to provide appropriate services, and doubly so for EL students with disabilities. Reduced stability and cohesion among staff are therefore likely to reduce the quality of instruction and educational opportunities available to them. Disparities between students with and without disabilities may also accumulate over time, due to ongoing and cumulative effects of disadvantage (Tindal & Anderson, 2019; Stevens & Schulte, 2017).

Furthermore, none of the patterns of disadvantage discussed so far address the significant, ongoing role that racism continues to play in our education system. Overwhelmingly, students are assigned to schools based on neighborhoods that are highly segregated by racialized identity and socioeconomic status, directly determining students' access to educational opportunity. Academic tracking then exacerbates issues of access by further segregating students within the same school. Moreover, tracking disproportionately affects students of color and students from low-income families, in addition to ELs (Gamoran, 2010). The significant overlap between EL status and other kinds of marginalization suggests that English learner students face intersectional disadvantages. Although I do not fully explore the relationship between teacher attrition and EL student outcomes from an intersectional lens, due to data and space limitations, I do consider in my discussion how future work could more explicitly examine intersectionality in teacher attrition research.

I discuss intersectionality because it offers another important lens for thinking about how disadvantages accumulate for individuals. ELs may face overlapping challenges, not only because public schools often undervalue the linguistic and cultural assets of multilingual learners, but also due to ableism, racism, and other forms of marginalization. Recognizing these many layers is critical for understanding inequalities in access to educational opportunity—and how differential teacher attrition might contribute to them in multiple ways. Although I avoid passing judgment on individual teachers for their role in this process, I do argue that it is important to fully understand whether and how teacher attrition might operate as a mechanism of disadvantage. The state has a constitutional obligation to provide all students with equal access to a sound basic education, which implies a demand for fairness in educational opportunity—the implications of which I discuss next.

Fair Opportunity in Education

Philosophical debate persists in articulating a coherent standard by which to measure whether educational inputs or outputs are (sufficiently) fair or just. In this dissertation, I center the democratic equality perspective of fair opportunity in education articulated by Anderson (2007). Briefly, Anderson argues that a democratic society demands that positions of power and influence must "be so constituted that they will effectively serve all sectors of society, not just themselves… This requires that elites be so constituted as to be systematically responsive to the interests and concerns of people from all walks of life." In order to actualize this arrangement, Anderson argues, advanced education must be available to people from all walks of life, ensuring that positions of power and influence are not held only by individuals from advantaged backgrounds—since those individuals (without meaningful opportunities to develop authentic relationships with people from disadvantaged backgrounds) would lack the knowledge and skills necessary to lead a democratic society. Anderson concludes that this standard requires an integrated elite, which in our society is largely based on access to college education. In short, "every student with the underlying potential should be prepared by their primary and middle schools to be able to successfully complete a college preparatory high school curriculum" that allows them to access a four-year college.

Anderson explains that the demand for a sufficiently integrated elite serves the interests of advantaged individuals by providing them opportunities to gain the cultural knowledge and skills necessary to be eligible for positions of power and influence, while simultaneously serving the interests of less advantaged individuals by providing them opportunities to access more elite status. In this way, less advantaged individuals are accorded a positional good that "counterbalances the positional advantages the prosperous obtain from investing more resources in their children's academic preparation." Assuming that the elites are genuinely responsive to everyone's interests, the value of other individuals' higher education would redound to everyone, ensuring democratic equality by offering every person a fair opportunity to acquire elite status through public education. In short, I take the view that the K-12 public education system owes English learner students equal access to a college preparatory curriculum. I will say more about what additional obligations this implies in the next subsection on non-ideal theory.

In the context of English learner education within Wisconsin, however, a few points are worth emphasizing. Currently, the English-first educational model that dominates EL instruction limits more than just the EL students who do not have access to more efficacious BLBC options. Programs that devalue the linguistic and cultural assets of multilingual learners also infringe on the many potential benefits for society that these students could bring to colleges and careers if they were supported in cultivating those assets. I offer two brief reasons to care about the potential detrimental effects of devaluing multilingual students' linguistic and cultural assets. Recognizing the increasing interconnectedness of our world in both economic and political spheres—including the globalization of commerce and information—it is more important than ever to prepare young people for a multicultural, plurilingual world. Furthermore, even within the United States context, we find overwhelming evidence of linguistic and racialized bias across essential fields distal to the education system, including both public and private healthcare, medicine, politics, legal studies, incarceration, and more. In addition to the moral and ethical obligations to equalize outcomes for students of marginalized backgrounds, there are also strong practical reasons to maximize equality in access to educational opportunity and invest in multilingualism for the benefit of society.

Fair opportunity to attain elite status through education is only one component of ensuring democratic equality under this framework, however. Anderson also notes that individuals must have the "internal capacities and external resources to enjoy security against oppression," and that certain other conditions must be met as well for all individuals to function as equals within society. Provided these assumptions, inequalities in educational attainment are justified so long as those inequalities benefit everyone, including the less advantaged. Anderson also maintains that such a conception of educational justice is workable within the constraints of our unjust world. Although the K-12 public education system in Wisconsin, as currently administered, likely does not fulfill the above criteria—especially not for English learner students, as discussed in Chapter Two—it is nonetheless reasonable to think that certain changes to state law and policy could create conditions more favorable to realizing democratic equality through the public education system. I turn next to non-ideal theories of justice to articulate the basis for this claim.

Non-Ideal Theory

In laying out the context surrounding disparities in English learner outcomes within the Wisconsin public education system, I highlighted how Bilingual-Bicultural education has been persistently underfunded by the state legislature. On the one hand, it might strike some readers as confusing that lawmakers have failed to respond to the magnitude of evidence that English learners on average demonstrate substantially lower academic outcomes, relative to their never-EL peers. Some readers might wonder why legislators have not acted on evidence that bilingual education promotes EL outcomes, especially given the state's dramatic disparities between racialized groups. On the other hand, legislators might disagree about whether the state has an obligation to provide bilingual education—especially when K-12 public education in Wisconsin is already underfunded for all students. Disagreements over evidence or the effectiveness of policy alternatives could also derail the policymaking process (Brighouse, Ladd, Loeb & Swift, 2016). Therefore, in presenting evidence of disparities in teacher retention and how they correlate with English learner outcomes, I hope simultaneously to accomplish several related goals. I first aim to identify teacher retention as a meaningful predictor of disparities in access to educational opportunity for English learners. Second, I aim to articulate justification for targeting teacher retention as a policy-relevant way to improve equal access to educational opportunity. Finally, I hope to raise practical suggestions for policies that might promote a more just educational system through increased teacher retention, especially in schools where students face disproportionate disadvantages.

As such, an important motivating assumption in this work is that teachers' employment decisions are malleable. In the face of entrenched inequalities and systemic injustices, educators could propose policy interventions that incentivize teachers to invest their careers in the schools where students are often multiply disadvantaged. At the same time, not all theoretically potential policy options are politically feasible—or, indeed, possible given the limitations that societies face. Non-ideal theory considers, as Anderson (2007) puts it, "workable criteria of justice in educational opportunity for our currently unjust world." Social arrangements and the policies that govern them must therefore be possible given certain parameters and assumptions. Educators in Wisconsin face substantial challenges that constrain their ability to fulfill their constitutional obligation to provide all students with "equal access to a sound basic education." Those constraints disproportionately affect marginalized students, including emergent bilinguals. This dissertation seeks to understand whether teacher attrition plays a role in exacerbating those disparities. If it does, that knowledge may help expand the policy alternatives available for equalizing access to educational opportunity. Even if we accept as fixed the "radical internal conflict" that characterizes the political process in funding education in Wisconsin, and further accept that teachers may have individual preference that collectively contribute to disparities in access to educational opportunity, changes to incentive structures may help overcome such tensions (Flowerman, 2024). I argue that the evidence I present justifies pursuing policies to reduce teacher attrition as a feasible way to reduce disparities for ELs.

Summary

In this empirical study, I document how English learners are disproportionately exposed to higher rates of both annual teacher attrition and chronically high staff instability at the school level. In addition, I provide evidence that higher teacher attrition rates are associated with slower growth in academic English proficiency, translating to wider disparities in ELs' access to instruction and educational opportunity. I connect these findings to broader patterns of educational disadvantage, highlighting how disadvantages are likely to accumulate over time. I argue that the constitutional obligation to provide equal access to a sound basic education—in addition to the ethical obligation implied by a democratic equality perspective of fair opportunity in education—demands that we address sources of disadvantage that contribute to disparities in access to educational opportunity. Given the evidence, I conclude that promoting teacher retention—especially within disadvantaged schools—is one way the state can, and should, promote equal access to educational opportunity.

Finally, I feel it is important to acknowledge that within this work I focus primarily on the disadvantages faced by multilingual learners and the ways many ELs are marginalized within the K-12 public education system. I would like to re-emphasize, however, that EL students possess tremendous assets—not only linguistic and cultural assets, but ways of being and knowing that are intrinsically valuable for those students and for society as a whole. To honor and value these assets, we must integrate and fully include multilingual learners in our schools, identify barriers to their inclusion, and eliminate or mitigate those barriers to the extent possible. Given the assumption that policy changes to promote teacher retention in disadvantaged schools are likely politically feasible, I now describe a research design aimed at providing valid evidence for educators and policymakers interested in promoting equal access to fair opportunity in education. Specifically, I examine ELs' exposure to teacher attrition and whether attrition rates correlate with English proficiency growth.

CHAPTER FOUR: RESEARCH DESIGN

Introduction

In the following analysis chapters, I explore the relationship between teacher attrition and English learner outcomes in Wisconsin's K-12 public schools. Specifically, I address the following three research questions:

1) To what extent are English learner students in Wisconsin exposed to different annual teacher retention rates at the school level, on average, relative to their never-EL peers?
2) To what extent are English learner students in Wisconsin disproportionately exposed to chronically high staff instability at the school level?
3) To what extent are teacher retention rates at the school level correlated with individual-level growth in academic English proficiency, as measured by ACCESS gain scores?

To do so, I leverage a combination of large longitudinal datasets, using publicly available administrative data about Wisconsin's teachers to document school-level rates of teacher attrition matched to de-identified student data provided by the state Department of Public Instruction (DPI), tracking all K-12 public school students in Wisconsin longitudinally over time. I supplement with school and district information from the Stanford Educational Data Archive (SEDA) and use the combined data to explore teacher attrition patterns and how they correlate with student outcomes.

The first analysis (Chapter Five) presents a range of descriptive statistics about students, teachers, and schools across Wisconsin. It focuses on average differences between English learner students and their never-EL peers—not only in terms of individual student characteristics, but also in average demographics of schools they attend and average teacher characteristics in schools with high EL enrollment. After presenting those basic statistics, I document trends in teacher attrition rates in Wisconsin, including evidence that some student subgroups—including English learners—are more likely to attend schools with very high teacher attrition rates. I document how emergent bilingual students are disproportionately exposed not only to higher annual teacher attrition, but also to the kind of chronic instability that researchers describe as the "revolving door" problem.

The next analysis (Chapter Six) explores the extent to which school-level teacher retention is correlated with individual-level growth in academic English proficiency, as measured by the standardized test used in reclassification decisions for ELs. Previous research has documented how delayed English acquisition can contribute to social stigma and low academic content proficiency, as well as barriers to accessing more advanced academic content and higher-quality instruction. Examining the entire population of ELs in Wisconsin, I employ a fixed-effects regression model to identify how strongly a school's teacher retention rate in a given year is associated with students' gain scores on ACCESS, the state's annual English language proficiency assessment. I control for observable time-variant student, school, and district characteristics, in addition to time-invariant factors at the student, school, and district-by-year level.[9] Findings from this dissertation identify the extent to which school-level teacher retention rates correlate with delayed English language proficiency for emergent bilingual students, potentially contributing to further disadvantages.

Data and Variables

This dissertation combines data from multiple sources into one large longitudinal dataset. I start by downloading publicly available information on the universe of K-12 teachers working in Wisconsin public schools from the years 2005 through 2019.[10] The "All-Staff" files are maintained by the Department of Public Instruction (DPI), which reports basic demographic information about each teacher (e.g., binary gender, race/ethnicity, degree level) as well as information about their assignments—including school, salary, position type, bilingual certification, and experience. I use these data to create school-level predictors that are then connected to individual students for one large, student-level longitudinal dataset that follows all K-12 students in Wisconsin over time.

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[9] The fixed effects included depend on the model specification being considered, as described later in this chapter.
[10] I exclude the years affected by the COVID-19 pandemic, which merit separate analysis. Poole & Sahakyan (2024) document, however, that average proficiency for ELs has declined while disparities for Hispanic ELs have increased.

I use the All-Staff files to calculate annual teacher retention rates for all Wisconsin public schools based on where teachers were employed in the previous year.[11] Although it is possible that some instructional continuity is lost when teachers are reassigned from one grade level to another (Hanushek, Rikvin & Schiman, 2019), the theory of action underlying my analysis assumes that school-level retention is conducive to staff stability and cohesion in supporting EL instruction. I therefore count teachers as retained if they are employed by the same school in the subsequent year, regardless of changes in subject or grade-level assignment. Teachers are only included in the retention rate if they belong to one of the position codes listed in DPI reports on teacher attrition, plus areas categorized as Bilingual or ELL-specific staff.[12] I also use the All-Staff data to generate school-average teacher experience,[13] salary, degree level (measured as the proportion with at least a master's degree), and bilingual certification rate (based on DPI records of BLBC certification).

Thanks to a generous partnership with DPI, I am able to join these teacher data (aggregated to the school level) to de-identified individual-level administrative data on all Wisconsin students enrolled in K-12 public schools during the years 2006 through 2019. I begin by combining six separate files from DPI into one dataset. The first five include individual-level data for all students attending public schools in Wisconsin from 2006-2019, reporting their enrollment, attendance, demographics (binary gender, race/ethnicity, IEP status, FRL status, English learner proficiency,

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[11] DPI first assigned teachers time-stable unique identifiers, known as "file numbers," starting in 2009. Linking teachers via file number to pre-2009 records is achieved by matching on name and birth year (Roth, 2017). Staff who do not have a DPI-assigned file number are assigned an ersatz file number using the same matching process. In the very few cases where different teachers are erroneously matched because they share the same name and birth year, those observations are dropped from the analysis. Dropped teachers account for less than 0.1% of all observations.
[12] Positions include Department Head (18), Teacher in Charge (19), Teacher (53), Speech/Language Pathologist (84), Librarian (86), Library Media Specialist (87), and Instructional Technology Integrator (88); Bilingual/ELL teaching area codes added for this analysis include 23, 395, 984, and 985.
[13] Due to data quality issues, I correct individual teacher experience using teachers' longitudinal records. Specifically, in cases of obvious errors (i.e., total experience in year "t" being lower than total experience in year "t-1"), I identify each teacher's initial experience level and add one year for each additional year they work in a Wisconsin K-12 school.

grade retention, and migrant indicator), state standardized test performance, and (where present) ACCESS test data. The sixth DPI file contains school-level characteristics. Code written for the statistical software program STATA imports each file and prepares its data before merging it into a single dataset. Much of this preparation is routine (e.g., recoding binary variables from "Yes" or "No" to numeric, aligning school year variables that are formatted differently across files). A few steps in the cleaning process are worth noting, however.

Student-level records include standardized test performance for students in all grades 3-8. Wisconsin has administered statewide standardized assessments in mathematics and English language arts for all students in grades 3-8 since 2005. The Wisconsin Knowledge and Concepts Exam (WKCE) was administered in November of each year from 2002 until 2014, after which students took the Badger Exam for one year in 2015, and then the Forward Exam from 2016 on. Because of these test changes, as well as state shifts in the cut scores that determine proficiency (adjusted in 2013 to align with broader standards-setting processes), I normalize students' scores. Math and ELA test scores therefore have a mean of zero and standard deviation of 1, based on the statewide mean and standard deviation for all students in the corresponding grade and year.

Because the Wisconsin Student Assessment System (WSAS) data and ACCESS for ELLs data are reported in long form, with multiple rows per domain tested for each student in each year, I first reshape these files to condense all test data into one row per student per year. Because many students attend multiple schools within a school year, I also aggregate all attendance data across all observations for that student in that year. I merge this aggregated attendance data to both the student demographic file, the reshaped WSAS and ACCESS data, and the school-level data for the enrollment schools associated with each student record. I add a binary variable to reflect students who transfer mid-year, identified as 1 if the student had multiple enrollments and 0 otherwise. For students who attended multiple schools within a given school year, a school must be assigned for the purposes of the analysis. In all cases, students are assigned to an enrollment school and an accountability school, which may differ from their enrollment school. I assume that a student's enrollment school is the one listed in their demographic file, but I update the accountability school in cases where state standardized test data are present to reflect the school listed in that file. I add a variable to reflect the school associated with a student's ACCESS test results, if any are present (which is only the case for English learner students).

A similar procedure is used to establish a student's grade level when it is inconsistent across multiple data sources: I assign the student to the grade level reported by the state standardized test data. If a student's grade level is present in the ACCESS file but missing in the WSAS file, the grade listed in the ACCESS file takes precedence over the grade listed in the demographic file. In cases where inconsistencies remain (i.e., no WSAS or ACCESS data can be used to corroborate the student's grade level), I interpolate the student's grade level based on the grade level reported in the prior and subsequent reporting year. A small number of students with standardized test data reported across multiple schools are dropped when I cannot determine which test results to use or because they have test data reported for multiple grade levels within the same year. Other students are dropped because they lack grade information entirely. Observations dropped for these reasons constitute less than 0.01% of all observations within the final student dataset.

For English learners, the individual-level records from DPI also report English proficiency scores for each year they are classified as an EL, according to state records. These scores represent performance on WIDA's Assessing Comprehension and Communication in English State-to-State for English Language Learners (ACCESS) test, an academic English proficiency exam that largely determines reclassification for ELs in Wisconsin (as well as other states and territories within the

WIDA Consortium). The ACCESS test evaluates students' English language proficiency in four domains: Reading, Writing, Speaking, and Listening. Scores from the four domains are combined to calculate a Composite Scale Score (CSS) from 100 to 600. Literacy skills (Reading and Writing) are weighted 35% each, and Oral language skills (Listening and Speaking) are weighted 15% each. CSS is grade-specific and vertically scaled, so EL students' overall progress in academic English acquisition can be compared across evaluation points. The outcome of interest in Chapter Six is therefore individual-level CSS growth, representing progress toward reclassification.[14] Students' performance is compared to English language development standards, rather than the expected performance of monolingual English speakers; only EL-identified students take the ACCESS test. Across all grade levels, more than 90% of EL-identified students have a valid CSS in each year.

Alongside yearly test performance, the combined dataset also tracks demographic variables reported by the school, including each student's gender (assigned male or female), race (coded as Native American, Asian, Black, Hawaiian or Pacific Islander, Hispanic, White, or Mixed Race),[15] and whether the student has an Individualized Education Program (IEP). Consistent with recent studies investigating the relationship between IEP status and English acquisition, students are coded either as Ever-IEP or Never-IEP according to whether they ever receive the IEP designation at any point in their DPI records (Sahakyan & Poole, 2022; Umansky, Thompson, & Diaz, 2017). The dataset also reports what language students speak at home; these have been grouped into the four home languages, other than English, that are most commonly spoken among Wisconsin ELs

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[14] Actual reclassification decisions are made based on a student's Composite Proficiency Level (CPL), which is derived from the student's CSS according to grade-specific cut-points. Because scale scores represent interval data, while proficiency levels do not, it is more appropriate to compare CSS growth over time, rather than changes in CPL.
[15] The federal Office of Management and Budget recently updated its guidance on categorizing individuals based on membership in racialized groups, incorporating "Hispanic or Latino" into a list of "race and/or ethnicity" categories. Throughout the duration of this study, however, any student identified in school administrative data as Hispanic was counted as Hispanic for the purposes of DPI data collection and reporting, regardless of any other racialized identities they reported or held. I am therefore unable to disentangle Hispanic status from racialized identity in my analyses.

(Spanish, Hmong, Chinese, Arabic), plus an indicator for all other home languages.[16] I additionally calculate, for each student and year, the proportion of peers in their school who share their home language, since schools that meet minimum thresholds of same-language speakers are obligated to provide BLBC programs for those students (and receive limited state aid to do so). Time-variable student characteristics include chronic absenteeism (defined by DPI as attending fewer than 90% out of a minimum 90 school days enrolled), whether the student has transferred schools mid-year, whether the student is repeating their current grade level, and whether they have been identified as a migrant student, as well as eligibility for Free or Reduced-Price Lunch (FRL status).

After reshaping and merging the six separate data files, I consolidate the data into a single longitudinal dataset with one observation per student per year. Once the data are prepared, I drop all Pre-K observations. Next, I drop students whose grade level progressions are inconsistent, increasing by more than two years (i.e., skipping more than one grade at a time) or regressing (e.g., going from 3rd grade in 2012 to 2nd grade in 2013).[17] Finally, because English learner status is central to the analysis, I perform several data cleaning procedures to ensure that ELs are tracked consistently over time. Student records in years prior to first identification as EL are dropped,[18] meaning that an EL's first year as an EL is the first time they are counted in the data. Demographic variables are updated to reflect EL status in cases of discrepancy (e.g., the student is identified as never-EL but has taken ACCESS). I also add several variables to categorize students: Ever-EL, Long-Term EL (LTEL), and Reclassified EL. Although I focus on current EL-identified students, the longitudinal data permits also analyses by Reclassified (former) EL status for future research.

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[16] Importantly, students' home language—as well as racialized identity, IEP status, FRL status, and other demographic indicators—are predictive of differences in students' outcomes not because of their identities per se, but rather because features of the education system influence outcomes in ways connected to identity (i.e., mechanisms of disadvantage).
[17] Observations dropped due to inconsistent grade-level progress account for under 0.6% of all observations.
[18] Pre-identification observations account for less than 2% of all ever-EL observations.

Because school and district characteristics are also likely to influence both teacher attrition and individual student outcomes, I also include a range of variables aggregated at the school and district levels. Covariates at the school level include logged total enrollment, student-teacher ratio, the proportion of students who demonstrate proficiency in standardized tests of academic content (averaged across math and English language arts),[19] the proportion of EL students, the proportion of same-home-language ELs, the proportion of students with disabilities, the proportion of students eligible for Free or Reduced-Price Lunch (FRL), Herfindahl-Hirschman index of racial diversity,[20] and whether the school is in an urban, suburban, town, or rural area.[21]

To account for other potential differences across districts, I also connect student records to the Stanford Educational Data Archive (SEDA). SEDA contains a broad array of characteristics potentially relevant to EL outcomes. I include time-varying district-average socioeconomic status, unemployment rate, an index of socioeconomic segregation, and district proportion of students identified as English learners. Unfortunately, the information available through the SEDA data only connects for the years 2009-2019, a range much smaller than the data from DPI. In order to supplement the district-level information from SEDA, and in particular to account for variation in school funding, I also add districts' annual per-pupil expenditures from the Common Core of Data, downloaded from the Elementary/Secondary Information System (NCES) and inflation-adjusted to 2019 dollars according to historical data on the Consumer Price Index from the U.S. Bureau of Labor Statistics. A list of variables used in the analysis is reported in Table 1 of the Appendix.

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[19] The proportion of peers who demonstrate proficiency on standardized tests is only available for those grade-year combinations where students in Wisconsin were tested in either math or English language arts (or both). Dropping the measure of peer proficiency from all models results in similar findings, reported in Table 12 of the Appendix.
[20] The Herfindahl-Hirschman index is a widely accepted measure of concentration (U.S. Department of Justice, 2023). Racial diversity is calculated by squaring the proportion of enrollment for each racialized identity category and then summing the resulting numbers. The index ranges from 0 to 1, where an index over 0.25 indicates high concentration.
[21] I categorize schools into the basic four types used by the National Center for Education Statistics, as reported in the Elementary/Secondary Information System from the Common Core of Data.

Analytical Samples

The combined dataset includes over 11 million observations from over 1.9 million students, including nearly 950,000 observations from more than 170,000 students identified as ELs, matched with teacher retention rates calculated based on over 2 million observations from 275,000 teachers across more than 2,000 public schools within Wisconsin's 421 districts. These data allow me to present comprehensive descriptive statistics about the landscape of English learner education throughout Wisconsin, focusing especially on the distribution of EL students and how it may correlate with disparities in exposure to teacher attrition. For my first and second research question, focusing on students' exposure to annual teacher attrition and chronic staff instability, I analyze nearly the entire population of students attending Wisconsin K-12 public schools. I exclude only combined schools (grades K-12) and junior high schools (grades 7-9), which together serve under 2.5% of students and 2% of ELs, and schools that enroll fewer than 20 students (due to cell size restrictions aligned with DPI data practices). This population-level data permits highly precise comparisons between student subgroups in terms of their school-average characteristics, including annual teacher attrition rates, across a variety of school contexts. I discuss in more detail how I approach these descriptive analyses in the next subsection.

Whereas the (descriptive) analysis in Chapter 5 compares EL students to their non-EL peers in terms of exposure to teacher attrition, the regression analysis in Chapter 6 examines a potential relationship between teacher attrition and opportunity gaps for English learners. In other words, I shift from comparisons between ELs and non-ELs to an analysis of observations exclusively from the English learner population. The analysis therefore focuses on the correlation between annual teacher retention rates and individual ELs' growth in academic English proficiency, a measure of the extent to which EL students can access instruction. Because only EL students take the English language proficiency assessment, I narrow the analytical sample to only EL students. I also restrict observations to academic years 2009 to 2019, since district-level data from SEDA are not available prior to 2009. Because peer proficiency is an important variable to control for in my approach to identifying a relationship between teacher retention and EL outcomes, I also restrict the sample to grade-year combinations in which average peer proficiency can be calculated.[22] This excludes all observations in early elementary grades (K-2), as well as observations from high school grades (except 10th) after 2014, when Wisconsin stopped testing 9th, 11th, or 12th graders in math or ELA.[23] Because my research question is focused on English proficiency growth, I also restrict the sample to only observations for which ACCESS gain scores can be calculated.[24]

These exclusions produce a population sample of 231,862 English learner observations—a little over 58% of the overall sample of ELs for which a gain score can be calculated. From these, I drop 6,700 observations from combined (K-12) and junior high schools (grades 7-9), resulting in a reduction of 3% of observations and a potential sample of 225,162 observations. 650 of these are missing school-level teacher retention rate (0.3%) and therefore excluded. 409 observations are dropped due to missing school or district-level covariates (0.2%). Following Biasi (2018), I drop 13,465 observations from Milwaukee in 2015 and all schools in Kenosha due to data quality issues; this results in a loss of 6% of observations. I drop 24,263 observations from students who transfer schools, reducing the sample by 10% to focus on the within-school relationship between teacher retention and EL student outcomes, resulting in a preferred sample of 186,375 observations. With student fixed effects, this sample is reduced to 159,379 observations. Descriptive statistics for the

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[22] Because the state data do not connect individual students to specific teachers, average peer proficiency is calculated at the school-by-grade level, rather than at the classroom level.
[23] As noted, I also present analytical findings from a robustness check model that includes the dropped observations, instead dropping peer proficiency rate as a covariate. These results are presented in Table 12 of the Appendix.
[24] For less than 0.7% of observations, I impute CSS gain as average annual growth from the prior non-missing CSS.

potential, preferred, and reduced samples are presented in Tables 4 to 9 of the Appendix.[25] Before analyzing these data, however, I first explore disparities for ELs in exposure to teacher attrition.

RQ1: Differential Exposure to Teacher Attrition

For my two first research questions, I leverage quantitative descriptive analysis. I begin by presenting summary statistics about Wisconsin students, schools, and teachers. This sketch of the state's educational landscape serves as the backdrop for my inquiry into the role teacher attrition may play in expanding opportunity gaps between emergent bilingual students and their peers. I focus first on population-level descriptive statistics on student demographics and standardized test performance, highlighting how averages differ for emergent bilingual students relative to peers never identified for English language support services. I then document school-level disparities in FRL eligibility rate, standardized test performance, and average teacher characteristics for schools serving high or low proportions of ELs, reporting averages and descriptive statistics in Table 3.

Because patterns of educational advantage and disadvantage are connected to patterns of segregation, I document the distribution of EL students across different school types and locales, graphing changes in Wisconsin's EL population over time. I juxtapose those trends with graphs of average teacher retention rates over time in different school types and locales. Finally, I document subgroup-average exposure rates to annual teacher attrition and chronic staff instability, presenting disparities across various demographic groups. I graph how disparities have fluctuated over time, focusing on disparities in annual teacher attrition by EL status. These graphs provide evidence for my first research question—namely, documenting whether English learners are disproportionately exposed to higher annual teacher attrition rates in Wisconsin, relative to their never-EL peers.

[25] As a robustness check, I also present in Table 11 of the Appendix findings that include all dropped observations—regardless of whether they were dropped due to data quality or because the student transferred schools between years.

RQ2: Differential Exposure to Chronic Instability

For my second research question, examining whether EL students are disproportionately exposed to chronically high staff instability, I continue to use descriptive analysis. I operationalize "high" instability in two ways. First, I operationalize an absolute threshold of 70% retention as the cutoff for high instability—schools that lose more than 30% of their teachers in a given year count as part of the high instability group for that year. Second, I assign each school in each year to a quintile according to its average retention rate, relative to all other schools in that academic year. Only schools in the lowest quintile of retention rate count as high instability for that year. Finally, I count a student as experiencing *chronically* high staff instability if they spent at least half of their academic years in a school with the highest (absolute or relative) teacher attrition rates, calculating exposure rates separately for elementary, middle, and high schools. I present graphs documenting the disparities between ever-EL and never-EL students in their exposure to chronically high staff instability using both the absolute and relative approaches. The descriptive statistics and graphical analyses in Chapter 5 thereby present evidence of opportunity gaps at the between-school level for emergent bilingual students. Chapter 6 then deepens this analysis by examining whether teacher attrition rates also correlate with opportunity gaps *within* schools for emergent bilingual students.

RQ3: Teacher Attrition and English Acquisition

After exploring whether English learners in Wisconsin are disproportionately exposed to higher annual teacher attrition rates, for my third research question I investigate whether teacher attrition rates are associated with within-school opportunity gaps for ELs. Specifically, I leverage multiple regression analysis and fixed effects to estimate the correlation between school-level teacher retention and individual growth in academic English proficiency, as measured by ACCESS gain scores. Prior research has documented how delayed acquisition of academic English language proficiency can contribute to social stigma and reduced academic outcomes for ELs, as well as barriers to accessing more advanced content and high-quality instruction. A significant correlation between teacher retention and individual gain scores on the ACCESS test could therefore be reasonably interpreted as preliminary evidence that school-level teacher retention correlates with EL students' access to instruction and, arguably, educational opportunity. Although my methods do not justify claims of any causal relationship between teacher retention and EL outcomes, I document whether higher annual teacher retention rates are statistically associated with gains in English language development for EL students in Wisconsin. This section outlines the methods used to credibly quantify that relationship, should it exist.

To begin, the credibility of a statistical association between teacher attrition and ACCESS gain scores will depend on several theoretical assumptions. Most importantly, I assume that ELs develop academic English proficiency in a growth process that occurs over time. This assumption aligns with many empirical studies of how students learn English. Academic English especially takes time to master, relative to oral conversation skills (Hakuta et al., 2000). Students therefore receive instruction and targeted language support throughout each school year, testing annually to determine whether their academic language abilities meet (or exceed) the state's threshold for reclassification as Fluent English Proficient. Studies suggest that many ELs reach that benchmark after three to five years of targeted English instruction, while other students receive support for seven years or more before reclassifying. Regardless, it is a process that occurs over time, and I model it according to that assumption.

I therefore model English proficiency as a growth process in which a student's gain score, measured as the change in Composite Scale Score points from the prior year to their current year performance on the ACCESS test, is a linear function of the number of years that student has been enrolled in public school within the state, plus a quadratic term (i.e., the square of the number of years they have been enrolled in public school within the state). The quadratic term accounts for possible non-linearity in growth. These is also evidence that students tend to exhibit slower growth at higher proficiency levels, independent of entry grade, a phenomenon known as "lower is faster, higher is slower" (Sahakyan & Cook, 2014). This pattern implies that, as students gain proficiency, their growth rates become slower over time. Therefore, in addition to linear and quadratic time, I also include lagged Composite Scale Score as a predictor of current-year growth, reasoning that students who are closer to reclassification will demonstrate less growth on average, compared to students at lower English proficiency levels, regardless of how long the student has been learning English.[26] Although gain scores implicitly control for prior ability, yearly gains also depend on the student's initial proficiency level (Umansky et al., 2022).[27]

Apart from these assumptions about the functional form of English language growth rates (controlling for linear and quadratic time plus lagged Composite Scale Score), my naïve model includes only annual school-level teacher retention rate and indicator variables for school types: whether the school receives Title I funding, whether it is a charter school, and its locale type (urban, suburban, town, rural). Table 10 in the Appendix charts this base model and eight other regression models that build on it with increasing complexity. I next briefly describe the variables in each subsequent model, as well as assumptions underlying those additions, before summarizing the identification strategy in my preferred model.

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[26] Although I do not observe students' prior exposure to English, including any formal instruction that may have been received outside the state, over half of EL students enter the dataset in primary grades, the vast majority of which enter in kindergarten. Unobserved differences in students' prior exposure to English is therefore assumed to be uncorrelated, on average, with their growth rates—conditional on lagged Composite Scale Score.

[27] One important note is that I do not observe LIEP type for students, and important factor in ELs' academic English language acquisition. As noted, however, the majority of EL students in Wisconsin receive services in ESL programs.

Model 2 adds grade and year fixed effects.[28] Grade fixed effects account for the assumption that schools may organize EL education differently depending on grade level. Anecdotal evidence suggests that the first and last grade levels within a group are important transition periods for many students—for example, educators may view 5th grade as the last opportunity for ELs to reclassify before transitioning into middle school, where services and supports may be different from what a student has experienced. School leaders may therefore adjust programs to prioritize transition years differently than other grades.[29] Year fixed effects, meanwhile, account for overall time trends within the state, such as economic recessions, that might be correlated with teacher retention rates and student outcomes. Together, these limit variance explained by the model to only the amount each student's individual gain score deviates from the overall average for each grade in each year, regressed on grade- and time-demeaned covariates, as well as indicator variables for school types.

Model 3 adds both time-invariant and time-varying individual-level covariates, reasoning that some of those individualized factors may, on average, contribute to differences in students' ACCESS score growth. The model includes each student's binary gender, whether they have an Individualized Educational Plan, whether they are eligible for Free or Reduced Price Lunch (FRL), what home language they speak (Hmong, Chinese, Arabic, Somali, or any other, with Spanish as the reference group), and what race/ethnicity the student is identified as (Native American, Asian, Black, Hawaiian or Pacific Islander, multiracial, or white, with Hispanic as the reference group).[30] Including these demographic characteristics in the model reflects the assumption that schools and

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[28] The separate contributions of grade and year fixed effects to the explanatory power of the model are reported in the findings section (Chapter Six). Coefficients for grade and year fixed effects are suppressed, but available on request.
[29] Grade fixed effects also increase precision by controlling for potential differences in ACCESS scaling across grades.
[30] Although students are categorized within state data as belonging to one of these subgroups, where racialized status is conflated with ethnic identity, I recognize race as a socially-constructed phenomenon that maintains systemic power dynamics within a racialized society (Bonilla-Silva, 1996). Nonetheless, I present student data as it is constructed and consumed by the state, as those categorizations are used to justify state and federal policies targeting racial disparities.

districts may provide different resources for students based on those characteristics—for example, schools with at least a minimum threshold of students with the same linguistic background are required by Wisconsin state statute to provide bilingual programs for those students, and they also receive additional financial resources from the state for those programs.[31] Students who share that home language may benefit from those programs. Additional time-varying characteristics at the student level include chronic absenteeism (defined by DPI as attending fewer than 90% out of a minimum 90 school days enrolled), whether the student is repeating their current grade level, and whether they have been identified as a migrant student.

Model 4 adds (time-varying) school-level average observable covariates of students who attend the same school—in other words, average peer characteristics. These covariates control for the percentage of students who demonstrate proficiency on state standardized tests, the percentage who have IEPs, the school's FRL eligibility rate, and the proportion of students identified as ELs, as well as school size and student/teacher ratio, a Herfindahl-Hirschman relative diversity index, and the proportion of ELs who share the student's home language. I also include interaction terms for proportion same-language and each home language, again with Spanish as the reference group. These covariates reflect two assumptions: that individual students' English acquisition rates are influenced by peers attending the same school, and that teachers' decisions on whether to attrite are influenced by the characteristics of the students they teach.

Another concern is that the characteristics of teachers at a school might correlate with both teachers' employment decisions *and* how effectively those teachers can support students' growth. For example, in a school with a high proportion of EL students, teachers may be less likely to leave

[31] School-level thresholds are 10 students in grades K-3, 20 students in grades 4-8, or 20 students in grades 9-12. Once a school meets the threshold, that school's district is statutorily required to institute a Bilingual-Bicultural program in the relevant home language. The district also becomes eligible for reimbursement of a percentage of the costs incurred.

if they have access to other teachers certified in Bilingual-Bicultural education. English learners in that school may also be more likely to develop academic English proficiency quickly. Model 5 therefore adds (time-varying) average teacher characteristics, including inflation-adjusted average salary, average years of experience teaching, the proportion of teachers with an advanced degree, and the proportion of teachers certified in Bilingual/Bicultural education.[32]

Model 6 adds (time-varying) district covariates which might also correlate with teachers' employment decisions and students' scores on the ACCESS test. These include inflation-adjusted per-pupil expenditures on elementary and secondary school programs, the proportion of students identified as ELs, district-average socioeconomic status, district-average unemployment rate, and a relative diversity index that captures the level of socioeconomic segregation within the district. This model specification includes all observed individual, school, and district-level characteristics assumed to be relevant in identifying a correlation between school-level teacher retention rates and student gain scores on the ACCESS test.

Model 7 builds on this specification by adding school fixed effects. These account for any unobserved time-invariant differences between schools that may be confounded with school-level teacher retention rates and students' English proficiency gains. One concern might be, for instance, that ACCESS score gains only appear to be positively correlated with teacher retention rates when we fail to account for the fact that students are nested within schools. Once we appropriately group the data, it is possible for that overall trend to change or disappear (i.e., Simpson's Paradox). One reason this might be the case is that not all schools experience the same kinds of teacher attrition. Schools with more resources (which tend to serve whiter, wealthier populations) tend to experience high teacher retention overall, and attrition at these schools might not be detrimental to students'

[32] Average teacher salaries and school finance data are inflation-adjusted by the Consumer Price Index to 2019 dollars.

outcomes. Disadvantaged schools, meanwhile, are more likely to experience the "revolving door" phenomenon. Lower average retention rates in those schools may have more negative externalities due to overall lower resources or a reduced institutional capacity to weather high-turnover shocks, negatively affecting student outcomes. In this study, however, I am interested in identifying an overall correlation between teacher attrition rates and English proficiency gains for EL students, regardless of what school they attend. School fixed effects limit the analysis to variation in each school separately. In this specification, the average size of test score gains EL students make in a year with one teacher retention rate is compared to the average test score gains EL students make in the same school, but in years with different teacher retention rates (while continuing to subtract overall state trends from the equation via year fixed effects). The model therefore identifies the relationship of interest more narrowly by accounting for a limited form of endogeneity.

Model 8 expands by adding district-year fixed effects. The concern here is that unobserved shocks may affect both the probability of teacher transitions and quality of instruction. In this case, we know that a significant policy shift was instituted during the time period of the study when the state legislature passed the Wisconsin Budget Repair Bill (Act 10). For many districts, that policy came into effect between the academic years 2011 and 2012; for other districts, though, preexisting collective bargaining agreements delayed the implementation by multiple years. Empirical studies have shown that Act 10 affected both teachers' employment decisions (Biasi, 2018) and students' performance on standardized tests (Baron, 2018). Because different districts were affected by the policy shift in different years, district-year fixed effects account for the district-specific timing of that significant policy shift, as well as regional variation in time trends like economic downturn.[33]

[33] For example, there may exist some endogeneity between teacher attrition rates and student outcomes due to the Great Recession, which occurred during the time of the study. District-year fixed effects also absorb the time-varying district-level covariates introduced within Model 6, which is why these covariates no longer appear in Model 8.

Model 9 enhances Model 8 by adding student fixed effects. Student fixed effects implicitly control for time-invariant factors at the student level, such as individual ability or motivation to learn English, and therefore eliminate student-level demographic characteristics from the model.[34] One downside of student fixed effects is that they limit the analysis to only the range of retention rates that a given student experiences throughout their trajectory within a given school. The benefit is that the model also controls for potentially endogenous sorting of students to schools—a major concern in identifying a relationship between teacher retention and ACCESS gain scores. Because students are not randomly assigned to schools, but the primary predictor varies at the school level, cross-sectional analyses may yield biased results by attributing differences in English growth to teacher retention rates instead of differences in the underlying student populations, their enrollment patterns, or the schools they attend.

For example, families with more advantages might select into well-resourced schools that happen to have higher teacher retention rates. If EL students from these families tend to outperform students from less-advantaged families, who on average attend schools with lower retention, then unobserved differences between schools in families' average advantaged status could inflate the correlation between teacher retention rate and growth in English language proficiency. Conversely, if students in schools with lower retention rates are independently likely to develop English more slowly—perhaps due to greater disadvantages they face, relative to students at other schools—then we may not accurately estimate the contribution of school-level teacher retention. Furthermore, if advantaged schools—due to greater resources and generally higher stability—are able to counsel out ineffective teachers while retaining effective staff, then attrition in advantaged schools may be positively associated with English proficiency growth regardless of student selection patterns.

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[34] Student fixed effects, in combination with year fixed effects, also absorb linear time-in-program as a covariate.

Student fixed effects control for both possibilities, but the approach relies on an assumption that families do not delay enrolling their child in a school based on the school's teacher retention rate in that year. If families strategically and systematically enroll their children based on when their school is expected to retain more teachers, that could bias the correlation of interest. I believe this is a plausible assumption, given the constraints parents face enrolling children in schools and the fact that enrollment age is relatively inflexible. Variation in unobserved student characteristics is also assumed to be uncorrelated with other predictors—for example, I assume that changes in students' motivations are not systematically correlated with teacher retention rates at their schools.

This model continues to assume districts have different policies, programs and procedures that influence both teacher retention and student outcomes. It also assumes that schools implement programs and practices differently over time—even within the same district. District and school fixed effects therefore control for time-invariant differences across contexts that could influence the relationship between retention and EL outcomes, while district-year fixed effects account for variation in time trends across the state. Combining these predictors results in the following model:

$$(A_{isdt} - A_{isdt-1}) = \alpha Retention_{isdt-1} + X_{sdt}\beta + \mu_i + \sigma_s + \gamma_t + (\delta_d * \gamma_t) + \varepsilon_{isdt}$$

Where $(A_{isdt} - A_{isdt-1})$ is an individual EL's gain score on the ACCESS test in year *t* for student *i* in school *s* and district d, $\alpha Retention_{isdt-1}$ is the parameter of interest (prior year teacher retention rate), X_{sdt} represents a set of time-varying covariates at the school and district level with vector of parameters β, μ_i represents student fixed effects, σ_s represents school fixed effects, and γ_t represents year fixed effects, while $(\delta_d * \gamma_t)$ captures district-by-year fixed effects, and ε_{isdt} represents idiosyncratic error. Covariates at the school level include the proportion of EL students, the proportion of students with disabilities, the proportion of FRL-eligible students, enrollment, student-teacher ratio, and average observable teacher characteristics. District covariates include the proportion of EL students, per-pupil expenditures, socioeconomic segregation, and an array of socioeconomic indices. Robust standard errors are clustered at the school level to account for how student outcomes may be correlated between observations within the same school.

Because the main predictor of interest is school-level teacher retention rate—and because I focus on within-school opportunity gaps—my preferred analysis restricts the sample to students who remain in the same school throughout their enrollment in elementary, middle, or high school.[35] Apart from this restriction, the analytical sample includes all ELs from 2009-2019 attending Wisconsin public elementary, middle, or high schools with at least four other ELs and a minimum 10 students overall, assuming a teacher retention rate can be calculated for that school and year,[36] average peer proficiency on state standardized tests can be calculated for that year and grade,[37] and a Composite Scale Score gain can be calculated for that student.

A potential concern with the student fixed effects in Model 9 is that it limits the analysis to within-student variation in teacher retention. Model 8, meanwhile, analyzes the total variation in retention rates for a given school throughout the entire period of the study, rather than the range in retention rates that an individual student experiences within a given school. The tradeoff is failing to account for time-invariant characteristics at the individual level that might be confounded with ELs' ACCESS growth. Given the observable covariates, however, I prefer Model 8 for quantifying a relationship between school-level teacher retention and English acquisition. Findings provide evidence of the extent to which teacher retention correlates with English acquisition rates for ELs, arguably representing a measure of access to instruction and equal educational opportunity.

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[35] Including students who transfer schools changes the size and significance of estimated coefficients only marginally. These results are presented in Table 11 of the Appendix, which reports findings including all dropped observations.
[36] Because retention rates cannot be calculated for schools in their first year, the analysis ignores a small number of disruptions in teacher retention rate due to changes in school identifiers after reorganization events.
[37] Results dropping peer proficiency as a covariate, expanding the sample, are presented in Table A.6 of the Appendix.

CHAPTER FIVE: EXPOSURE TO TEACHER ATTRITION

Introduction

A growing body of research explores patterns in public school teacher attrition. Educators are concerned about attrition not only because of the administrative costs associated with replacing teachers who leave, but also because staff transitions likely have a direct impact on the quality of instruction available to students. Evidence suggests that, even when teachers who leave tend to be less effective than teachers who stay (Boyd et al., 2011; Sass et al., 2012), attrition itself still reduces the average experience and effectiveness of a school's staff (Rockoff, 2004). In addition to the instability introduced by high turnover rates, replacement teachers are also more likely to be novices who have not yet benefited from the substantial returns to experience (Harris & Sass, 2011; Papay & Kraft, 2015). This is especially true for urban schools that serve higher proportions of low-income students, lower-performing students, students of color, and Black students especially (Ronfeldt et al., 2013). These schools also tend to be where English learners are concentrated, and they are typically the schools where attrition rates are highest (Boyd et al., 2011).

School demographics vary widely across different locales, however, and the similarly wide variation in teacher attrition rates cannot easily be explained by observable characteristics alone (Papay et al., 2017). Both the causes and effects of teacher attrition are therefore likely to be highly context-dependent. Meanwhile, most research on teacher attrition currently available comes from a small number of states and districts with quality data, primarily from New York, North Carolina, Florida, and Texas. Recognizing the important role of context in analyzing teacher attrition and its relationship with opportunity gaps, this chapter provides an overview of the educational landscape for English learners in Wisconsin, the schools they attend, and the teacher attrition patterns across those schools. I present evidence that English learner students in Wisconsin are disproportionately exposed to higher annual teacher attrition rates and disproportionately enrolled in schools that regularly experience high rates of teacher attrition, which I refer to as chronic staff instability. This pattern of disproportionate exposure is further shown to be consistent across locales and over time.

Although my larger project is interested in how teacher attrition may expand opportunity gaps *within* schools, differential exposure between schools remains a very important layer in how marginalized students—including English learners—may be disproportionately disadvantaged by teacher attrition. This chapter therefore adds to the literature on differential attrition in at least three ways. First, by presenting descriptive analyses of teacher attrition rates in Wisconsin, I expand on the evidence available to educators concerned about teacher attrition and its potential effect on educational opportunity, as well as its distribution. Second, by documenting students' exposure to chronic attrition, I build on recent work advocating for further study of teacher turnover from a longitudinal perspective (Holme et al., 2017). Third, by highlighting persistent disparities between English learners and their never-EL peers in exposure to attrition, I lay the groundwork to examine whether emergent bilingual students are more likely to be adversely affected by high attrition or chronic staff instability in their schools. In doing so, I pay special attention to the role of context.

A clear look at the background context is valuable because student outcomes are influenced by a wide variety of factors, especially for ELs. Sahakyan (2024) developed Picture 1 as a model to depict how individual identities and abilities intersect with many overlapping layers of family, school, and community characteristics, in addition to local, state, and federal policies that shape emergent bilingual students' educational experiences. Recognizing the role that context plays in opportunity gaps and patterns of student performance, my inquiry therefore starts by exploring some of the factors likely to inform our understanding of school-level teacher attrition and how it may affect English learner education.

I begin by presenting summary statistics about Wisconsin students, schools, and teachers. I first examine population-level descriptive statistics like student demographics and standardized test performance, noting how averages differ for English learners relative to the state's never-EL student population. I document differences between ever-EL and never-EL students in terms of school-level demographics and average teacher characteristics, highlighting disparities in average annual teacher attrition. As patterns of educational advantage and disadvantage are historically associated with patterns of racial and socioeconomic segregation, I next discuss the distribution of English learner students across different school types and locales, highlighting how concentrated EL enrollment is correlated with characteristics common to disadvantaged schools. I therefore explore exposure to annual teacher attrition by student demographics, noting disparities for certain student subgroups, including English learners. Finally, hypothesizing the potentially salient role that chronic exposure may play in how teacher attrition rates may affect educational disadvantage, I present evidence that English learners are significantly more likely to be exposed to chronically high attrition compared to never-EL peers.

Collectively, the descriptive statistics in this chapter provide preliminary evidence that, in addition to the intersectional barriers that English learners often face in terms of socioeconomic disadvantage, structural racism, and linguistic marginalization in schools, English learner students in Wisconsin are 1) concentrated in schools that tend to be more disadvantaged, in terms of average teacher experience and annual teacher retention rate, relative to schools with lower EL enrollment; 2) disproportionately exposed to higher annual teacher attrition rates, relative to never-EL students; and 3) disproportionately exposed to chronically high teacher attrition, relative to never-ELs. After documenting these disparities in exposure, I turn in Chapter Five to potential negative externalities associated with higher teacher attrition, including slower English proficiency growth for ELs.

Summary Statistics

Table 2 reports population-level averages for various demographic characteristics, both at the observational (i.e., multiple years per student) and student level (counting each student once, with time-variant characteristics averaged across years within each student). Three columns for each level report averages for never-EL and ever-EL students, as well as overall means. The table also reports average student and teacher characteristics aggregated at the school level, both for schools with under 15% EL enrollment and schools with at least 15% EL enrollment. I selected 15% as the threshold for high EL enrollment because these schools (usually elementary schools in urban areas) serve fewer than 8% of never-ELs but over 42% of ever-ELs in the state, and nearly half of students receiving EL services. Exactly one-third of students who attend such schools will have received EL services at some point. Although the exact threshold is ultimately arbitrary, schools with at least 15% enrollment do differ significantly from other K-12 public schools in terms of their demographics, standardized test scores, and average teacher characteristics.

Focusing first on the student level of analysis, public school students in the state are slightly more likely to be identified as male (51.2%) rather than female (48.8%). About half (47%) are eligible for free or reduced-price lunch. An overwhelming majority are identified as white (71%); about 10% identify as Black, 10% as Hispanic (considered a racial/ethnic category in state data), 4% as Asian, and 1% as indigenous American, while about 5% identify as multiracial. Meanwhile, English learners are only identified as white about 7% of the time. 57% are identified as Hispanic, 29% as Asian, 3% as Black, and 3% as multiracial. ELs are much more likely to be eligible for free or reduced-price lunch (82%), but much less likely to have an IEP—only 15%, versus 18% for all students. Within the overall student population, 9% are identified as EL at some point and almost 2% are considered “long-term” (LTELs), meaning they have received at least six years of English support services.[38]

Examining the observation level of analysis, several noteworthy trends stand out. Although only 18% of students are identified as ever-IEP, they are somewhat overrepresented at 20% of the total observations. Ever-EL students, meanwhile, are underrepresented at the level of observation: for every grade after 2nd, fewer and fewer ever-EL students persist in the data, from a high of 9.3% to a low of 6.6% by grade 12. Within the ever-EL population, however, Spanish-speaking students are overrepresented at 50% of EL observations, whereas only around 46% speak Spanish at home. Hmong is the second-most common home language for ELs at 14% of students, but over 16% of observations. About 2% of ELs speak Chinese, 1.4% Arabic, and 1.3% Somali, all of which have fewer observations than expected. 36% of EL students speak one of more than 200 other languages, but these students account for only 30% of observations in the data.

53% of ever-EL students enroll in urban schools, compared to only 25% of never-ELs; enrollment rates across EL status are relatively similar in suburban areas (24% compared to 27%), while far fewer EL students enroll in town and rural areas (23% combined, compared to 46% for never-ELs). These differences are largely consistent with EL enrollment patterns in many states (Orfield & Lee, 2005; Gándara & Orfield, 2012; Heilig & Holme, 2013).

In terms of standardized test performance, only 27% of ever-EL students score at or above proficiency in math, compared to 47% of never-EL students. For English, the disparity is greater: 37% compared to 60%. However, these figures fail to differentiate between ELs who have recently entered EL status and those who have reclassified. Multilingual learners who do reclassify perform

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[38] Students who first appear in the data in 2014 and have not yet reclassified are excluded from this calculation, as they do not yet have sufficient history to determine whether they will be captured by the LTEL label.

as well or better than never-ELs on state standardized tests: 49% of former ELs score at or above proficiency in math and 61% in English, compared to 47% and 60% respectively for never-ELs.

Turning to the school level of analysis in Table 3, an average school with under 15% EL enrollment has 407 students, 2.9% of whom are multilingual learners in EL programming, while another 1.4% of students are reclassified (former) ELs. In schools with at least 15% EL enrollment, however, average enrollment jumps to 443, while the percentage of students in EL services rises to 28.7% and the proportion of reclassified ELs rises to 3.6%. These differences are all highly statistically significant, suggesting that multilingual learners are more likely to attend schools that are much larger than average and enroll greater proportions of English learners, meaning that ELs tend to be concentrated in the same schools.

The data also show other statistically significant differences between English learners and their peers in terms of the schools they attend. Whereas the average school with under 15% EL enrollment serves a student population 37% eligible for free or reduced-price lunch, the average school with at least 15% EL enrollment serves a population 66% eligible for those benefits. The average K-12 school in Wisconsin with under 15% EL enrollment is 78.5% white, 7.6% Black and 5.2% Hispanic; the average Wisconsin school with high EL enrollment, however, is 40.3% white, 12.7% Black and 29.7% Hispanic. Schools with high EL enrollment are served by teachers with 1.3 fewer years of experience, on average, compared to schools with low EL enrollment; those teachers are also 2% more likely to have a graduate degree, however (52% vs. 50%), and they are paid more on average compared to the average across all Wisconsin schools ($58,189 per year vs. $56,071 per year). High-EL schools are also much more likely to be in cities, compared to low-EL enrollment schools. Finally, schools with high EL enrollment also have a lower average teacher retention rate at 79.2% compared to an average of 83.0% in schools with low EL enrollment.

English Learners in Wisconsin Schools

Figure 1 provides a histogram of school-level proportions of students who are identified as English learners across school types (elementary, middle, or high school). Both combined schools (grades K-12) and junior high schools (grades 7-9), which together serve under 2.5% of students, are excluded. The figure shows that there are far more elementary schools in Wisconsin (n = 1,338) than middle schools (n = 418) or high schools (n = 604), and that elementary schools serve higher proportions of English learner students on average—an average proportion of 7.2%, compared to 4.2% and 2.7% for middle and high schools, respectively.

Figure 1 – Distribution of Proportion EL by School Type

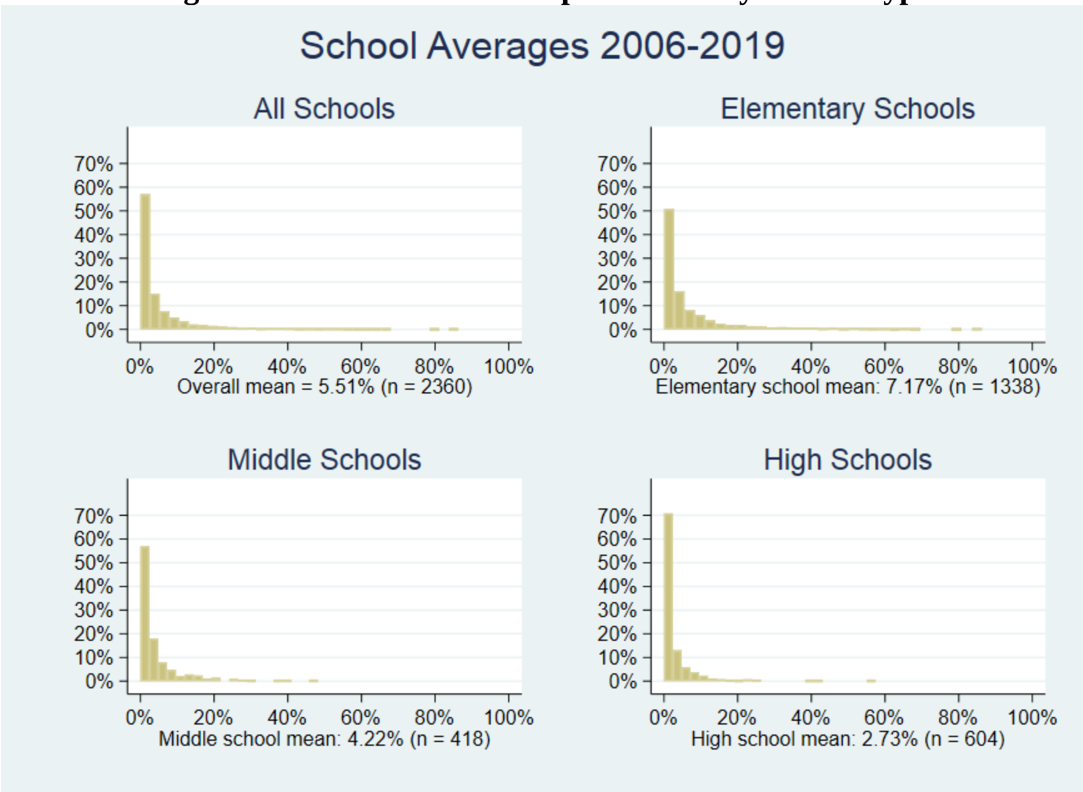
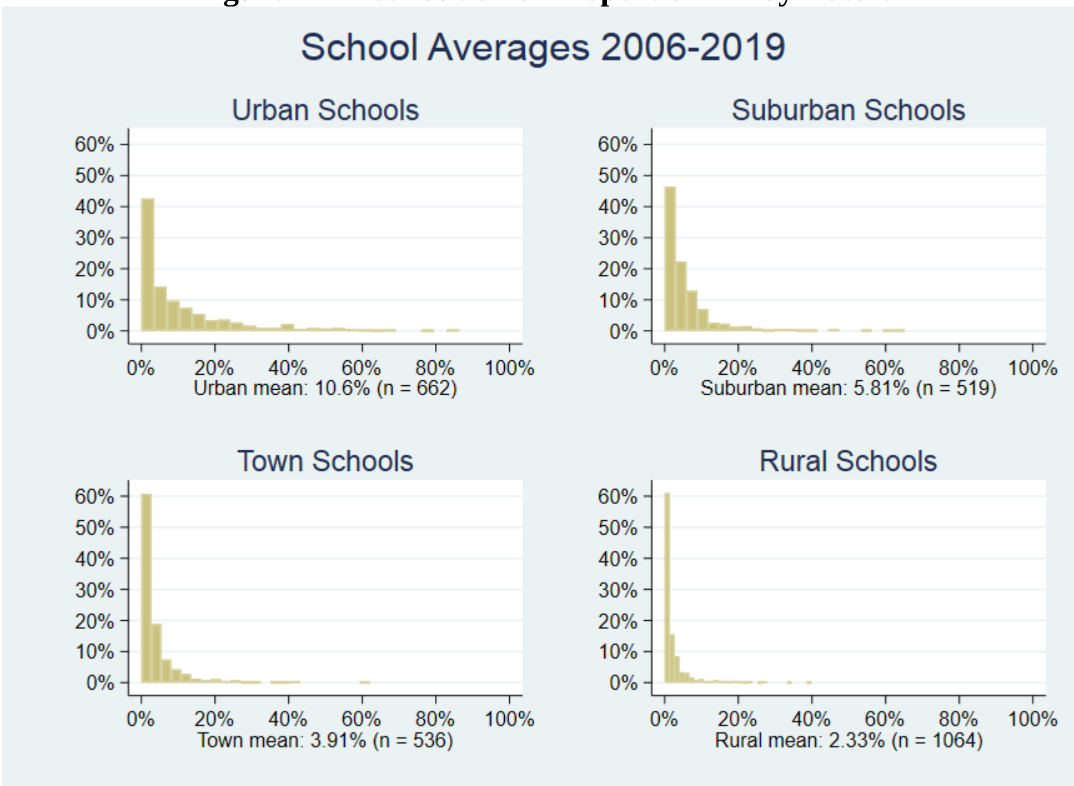


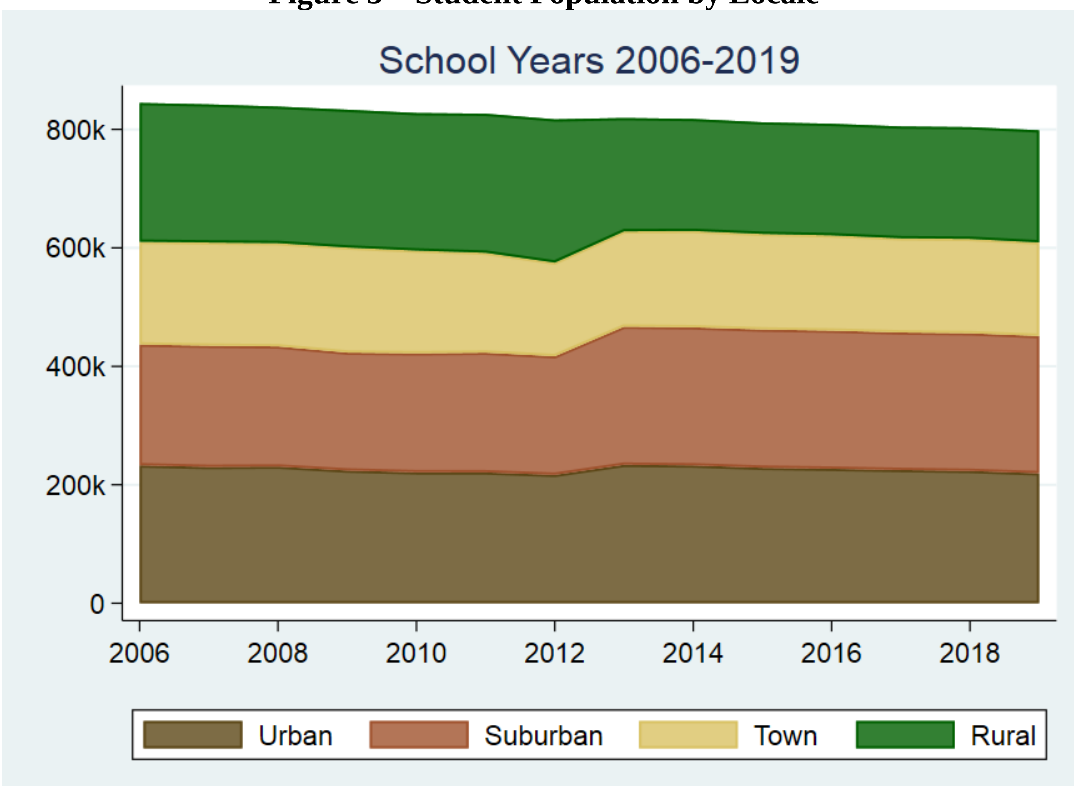
Figure 2 – Distribution of Proportion EL by Locale



Similarly, Figure 2 provides a histogram of school-level proportions of English learners by school locale (urban, suburban, town, or rural), as defined by the National Center for Educational Statistics (NCES). Urban schools enroll the highest proportion of ELs on average, a mean of 10.6% compared to 5.8% in suburban schools, 3.9% in towns, and 2.3% in rural areas. Urban schools are also more likely to enroll higher proportions of EL students, while schools in less urbanized areas exhibit distributions heavily skewed toward low proportions of ELs. The overall larger number of rural schools can affect means aggregated at the school level, however, and it is important to clarify what level of aggregation is appropriate for different statistics—for example, the next section on average exposure to annual teacher attrition will focus on disparities between student subgroups, and therefore aggregates teacher retention rates at the student level, rather than at the school level.

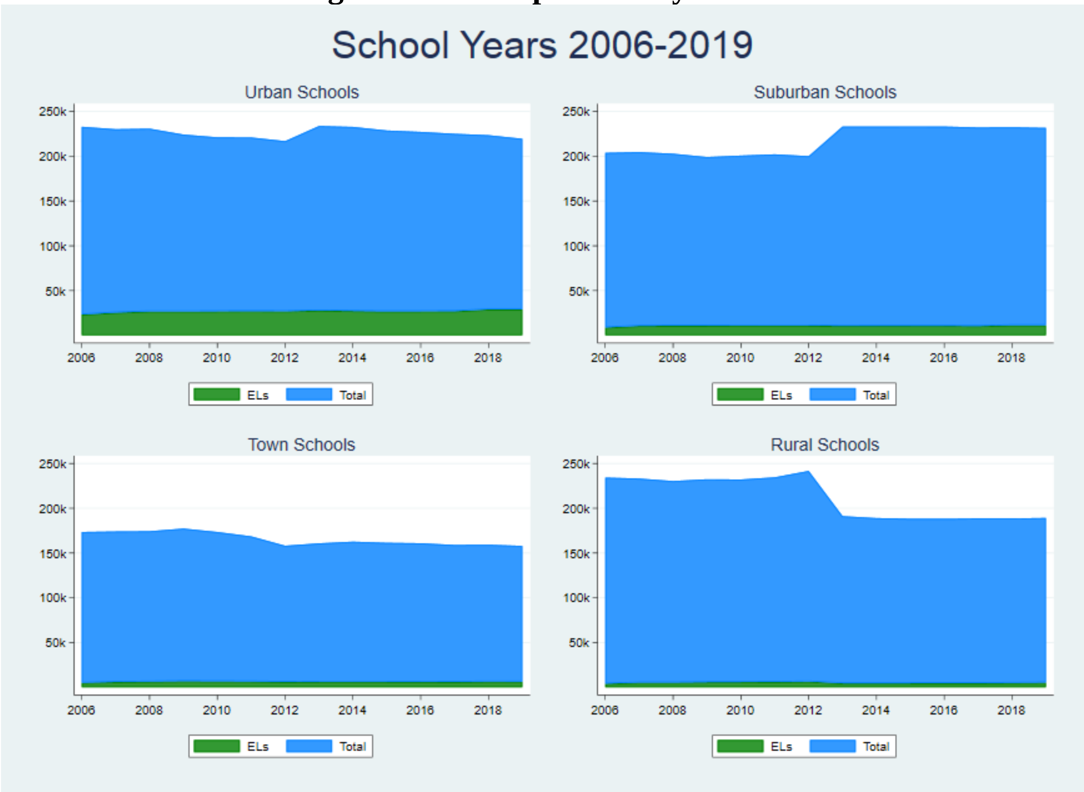
Figure 3 graphs the state's overall population of public school students from 2006 to 2019, with differently colored areas representing the four different NCES locales. Comparing Figure 3 to Figure 4, breaking out the English learner population relative to overall enrollment by locale, two prominent trends emerge. First, overall enrollment has historically been similar across locale, but English learner enrollment has not: far more ELs enroll in urban schools than in other settings (cf. Figure 2). Second, while overall public school enrollment declined during this time period, the number of students identified as ELs steadily increased—the 2019 EL population was about 28% higher than in 2006, while the overall count of ever-EL students grew from about 51,000 in 2006 to over 78,000 in 2019, an increase of 54%.[39]

Figure 3 – Student Population by Locale



[39] Note: the dramatic drop in rural enrollment from 2012 to 2013, commensurate with substantial increases in suburban enrollment, is not itself a trend—it corresponds with the introduction of population counts from the 2010 census, first used in the 2012-2013 school year to delineate metropolitan areas for NCES locale assignments (Geverdt, 2015).

Figure 4 – EL Population by Locale



Examining EL-specific enrollment by locale, Figures 5 through 7 show how most English learner population growth has come from urban enrollment. Even when many rural schools were redefined as suburban schools in 2013, those changes did not lead to an increase in suburban EL enrollment, the way they did for overall student enrollment. In fact, the number of suburban EL students receiving services actually decreased in 2013, relative to 2012, while the size of incoming cohorts remained stagnant outside cities. Instead, the one-year drop in rural EL enrollment appears to have been absorbed primarily by urban schools, where incoming cohorts continued to increase. Indeed, after a big bump across the state in 2007, new EL enrollment has remained largely stagnant in less populous areas, with some growth occurring in cities. This disproportionate enrollment of ELs in urban areas has important consequences for their exposure to annual teacher attrition.

Figure 5 – EL Population by Locale and School Type

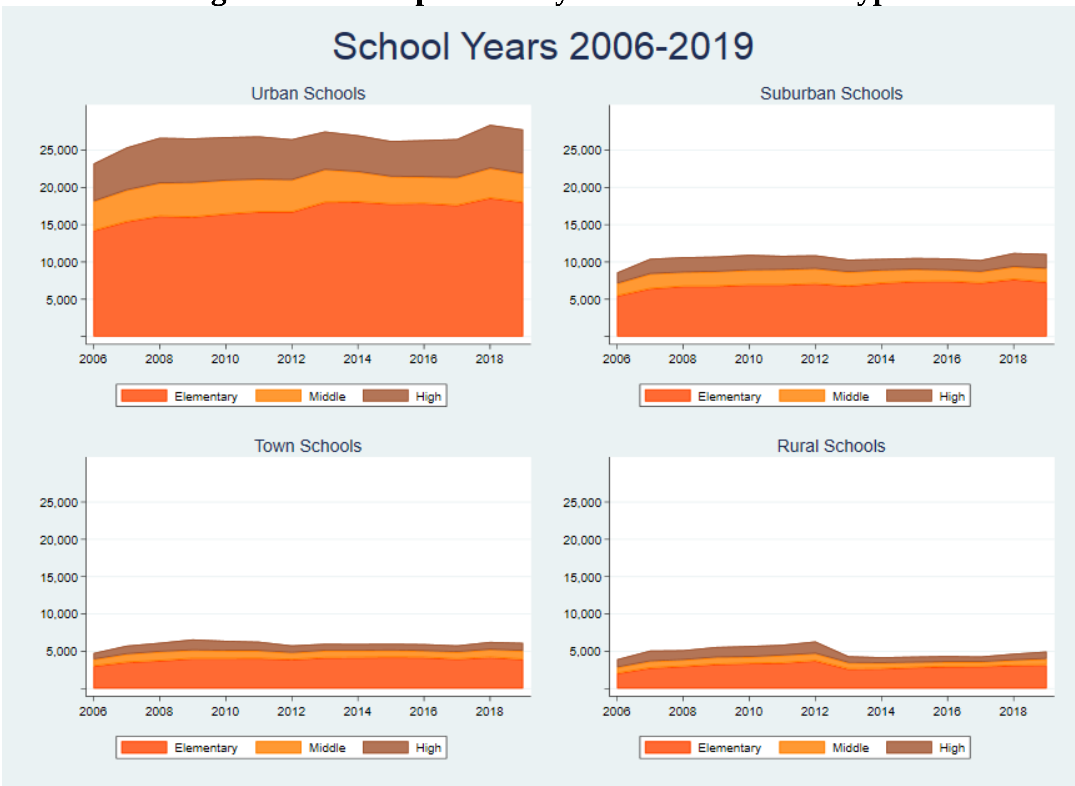
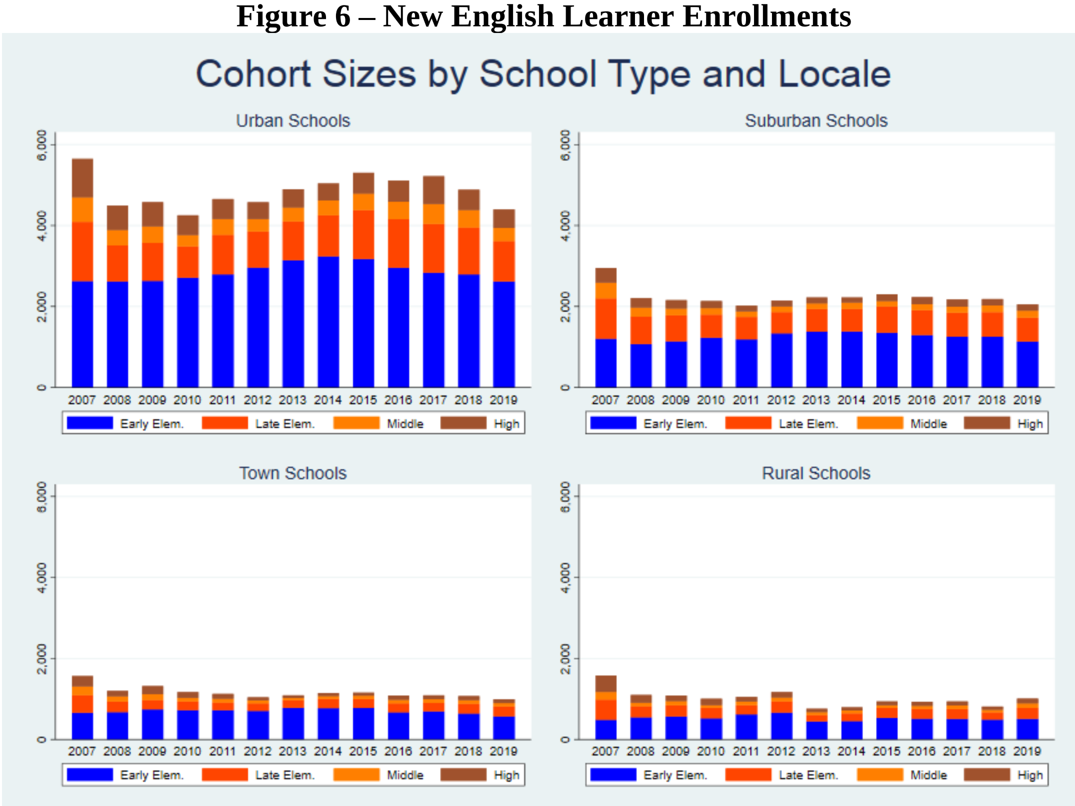
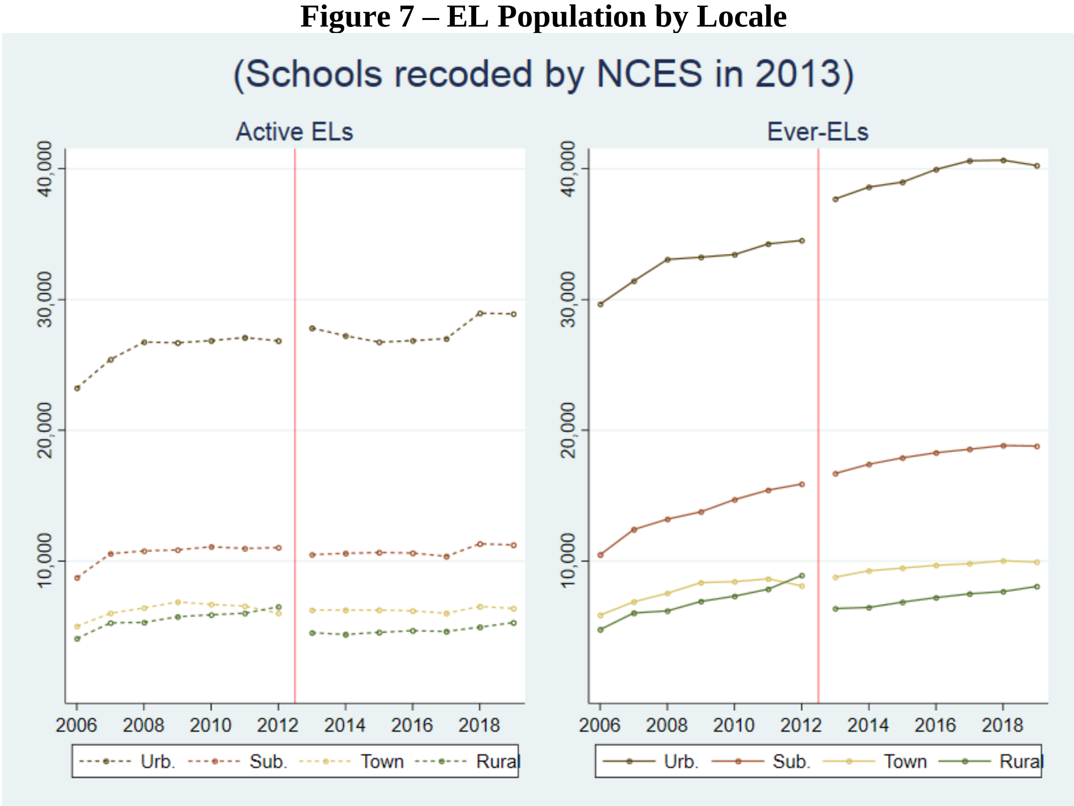


Figure 6 – New English Learner Enrollments



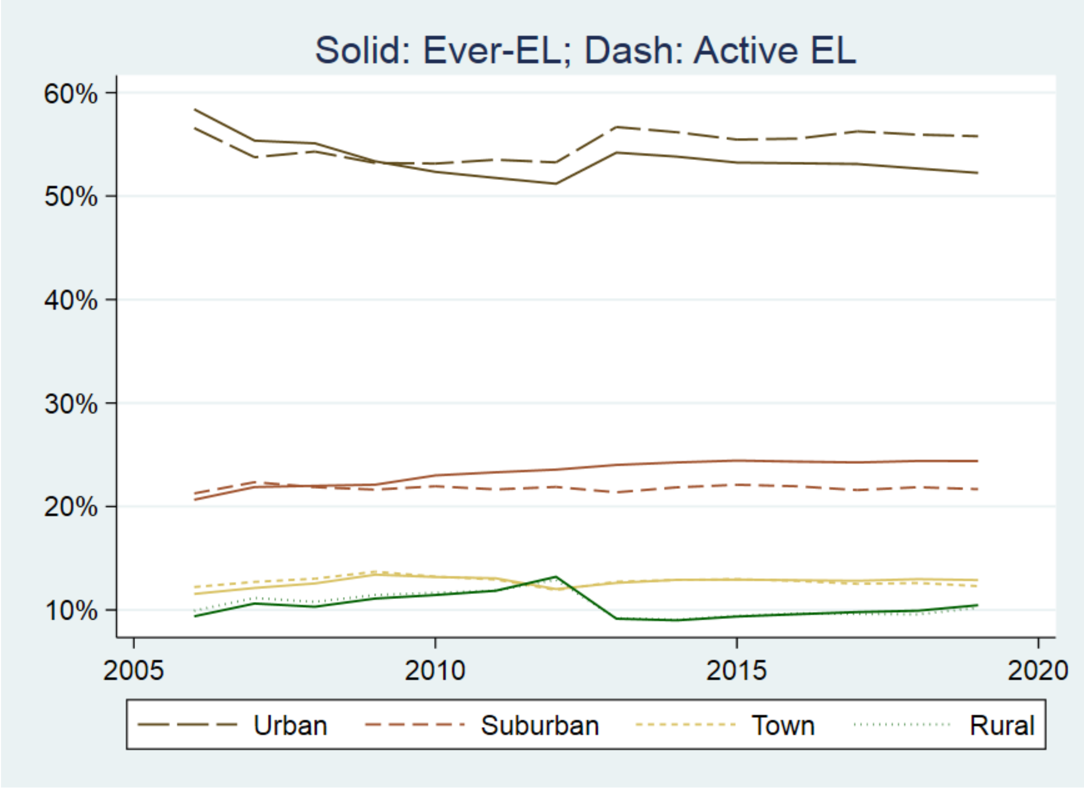
Two additional trends in EL enrollment are worth identifying, however. Figure 7 graphs the population of active ELs and ever-EL students respectively by locale. We see further evidence that NCES locale reassignments led to a drop in rural and suburban EL enrollment counts, absorbed primarily by urban schools. Whereas the population of active ELs (i.e., students receiving English support services) remained largely stagnant in the 2010s, though, the population of ever-ELs has continued to increase throughout all areas across the state—especially in cities and suburbs. This discrepancy between active EL and ever-EL population growth underscores the importance of following reclassified (former) ELs over their entire educational trajectories, rather than focusing only on students receiving services. After all, ELs may experience lingering effects from the time they spent in-program, such as delayed access to content and barriers to more advanced pathways. The analyses in later chapters therefore disaggregate reclassified ELs from never-EL students to how this subgroup may be differentially affected by teacher attrition.

Figure 7 – EL Population by Locale



Furthermore, Figure 8 demonstrates how EL enrollment trends can differ across contexts in nuanced ways. This graph breaks down the distribution of the active EL and ever-EL populations by the percentage of each subgroup enrolled in schools of different locales. Suburban active EL enrollment has remained, as discussed, largely stagnant over time, while urban EL enrollment has increased over the last decade—both in raw counts and as a share of the total active EL population. The suburban share of ever-EL students, however, has steadily increased relative to other locales, while the proportion of ever-ELs enrolled in cities has decreased over time. These trends could be explained by differential reclassification rates: if suburban ELs exit services relatively faster than urban ELs, the suburban proportion of ever-ELs would increase more quickly than the suburban proportion of active ELs. Likewise, if urban ELs remain in-program longer on average than ELs in other locales, the urban proportion of ever-ELs would decrease even if the overall population of English learners in cities continued to outpace EL enrollment in other areas.

Figure 8 – EL Distribution by Locale



In summary, the population of emergent bilingual students has increased substantially over the last decade or more in Wisconsin, even as overall enrollment has declined. While roughly equal proportions of the overall student population attend schools in cities, suburbs, towns, and rural areas, students identified for EL services primarily attend urban schools. EL enrollment has been increasing most rapidly in cities, but there are large and growing numbers of ever-EL students in suburban schools as well. Recognizing these nuances across different locales within the state, and acknowledging the incredible diversity of context that I have not been able to address within this limited space, I will continue to report on differences across locale types in addition to overall averages. Having documented trends in the population of interest of this dissertation, I turn now to school-level teacher attrition rates as an important indicator of access to educational resources. This variable will be the predictor of interest in analyzing my third research question, examining the correlation between teacher retention and EL student outcomes.

Average Teacher Attrition Rates

I first examine students' average exposure to teacher attrition rates in Wisconsin. Figure 9 graphs the mean annual teacher retention rate for all public schools, plus the mean annual teacher retention rates for elementary, middle, and high schools, aggregated at the school level. Similar to Figures 1 and 5, the very small number of junior high schools (grades 7-9), as well as combined schools with grades K-12, are excluded—these schools tend to have lower annual teacher retention on average, but only about 2.5% of students attend such schools. Retention rates for 2012 are clear outliers—an outsized number of teachers retired after the 2011 school year, in large part because many decided to retire before the implementation of Wisconsin Act 10. Teacher retention remained lower than average for several years before returning slowly to pre-Act 10 levels, albeit never reaching the high-water mark from 2010-2011, and then dipped again in 2019.

Figure 9 – Average Annual Teacher Retention Rate by School Type

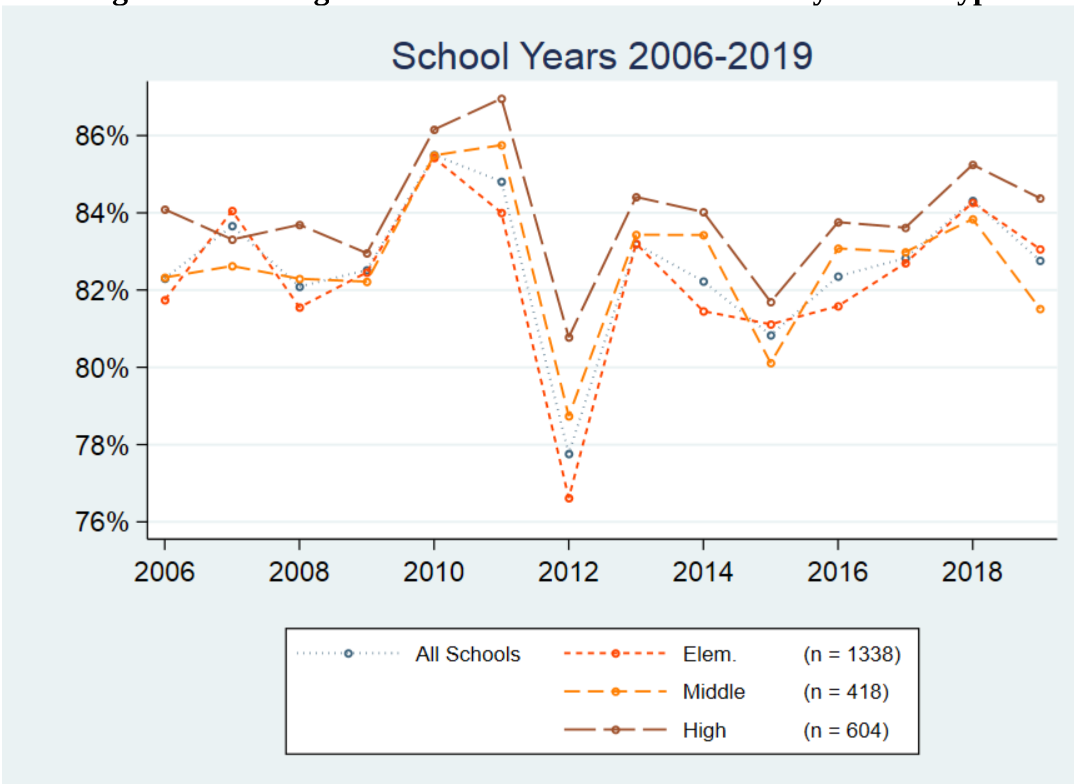


Figure 10 – Average Annual Teacher Retention Rate by School Type and Locale

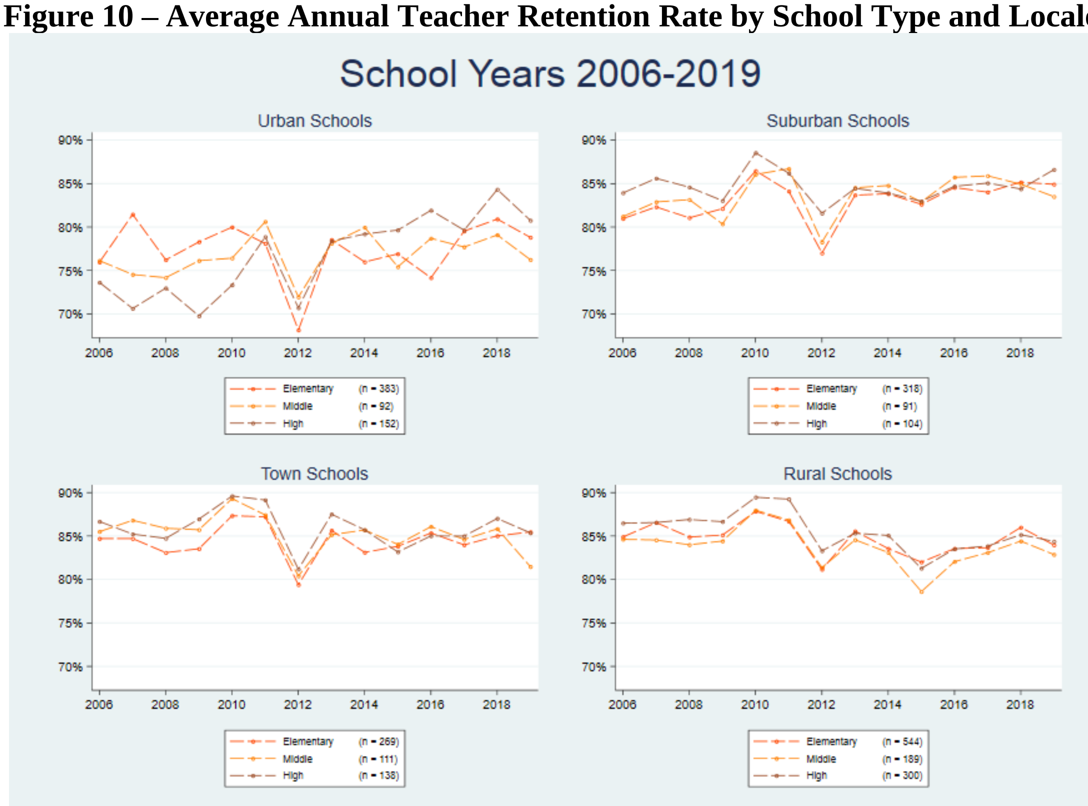
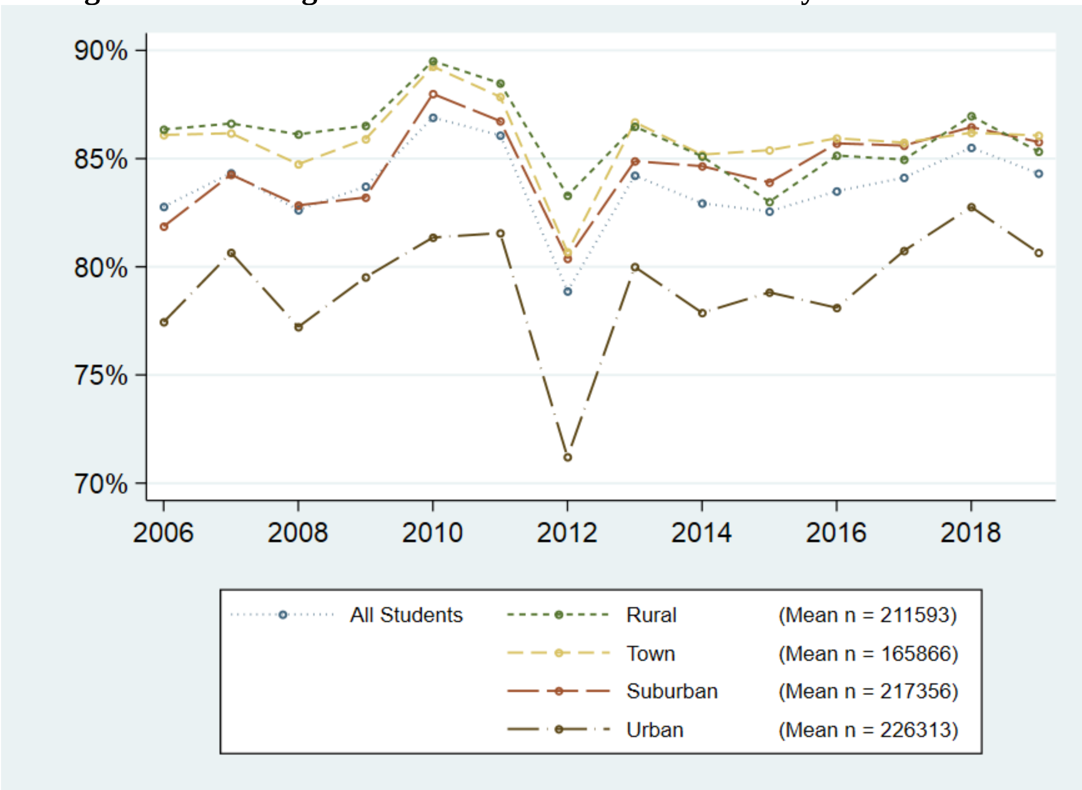


Figure 10 breaks down average school-level teacher retention by year for each school type (elementary, middle, or high school) within each of the four NCES locales. Overall, high schools tend to have the highest average retention rates, except for urban high schools prior to 2013, where they were lower than any school type in any locale. Within locales, schools of different types often follow similar trends in their retention rates over time, especially since 2012. Figure 11 shows how retention trends are also similar across locale. Across all school types, teacher retention rates were highest in rural schools prior to 2013. After that year, rural teacher retention decreased relative to town and suburban retention; suburban retention, meanwhile, has steadily increased.

Figure 11 – Average Annual Teacher Retention Rate by Student Locale



While Figures 9 and 10 aggregated retention rates at the school level, Figure 11 represents the population-average exposure to attrition, and therefore aggregates retention at the student level. In this figure we can see more clearly the large disparity between urban and non-urban schools: even at its highest, the annual average for urban students is barely higher than the lowest annual mean for students in any other locale. The disparity is salient because of the significantly different demographic compositions of urban schools, relative to schools in less urbanized areas: schools in cities are more likely to enroll higher proportions of English learners, students of minoritized racial identities, and students whose families qualify for assistance under federal poverty guidelines.

Exposure to Annual Attrition

Figure 12 graphs population-level disparities in teacher retention rates across demographic subgroups. As indicated by the red horizontal line, the overall mean for all observations is 83.66%. Each pair of columns displays the mean teacher retention rates for all observations identified with either a zero or one across various binary indicator variables. Differences across subgroups are all highly significant ($p < 0.001$ or greater) due to extremely large sample sizes, but the disparities vary dramatically in size. For example, across all observations for students identified as male, the average annual teacher retention rate is 83.65%, versus 83.67% for students identified as female—a difference of less than 0.002 standard deviations from the overall mean. The difference between students with and without IEPs is also relatively small at about 0.87%, or 0.08 SD, while the disparity across FRL status is about 3.16%, or 0.30 SD. The columns for FRL status indicate that students in households with incomes below federal poverty guidelines—or households that are otherwise eligible for subsidized school lunch—attend schools that retain 2.0% fewer teachers each year, compared to the overall mean, while students who do not qualify for school meals attend schools that retain about 1.2% *more* teachers each year, compared to the overall mean.

The next two pairs of columns show similar disparities. Students who are not identified as English learners are exposed to an average teacher retention rate of 83.82%, slightly higher than the overall mean, while the average English learner attends a school that only retains 81.04% of its teachers each year, a difference of 0.26 SD. Hispanic students, more than half of whom are at some point identified as EL, attend schools with an average annual retention rate of only 80.78%, or 0.30 SD lower than students who are not Hispanic. The largest disparity, however, is the one across Black racial identity: 76.10% compared to 84.37%, a difference of 0.78 SD.

Figure 12 – Subgroup-Average Teacher Retention Rates

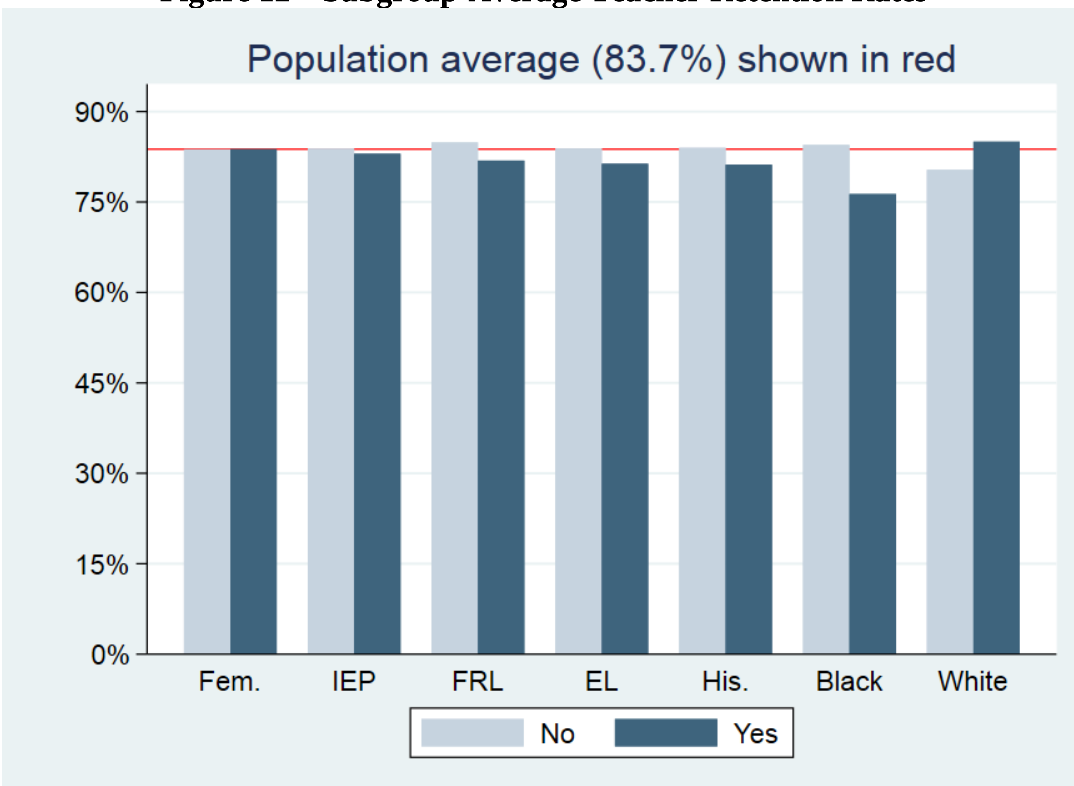
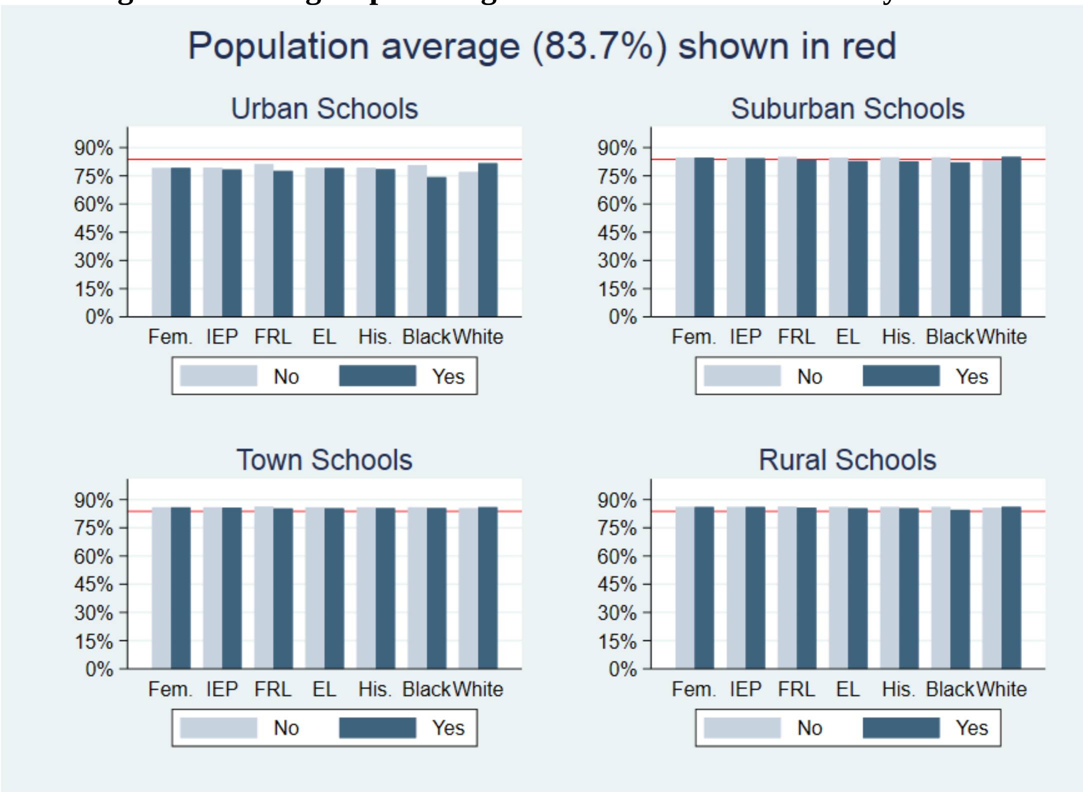


Figure 13 partitions the demographic subgroup comparisons into four panels, one for each locale. Each panel still shows the overall population mean of 83.66% as a red horizontal line, while column pairs display the disparities from Figure 10, but with annual retention rates aggregated within observations from urban, suburban, town, or rural schools only. The top left panel graphs subgroup disparities for students attending urban schools, which across the board have much lower teacher retention rates on average. The racial disparities in annual teacher retention are also largest for students in urban schools: students identified as white attend schools with an average of 81.59% annual teacher retention, compared to 73.96% or 77.79% for Black students and Hispanic students respectively. The gap between English learners and non-ELs, meanwhile, is relatively small in urban schools—probably because most urban schools do have ELs in their student body—but this gap is much higher for suburban English learners, who attend schools with 1.9% lower retention rates on average (0.21 SD).

Figure 13 – Subgroup-Average Teacher Retention Rates by Locale



Town and rural schools have smaller disparities across demographic subgroups in general, but differences remain: the largest gap for students in towns can be found across FRL status (0.9%, or 0.12 SD), whereas Black students face significantly higher teacher attrition in rural areas (1.5%, or 0.17 SD). In towns and rural areas, as in suburban areas, disparities for ELs are relatively high, compared to other subgroup disparities within those locales, even though retention rates in general are historically higher in those areas, relative to urban areas especially.

Figure 14 – Subgroup Teacher Retention Rates Over Time

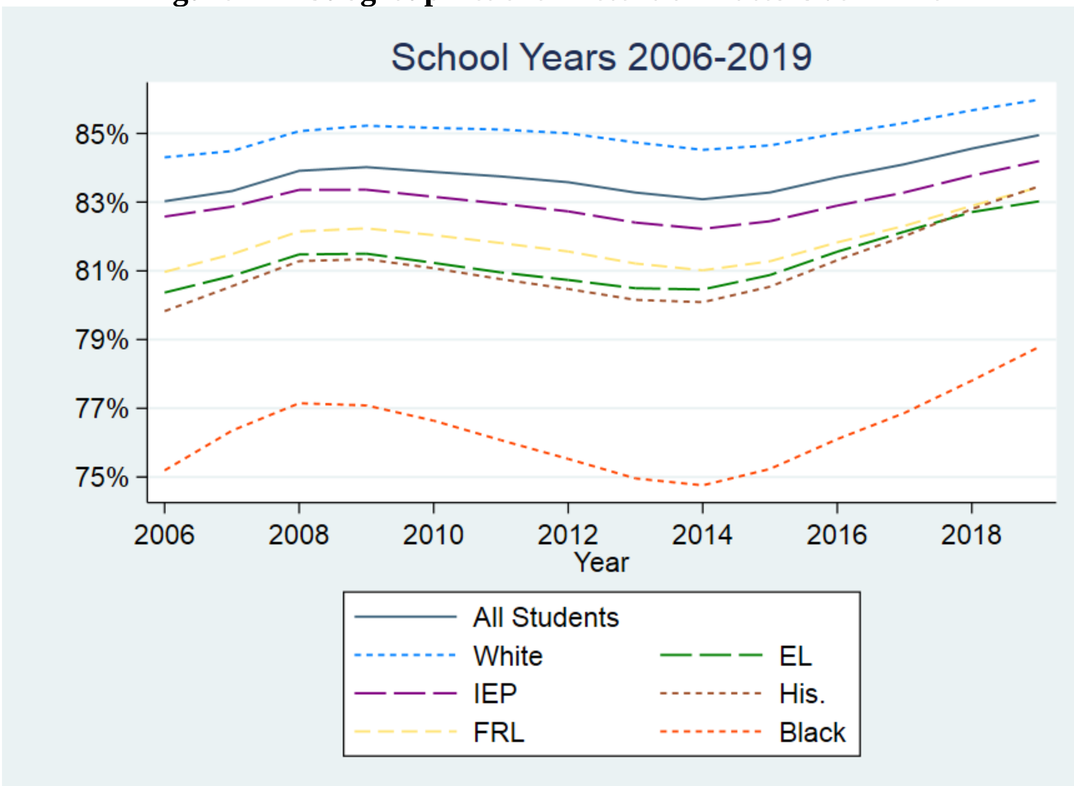


Figure 15 – Subgroup Teacher Retention Rates Over Time by Locale

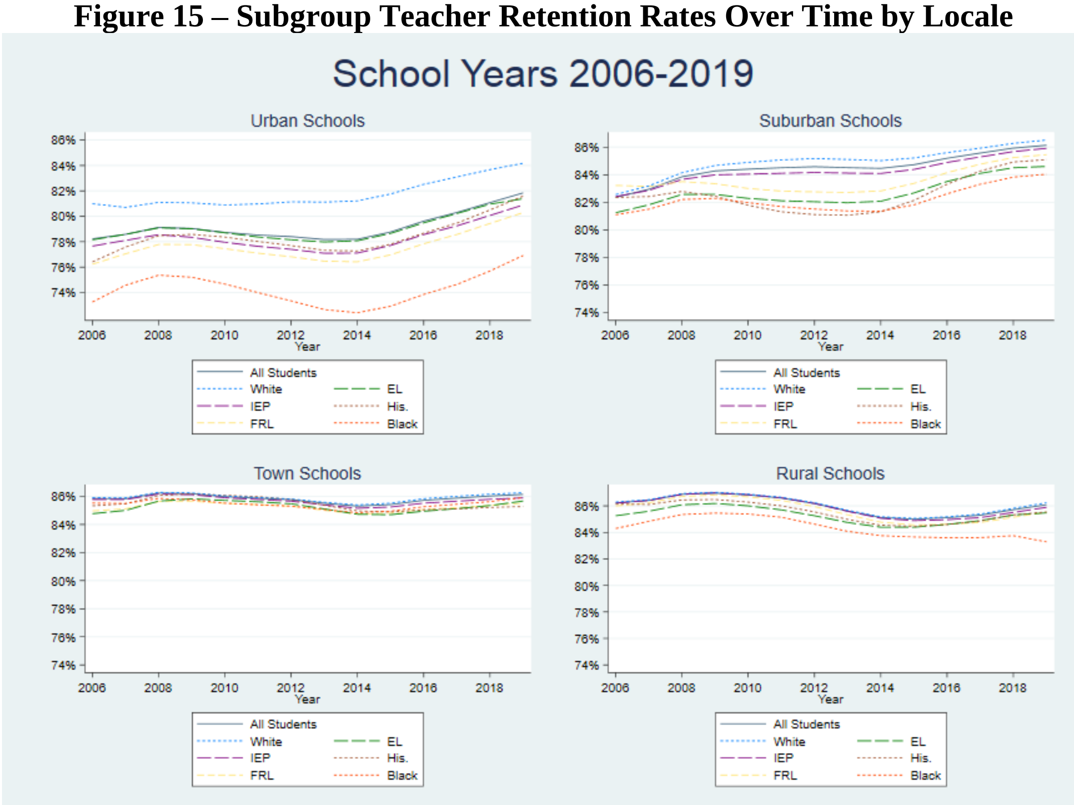
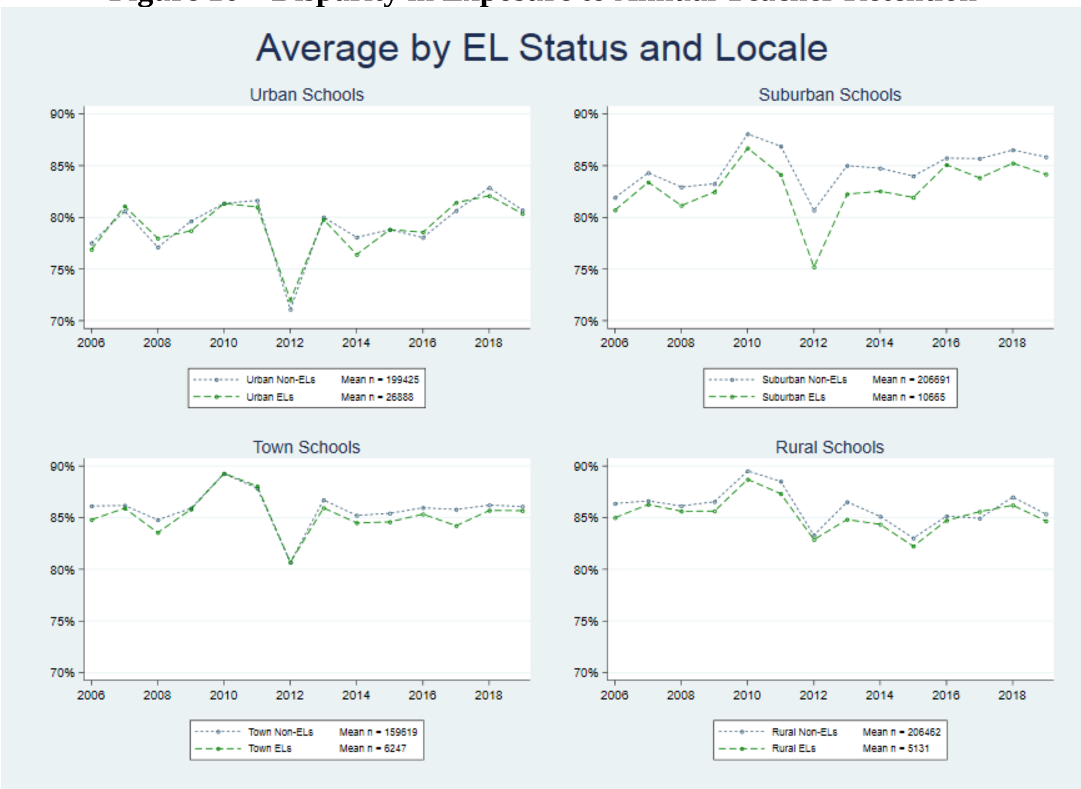


Figure 14 graphs average annual teacher retention rates for various demographic subgroups over time. This locally weighted scatterplot smoothing graph shows how persistent disparities have been despite overall fluctuations in average teacher retention rates. Figure 15 graphs changes in subgroup-average teacher retention rates over time for different locales, demonstrating that the disparities are consistent across locale, though much starker in some contexts. Urban schools have the greatest disparities overall, especially between students racialized as white compared to Black students. Towns have somewhat smaller teacher retention gaps overall, but EL students are among the most disadvantaged in this context, relative to other subgroups. Figure 16 shows the specific gap between EL students and non-EL peers, by locale; though this potential opportunity gap exists across the state, it is perhaps largest in suburban schools, which enroll almost 22% of ELs.

Figure 16 – Disparity in Exposure to Annual Teacher Retention



Exposure to Chronic Instability

Researchers are careful to point out that at least some teacher attrition is normal and even necessary—for example, when schools lose teachers to retirement. Higher attrition may also be beneficial in some cases: if ineffective teachers leave and are replaced by more effective educators, students in that school may benefit in the long term. Short-term spikes in teacher attrition may also be related to positive shifts in the staff or institutional culture of a school, as when a new principal institutes new policies or implements a new curriculum. There is reason to think that schools (and therefore students) may be resilient to the subsequent short-term spike in teacher attrition, and that disparities in exposure to *annual* attrition may not be uniformly detrimental to long-term student outcomes. Identifying the sign and magnitude of how teacher attrition affects individual students therefore requires more rigorous analysis, which I present in the next chapter.

Studies largely agree, though, that many schools experience chronically high attrition rates that contribute to significant disparities in the average experience and effectiveness of their staff, relative to schools that do not experience the "revolving door" problem. These schools do not have random spikes in attrition, but persistent staffing challenges that are exacerbated by the difficulties teachers experience in educating marginalized students in disadvantaged communities. Often, the schools with chronic staff instability also serve high proportions of racially marginalized students, students from socioeconomically disadvantaged backgrounds, and students who must overcome structural barriers within the K-12 public education system—for example, having to master a new language in order to access instruction. In the same way that negative externalities related to the "revolving door" accumulate over time for schools, the disadvantages facing marginalized students also operate and accumulate over time. In both cases, not only are the underlying causes likely rooted in systemic disadvantage, but the effects may play a role in how the patterns are perpetuated.

Recent research therefore frames teacher attrition similarly to poverty—not only because students are at higher risk of exposure to chronic attrition in areas of concentrated poverty, but also because that exposure is likely to be especially detrimental for students when they experience it continuously. Recognizing the compounding nature of chronic staff instability, I present graphs showing how different subgroups of students are exposed at different rates, depending on what schools they attend and where they are located. If students of different races are systematically and persistently exposed to different levels of chronic instability, that would count as suggestive evidence of a significant opportunity gap. Unfortunately, we do indeed find this to be the case in Wisconsin public schools across all grade groups and locale types.

I operationalize chronic instability at the student level as the proportion of students who spend at least half of their academic years in schools with high teacher attrition rates, calculating exposure separately for elementary, middle, and high schools.[40] Because there is no universally accepted definition of what counts as "high" attrition—and because it likely depends on the local context within the school and its district—I present two complementary sets of graphs. The first defines high attrition according to an absolute threshold, where a school counts as "high attrition" if it loses 30% or more of its staff in a given year. This aligns with the absolute threshold used by Holme et al. (2017) in their study of chronic teacher attrition. The second set of graphs defines high attrition relative to the distribution of attrition rates for all Wisconsin schools in a given year, so "high attrition" schools are those in the highest quintile (top 20%) of the attrition distribution. This quintile-based definition departs slightly from the quartile-based definition of relative attrition used by Holme et al. (2017).

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[40] Junior high schools and combined elementary/secondary schools are excluded from the analysis, as they together enroll under 2% of all EL-identified students in the state.

Figure 17 – Elementary School Exposure to Chronic Instability (Absolute)

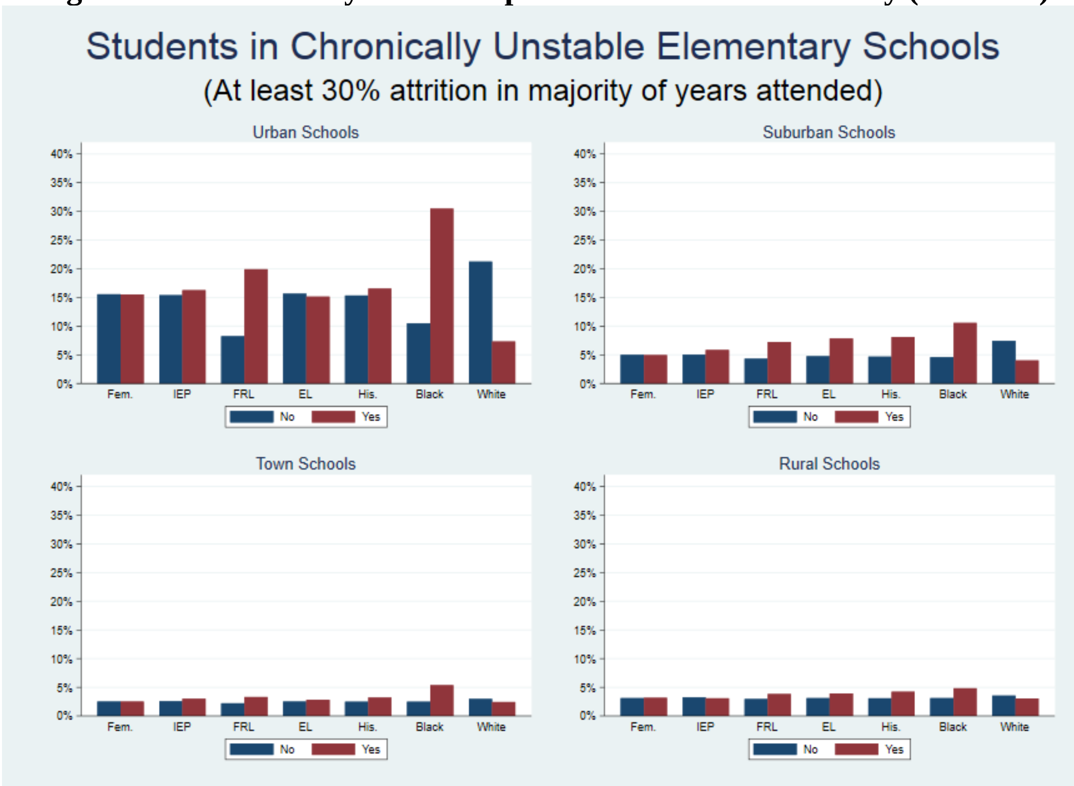
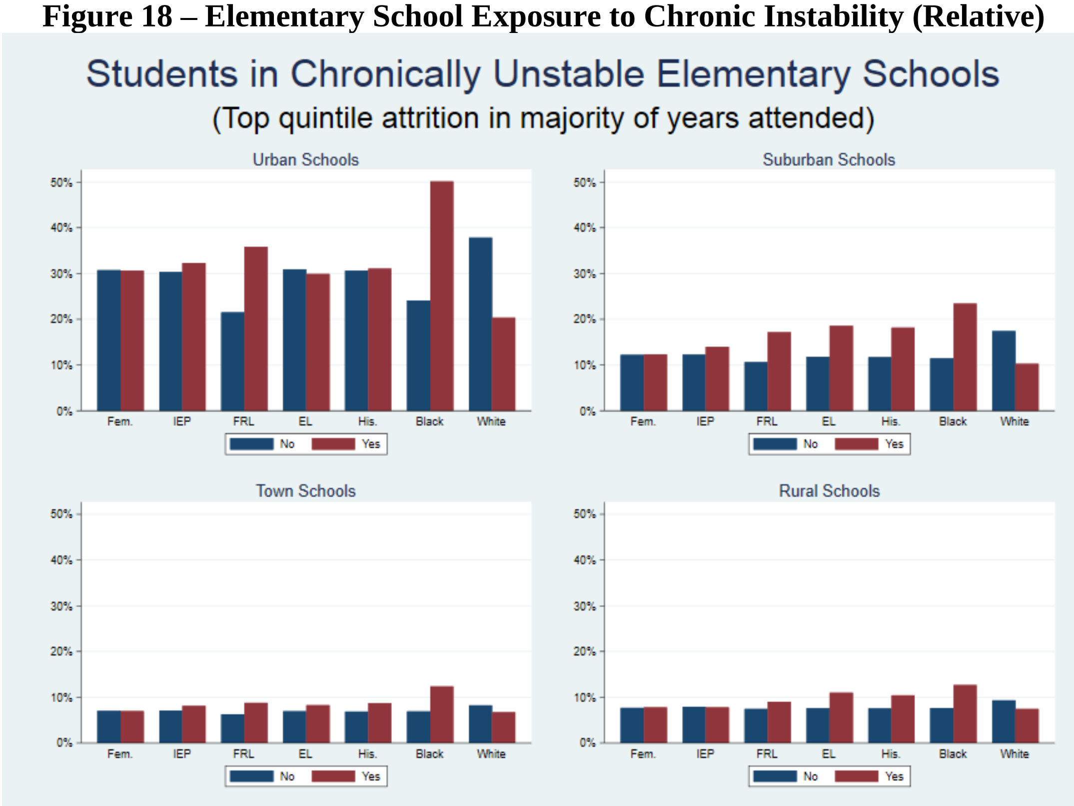


Figure 18 – Elementary School Exposure to Chronic Instability (Relative)



Figures 17 and 18 present the proportion of students across demographic subgroups that attend schools that meet the absolute and relative thresholds for high attrition, respectively, in the majority of the academic years they spend in Wisconsin elementary schools. For instance, we see almost no disparity between male and female students in the proportion who experience chronic instability, regardless of the locale where they attend school. There are large disparities, however, between different locales: over 15% of students in cities spend most of their elementary years in schools with attrition rates of 30% or greater, while chronic exposure rates in suburbs are only 6%, and students in towns and rural areas are even less likely to spend a majority of their elementary years in schools with 30% or greater attrition. Similarly, looking at the relative threshold graph, 30% of students in cities spend a majority of their elementary years in the top quintile of attrition, compared to 12% in suburbs and under 10% in towns and rural areas. These high rates of chronic exposure reinforce earlier graphs documenting large disparities between different locales.

Taking a closer look at some of the subgroup differences within each locale, however, we see that certain demographic subgroups attend schools with chronic staff instability more often—regardless of whether they live in a city. FRL-eligible students are exposed to chronic instability at much higher rates than their peers who are not eligible, and the trend holds across locale types. The disparity is largest in cities but can be found within suburban, town, and rural schools as well. That pattern is even more dramatic for Black students, who experience by far the highest exposure rates and the largest gap, measured relative to non-Black students. Again, the disparity is especially problematic in urban areas, but it exists within all locale types. The opposite pattern exists in the gap between students racialized as white or non-white. Here the disparity is smaller than the one for students racialized as Black, but larger than the FRL eligibility gap, regardless of locale type. Non-white students in urban schools have even higher exposure rates than FRL-eligible students.

A smaller disparity, but with a similar pattern to the FRL eligibility gap, can be found in the difference in exposure rates between students identified as Hispanic or non-Hispanic. In the state of Wisconsin's database, Hispanic is treated as a category of racial identity like Black, Asian, Native Hawaiian / Pacific Islander, American Indian / Alaskan Native, and "Two or More Races." The lack of nuanced, non-exclusive options for student race and ethnicity prevents more thorough (intersectional) analysis of disparities for these demographic subgroups, but Hispanic students are more likely to experience chronic staff instability for a majority of their elementary years across all locale types. Although the disparity in exposure rate by FRL eligibility is larger in cities than the corresponding disparity by Hispanic status, outside of cities the disparity by Hispanic status is as large as or even larger than the disparity by FRL status.

Exposure rates by English learner status, meanwhile, are nuanced. In urban areas, ELs are moderately less likely to spend a majority of their elementary years in schools with high attrition—perhaps counterintuitively, given that the majority of ELs identify as Hispanic (57%). EL students in other locales do face disparities in their exposure to chronic staff instability, however. The gap is largest in suburban areas, but it can be found in towns and rural areas as well. One potential explanation for this trend is that urban schools are generally more likely to experience chronically high teacher attrition, whether or not they serve a high concentration of EL students. Schools in less populous areas, however, might experience a higher correlation between EL enrollment and teacher attrition rates.[41] In any case, in suburban and rural elementary schools within Wisconsin, disparities in exposure to chronic staff instability are larger by EL status than by FRL status, regardless of how the disparity is measured (absolute or relative). This points to a meaningful disparity between English learners and their non-EL peers in exposure to chronic staff instability.

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[41] As noted, however, school demographics do not adequately explain variation in teacher attrition (Papay et al., 2017).

Figure 19 – Middle School Exposure to Chronic Instability (Absolute)

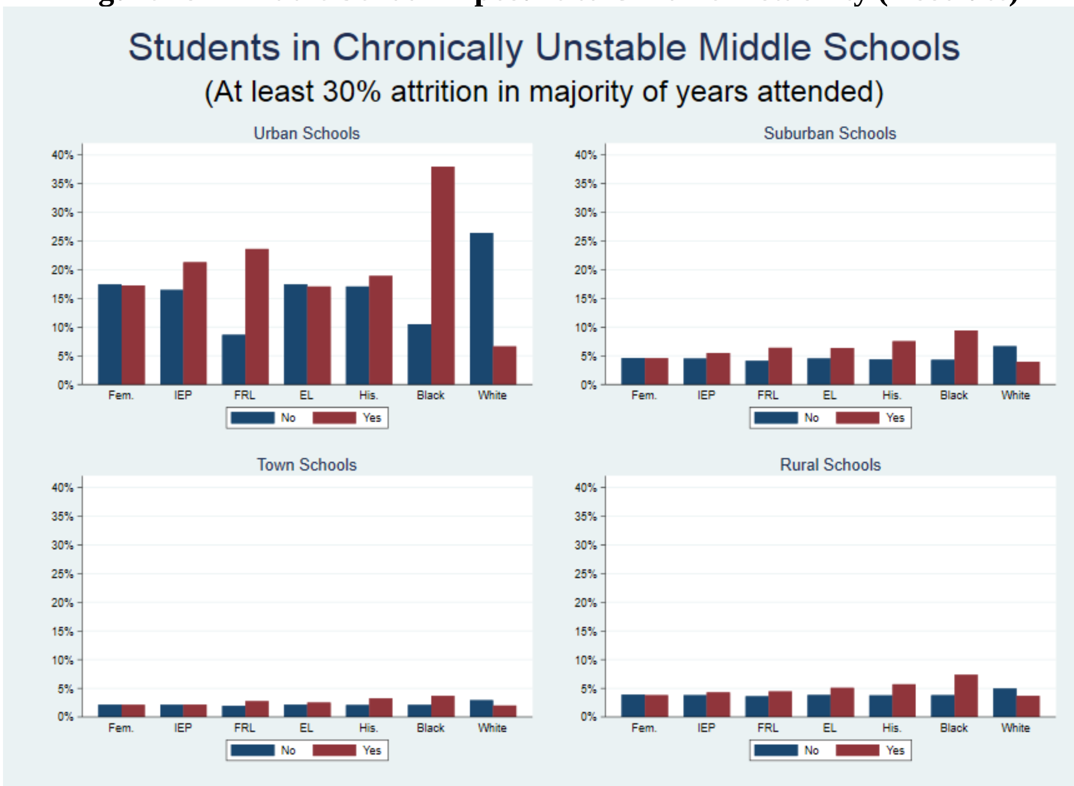


Figure 20 – Middle School Exposure to Chronic Instability (Relative)

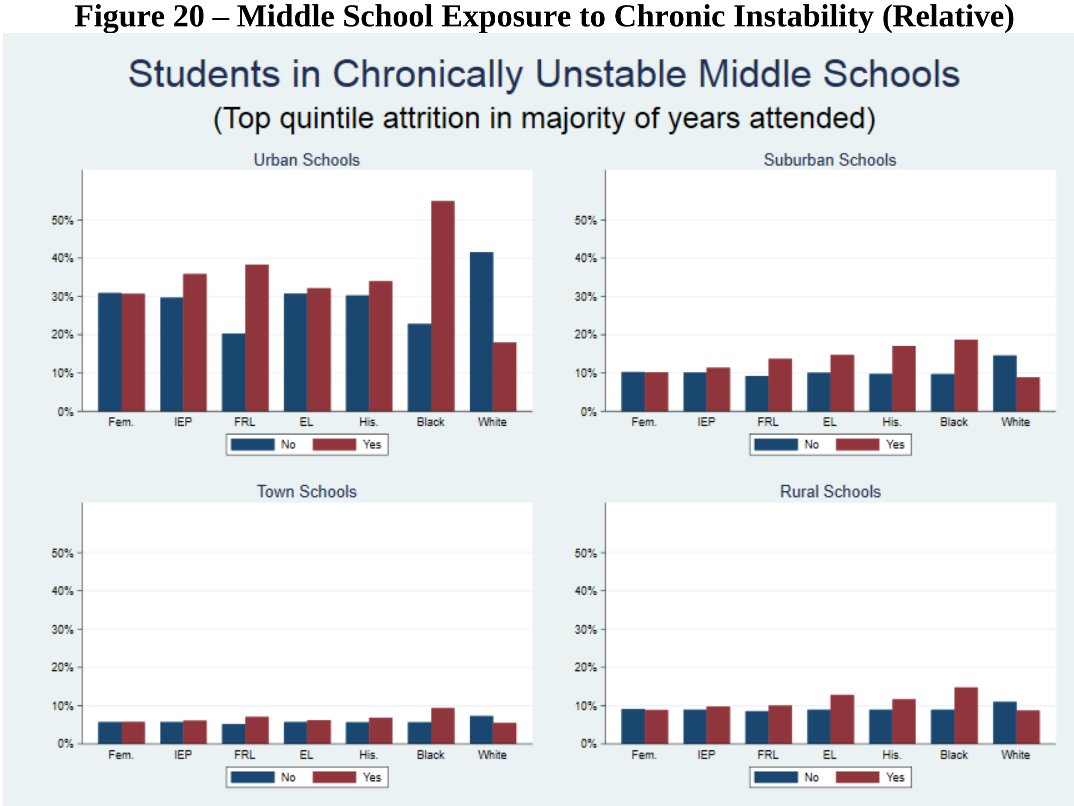


Figure 21 – High School Exposure to Chronic Instability (Absolute)

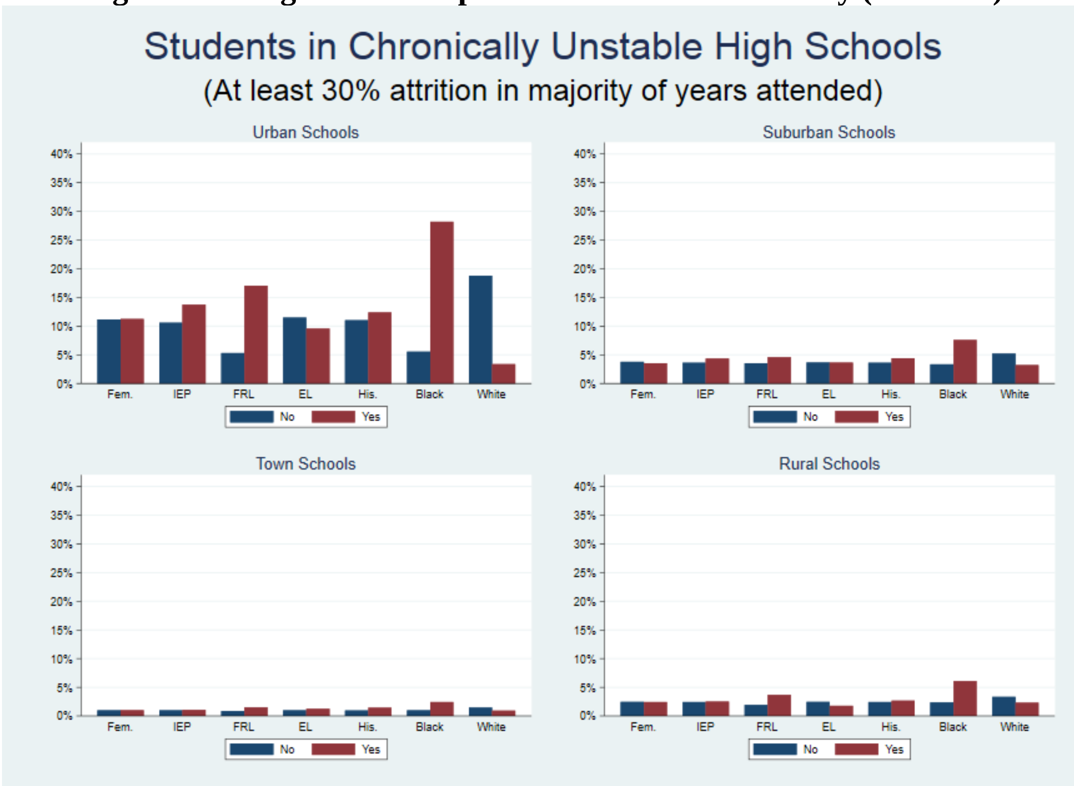
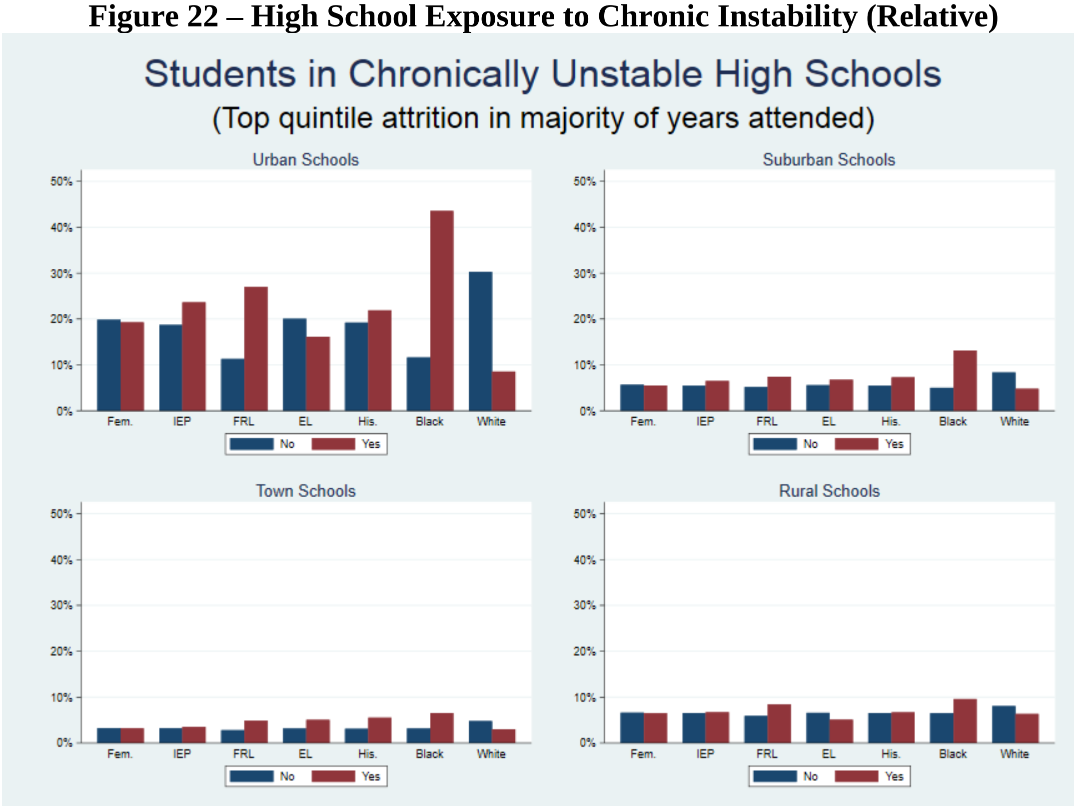


Figure 22 – High School Exposure to Chronic Instability (Relative)



Patterns largely similar to elementary school subgroup disparities, both within and across locale types, can also be found in middle schools and high schools (Figures 19 to 22). Generally, the absolute 30% threshold corresponds to lower overall exposure rates for middle schools across all locale types, compared to elementary schools; when measured with the relative quintile method, however, demographic subgroup disparities are larger in middle schools, compared to elementary schools, regardless of locale. The high school exposure rates, meanwhile, are greater than exposure rates for middle schools across all locale types when using the relative quintile approach, but the within-subgroup disparities are greater for all locale types when using an absolute threshold. Disparities by FRL status are larger than by EL status in high schools, regardless of school level.

Finally, there are some disparities in exposure rates to chronic instability across IEP status. These disparities are primarily found in urban areas and, to a lesser extent, in suburbs as well—regardless of which definition for chronic instability is used. Even smaller disparities exist in towns, and in rural areas the disparity is nearly as small as the gender gap. Overall, this disparity appears to be primarily a disparity for students who live in cities, where the ever-IEP rate is 17%, compared to 13% or lower in all other locale types. While I am tempted to characterize this finding as a less consequential gap than either the FRL gap or the disparities across racialized identities like Hispanic, white or Black, I do not have expertise in disability identification and support across different locales to be able to speculate about this disparity with much confidence. The exposure gap between ELs and non-ELs, on the other hand, is similar to disparities across racial/ethnic identities—and, within some locales and school types, larger than the disparity by Hispanic status, especially for ELs in suburban and rural elementary schools, rural middle schools (using a quintile approach), and rural high schools. Even more concerning, disparities are larger by EL status than FRL status in both suburban and rural elementary and middle schools.

Summary

In summary, I argue that the evidence supports characterizing English learner students as a subgroup of students at much higher risk of exposure to both high annual teacher attrition rates and, crucially, higher risk of exposure to chronic instability—the kind that suggests deep-seated, systematic challenges that contribute to having difficulty retaining teachers, especially the most experienced and effective teachers. Moreover, while exposure rates are highest in urban areas, the *disparities* in exposure rates for ELs are even larger in suburban and rural areas. This pattern may result in an overall detrimental effect on the educational experiences and outcomes of EL students, relative to their never-EL peers. It is not immediately clear, however, whether English learners are negatively affected by teacher attrition relative to their never-EL peers *in the same school*. In other words, it seems very clear that ELs are subjected to disadvantages based on where they live, with disparities between schools—but are within-school disparities also exacerbated by higher teacher attrition rates? I examine this question by estimating the correlation between teacher retention and English proficiency growth for English learners, arguing that slower growth represents more limited access to instruction and, ultimately, greater disparities in educational opportunity.

Regardless of any within-school effect of teacher attrition on opportunity gaps, however, the finding of differential exposure rates by EL status is significant. For the same reasons that we often pursue innovative curricula, instructional improvement strategies and inclusive education, schools can prioritize the elimination of the EL opportunity gap just as we do the opportunity gap between students of different racialized identities or socioeconomic backgrounds. Regardless of how quickly the English learner population continues to grow, or where—and projections do suggest that emergent bilingual enrollment will continue to expand for the foreseeable future—disparities in access to educational opportunity remain both politically and morally significant.

CHAPTER SIX: TEACHER ATTRITION AND ENGLISH ACQUISITION

Introduction

The descriptive evidence provided in the previous chapter documents significant disparities between English learner students and their never-EL peers in exposure to annual teacher attrition, as well as chronic staff instability at the school level. These findings expand our understanding of teacher attrition first by presenting new evidence of statewide teacher attrition patterns, and second by highlighting English learners as a subgroup of students who face disproportionate exposure to school-level teacher attrition. One logical follow-up question would be, of course, to ask whether English learners are also disproportionately exposed to teacher attrition (or its potentially negative effects) *within* schools—for example, whether instructors of classes with higher EL enrollment are more likely to leave than those assigned to classes with lower EL enrollment, or whether ELs are disproportionately assigned to novice teachers in years following high attrition. Exploring these questions would require more detailed information about how students are assigned to teachers, which is not available in the data I have from the Wisconsin Department of Public Instruction.[42]

As previously discussed, however, disproportionate exposure at the within-school level is just one pathway by which EL students might be differentially affected by higher teacher attrition. Even if teachers are uniformly likely to attrite, and all students are equally likely to be assigned to classes taught by replacement teachers, students may differ in how much their education draws on the institutional knowledge and collaboration between staff lost during periods of higher attrition. In addition, schools often incur greater costs when attrition rates are higher, since it takes time and energy to hire and train new staff. When resources are scarce—as they often are in schools where English learners are concentrated—increased resource burdens due to higher teacher attrition may

[42] Some states do connect students and teachers in this way, which could facilitate the subgroup analysis I pursue here.

disproportionately affect ELs if schools and staff then struggle to provide what those students need to overcome the barriers they often face within the public school system.

Furthermore, educators are likely to be interested not only in how much different student subgroups are exposed to teacher attrition, but also in how intensely it affects them. For that reason, rather than continuing to explore disproportionate exposure, I turn now to potential within-school differences in how intensely teacher attrition rates affect student outcomes. Specifically, I estimate correlations between school-level teacher attrition rates and disparities for English learners. I begin by exploring the extent to which empirical data from Wisconsin schools align with a hypothesized relationship between school-level teacher attrition and English language acquisition rates for ELs, as measured by annual gain scores on the ACCESS test. This analysis focuses on the state's annual English language proficiency assessment, a high-stakes outcome for EL students, not only because the test carries consequential validity for ELs—largely determining whether they will reclassify as Fluent English Proficient—but also because it arguably represents a direct measure of EL students' educational opportunity.

In identifying proficiency as a direct measure of educational opportunity, I am bracketing the many indirect ways that English proficiency (or proficiency status) can influence EL students' access to more advanced academic coursework, including educator perceptions about whether an emergent bilingual student is "ready" for more rigorous material. In addition to questions of class placement, tracking, and teacher expectations, academic English proficiency is the means by which students access instruction and learn academic content in United States public schools. Therefore, if EL students develop academic English proficiency more slowly on average when their school's teacher retention rates are lower, that relationship could be interpreted as evidence of increased disparities between emergent bilingual students and their peers in terms of access to instruction.

In other words, a statistically significant positive correlation between teacher retention and ELs' gain scores on the ACCESS test would suggest that higher teacher retention rates could reduce within-school disparities between EL students and their peers in access to educational opportunity.

Although my overall project is to investigate within-school heterogeneity in how teacher attrition affects educational opportunity, I avoid drawing causal inferences from the current study. How EL students learn English is an extremely complex process—many factors relevant to student learning cannot be accurately measured, nor are their causal effects reliably disentangled. Teacher employment decisions are similarly complex, with numerous studies dedicated to identifying the multilevel factors predictive of attrition. The study's primary predictor and outcome of interest are therefore both context-dependent phenomena within dynamic systems. Even with the benefit of a comprehensive longitudinal dataset, the threats of omitted variable bias and other confoundedness remain, and so I present statistical analyses without claiming that relationships are causal in nature. Nevertheless, I do attempt to control for as many sources of potential bias and endogeneity as is feasible within the constraints of my dataset. I model English proficiency gains as a growth process that occurs over time, predicted by linear and quadratic time-in-program plus prior-year scale score (since evidence suggests that growth is closely related to prior proficiency). Using gain scores and controlling for prior-year scale score also implicitly controls for the cumulative nature of education (Rivkin et al., 2005). School fixed effects control for non-random sorting of teachers and students across schools. The addition of district-year fixed effects in Model 8 controls for differences across districts in the timing of policy changes, such as Act 10. As students are sampled longitudinally, student fixed effects in Model 9 also account for underlying student ability and serial correlation, plus any potential endogeneity in school enrollment patterns. I therefore argue that the significant correlations I identify provide a promising jumping-off point for future analysis of teacher attrition.

Model Specification

In identifying the appropriate model for analyzing my third research question, I have so far described the theoretical justifications for model specification decisions. I now present additional evidence for those decisions based on the data actually used in this study. The following results, derived from statistical analyses of the data, corroborate the theoretical justifications for preferring models that include grade, year, school, district-year, and student fixed effects. I address each of these statistical analyses in turn. I also explain how they relate to the research question at hand, examining whether school-level teacher retention rates correlate significantly with ACCESS gains.

I first consider grade fixed effects, which are introduced in Model 2 to account for average grade-level differences in how English language is taught and assessed, independent of the vertical scaling of the ACCESS test. An *F*-test confirms that grade fixed effects are jointly significant at the $p < 0.0000$ level. This result suggests that it is appropriate to include grade fixed effects, since failing to account for systematic grade-level differences in English proficiency growth would bias the correlation between teacher retention and ACCESS gain scores. Adding grade fixed effects increases the model's R2 from 0.206 to 0.244, indicating an increase in explanatory power.[43]

An *F*-test confirms that year fixed effects are also jointly significant at the $p < 0.0000$ level. This rejects the null hypothesis that the effect of time is equal across subjects, meaning that pooled OLS and random effects will be biased if the fixed effects are correlated with the other explanatory variables in the model. A Hauman test rejects at the $p < 0.0000$ level the null hypothesis that the fixed effects are uncorrelated with other predictors; models without year fixed effects are therefore inconsistent and potentially biased. This finding justifies the decision to include year fixed effects, aligning with the expectation that time trends within the state may be confounded with the primary

[43] This intermediate model is not included in the results table, as Model 2 adds both grade and year fixed effects.

predictor and outcome of interest. For example, the Great Recession may have affected individual teachers' employment decisions (and therefore school-level retention rates) as well as individual students' English proficiency outcomes, potentially biasing correlations between them that do not account for time trends. Adding year fixed effects increases R^2 from 0.244 to 0.293.

Similarly, an *F*-test confirms that school fixed effects are significant at the $p < 0.0000$ level. School fixed effects are added in Model 7, after the addition of several other sets of covariates. Adding school fixed effects increases R^2 from 0.323 to 0.341, and the adjusted R^2 from 0.323 to 0.336—a smaller increase due to the penalty incurred to avoid overfitting the model. Nonetheless, the addition of school fixed effects increases the explanatory power of the model. This aligns with the expectation that school-level factors, including time-invariant characteristics of the school, are likely to play a role in both teacher retention rates and student outcomes within the school. Adding school fixed effects accounts for those time-invariant differences between schools, allowing for an examination of the potential within-school relationship between teacher retention and EL students' English proficiency gains.

A separate *F*-test confirms that district-year fixed effects are also jointly significant at the $p < 0.0000$ level. This rejects the null hypothesis that time trends do not vary by district. This result aligns with the expectation that districts experience their own time trends in ways that could bias the correlation of interest in this study. For example, prior research has provided strong evidence that Act 10 led to increases in teacher attrition and statistically significant short-term decreases in average test scores for students in the lower deciles of performance. Failing to account for variable timing across districts in these trends could lead to bias in estimating a relationship between teacher retention and ACCESS gain scores. Reinforcing this, adding district-year fixed effects increases R^2 from 0.341 to 0.363, or from 0.336 to 0.348 in the cases of adjusted R^2.

Furthermore, a Hausman test rejects at the $p < 0.0000$ level a null hypothesis that students do not systematically vary in their ACCESS gain scores. While and *F*-test would be infeasible for the number of students considered here—especially given all the other fixed effects already in the model—the Hausman test points to the explanatory power of differencing out the ways that each individual student's scores are partially explained by time-invariant characteristics of that student. Even setting aside the so-called "intelligence quotient" and other concepts rooted in histories of racism within educational testing, there are reasons to think that stable student characteristics play a role in English language development. For one straightforward example, student fixed effects would effectively control for a student's home language—even if it is not one of the most common home languages explicitly controlled for throughout these models. Adding student fixed effects increases R2 from 0.363 to 0.701, or 0.348 to 0.551 in adjusted R2. This larger increase is balanced by a reduction in the explanatory variation available, a tradeoff I discuss further in the findings.

Finally, a modified Wald test for heteroscedasticity rejects at the $p < 0.000$ level the null hypothesis of homoscedastic standard errors within the models presented. This finding indicates that the errors do not have equivalent variance across all observation timepoints, violating a key assumption in linear regression. To account for this violation, I specify robust standard errors, and additionally specify them to be cluster-robust at the school level. Using cluster-robust standard errors at the school level is additionally appropriate due to the likelihood that students' English proficiency outcomes are correlated across observations within the same school. If school-specific characteristics lead to within-school correlation in English proficiency growth, the variance terms may be incorrectly underestimated. For example, in the current study, the concentration of EL students with the same home language or how a school implements LIEP practices may influence English acquisition in school-specific ways. Cluster-robust standard errors account for this issue.

I have reviewed the statistical evidence that grade, year, school, district-year, and student fixed effects are appropriate to include in modeling a relationship between school-level teacher retention and ACCESS gain scores for English learners. These fixed effects reduce the effective analytical sample by dropping singletons—observations for which no comparison can be made, given the combination of school, district-year, and student fixed effects used. The overall models analyze a consistent sample, however, consisting of 186,375 English learner observations. I now turn to the estimates of other key covariates at the student, school, and district level before turning to teacher retention rate.

Student-Level Characteristics

Across the nine models, despite adding increasingly more complex controls for potential omitted variable bias and endogeneity between retention rate and ACCESS composite score gains, the signs and sizes of estimated coefficients are remarkably consistent. Apart from Model 9, which includes student fixed effects (and therefore requires different interpretation for some coefficients), each additional point in lagged composite scale score (i.e., prior year performance on ACCESS) is associated with a 0.2 to 0.3-point reduction in current-year gain score, with a standard deviation of about 0.01 points. This finding aligns with "lower is faster, higher is slower" expectations for English acquisition (Sahakyan & Cook, 2014).

Relatedly, the coefficients for linear and quadratic time-in-program are highly significant and opposite in sign. Each additional year in English language support services is associated with a decrease of about 2 to 3 CSS points gained per year (depending on specification), controlling for lagged CSS and grade, while the positive quadratic term coefficient implies that those decreases shrink over time. Standard deviations for both linear and quadratic time-in-program are 0.2 to 0.3 and 0.02 to 0.03 points around the mean, respectively.

Most individual student-level predictors are also highly significant across specifications. Female ELs gain 1.0 additional point over male students per year, on average, while ELs with IEPs gain about 7.2-7.6 fewer points per year. Students eligible for Free or Reduced-Price Lunch gain 1.8 to 2.1 fewer scale score points, compared to other students. This coefficient is not significant in Model 9—however, interpretation of student-level coefficients changes under this specification since the explanatory variation available is limited to changes in status within individual students over time. FRL eligibility is typically stable within individuals, so the estimated coefficient here corresponds to the average difference in ACCESS gain scores in years when a student is counted FRL eligible versus years when they are not eligible (not the average difference between students who are or are not eligible). This estimate is made using the relatively small subset of EL students who change FRL status within school type and grade group combinations (9% of English learners in this sample).[44] The same is true for other potentially time-variant student-level characteristics such as grade-level retention, mid-year school transfers, and high absenteeism. Grade retention is associated with a 3.8 to 5.1 point decrease in CSS growth. Students who transfer schools mid-year demonstrate gain scores 2.0 points lower, on average, relative to students who enroll in only one school, while chronically absent ELs (i.e., attending fewer than 90% of school days for a minimum 90 days enrolled) gain 1.9 to 3.1 fewer points per year than ELs with higher attendance.

Differences associated with EL students' racialized identities are statistically insignificant, except for persistent disparities in Black students' gain scores, relative to other racial subgroups, across all models. In terms of home language, most models show that Arabic speakers gain about

[44] Incidentally, while ever-EL students are over twice as likely to be FRL eligible than their never-EL peers, they are 20% more likely to change FRL status (within school type and grade group combinations). In the general population, it is somewhat more common for someone to lose FRL eligibility rather than gain it; for ever-EL students, this trend becomes much more pronounced.

1.5 to 2.0 more points annually, relative to Spanish speakers, while Chinese speakers tend to gain 3.6 to 6.0 more points than Spanish speakers. Hmong and Somali speakers tend to gain slightly fewer points per year than Spanish speakers, but coefficients are statistically insignificant across most models—except for Hmong speakers in Model 6, which does not include fixed effects.

School-Level Characteristics

Differences in English proficiency growth may depend on what percentage of a student's English learner peers in the same school share the student's home language, for instance if the school reaches the minimum enrollment threshold for BLBC programming. Generally, a higher proportion of same-language speakers is associated with slightly lower gains—potentially because schools with high concentrations of same-language ELs are most often low-income schools with primarily Spanish speakers—but the coefficient is statistically insignificant in most specifications. Relative to Spanish speakers, though, students who speak Chinese or Hmong and attend schools with a high concentration of same-language ELs may exhibit greater gains in English proficiency, relative to other home language groups. The coefficient is statistically insignificant in fixed-effects models, however—and, for Chinese speakers, the sign of the coefficient is reversed in Model 9. A similar reversal in coefficient sign occurs for Somali speakers, who appear to gain English more quickly with higher concentrations of Somali speakers until school fixed effects are included. Higher proportions of same-language ELs are consistently negatively associated with ACCESS gains for Arabic speakers, but the coefficients are statistically insignificant. Generally, a higher proportion of EL-identified students is associated with greater gains in English proficiency, even when school and district-year fixed effects are included—but not if including student fixed effects.

Other school-level characteristics also correlate significantly with EL student gains on the ACCESS test. Across some specifications, the school-wide proportion of peers who demonstrate proficiency on standardized tests is positively associated with gain scores. When including fixed effects, however, the sign of that correlation is negative, yet still highly statistically significant. It is not immediately clear a priori why that might be the case. Student-teacher ratio and logged total enrollment, on the other hand, are both statistically insignificant in all of the models. School-wide proportion of FRL-eligible students is statistically significant when district-year fixed effects are included, suggesting that higher proportions of FRL eligibility are negatively associated with gain scores. Across most models, students in urban schools show lower gains than students in other locales, though the differences depend on specification and are statistically insignificant when including school fixed effects. Across all models, EL students in Title I schools demonstrate lower annual gains. ELs in charter schools tend to make slightly larger gains than ELs in regular public schools, but the coefficient is not significant in preferred models. Relative diversity in students' racialized identities, on the other hand, is positively and significantly correlated with ACCESS score growth once school fixed effects are included, and even more so when student fixed effects are included. This coefficient could be pointing to positive externalities in the enrollment of more diverse student populations, or else it could be explained by differences between schools: in highly segregated areas, schools with higher EL enrollment rates may be more likely to be more racially homogenous when the student population is generally lower-income. In higher-income schools, meanwhile, increases in the diversity of the student population—including increases in EL enrollment—may prompt schools to increase services for English learner students, whether due to statutorily-mandated BLBC programming or other support programs.

In terms of school-average teacher characteristics, the proportion of teachers with advanced degrees shows an insignificant but weakly positive association with gain scores. Average teacher experience is insignificant and overall weak in most specifications. The coefficient on average teacher salary is positive and statistically significant in Models 7 and 8, but otherwise statistically insignificant. The proportion of teachers with Bilingual-Bicultural certifications is positively but statistically insignificantly associated with gain scores, perhaps because very few teachers have BLBC certifications in Wisconsin.[45]

District-Level Characteristics

In models that add district-level finance information, per-pupil expenditures are negatively associated with ACCESS gain score. This coefficient is more statistically significant when school fixed effects are not included, however, perhaps because of within-district funding heterogeneity. Per-pupil expenditures may also correlate with greater enrollment of disadvantaged students, and the additional funding may be insufficient to meet the increased needs of the population. District proportion EL is highly negatively correlated with gain score and statistically significant with school fixed effects. District-average socioeconomic status has a weak positive association with CSS gain score, but statistical significance disappears with school fixed effects. Socioeconomic diversity has a strong and statistically significant negative correlation with CSS gains, implying that district-level socioeconomic segregation is associated with slower English acquisition rates for ELs. Meanwhile, district unemployment rate has a very strong, positive, highly statistically significant association with ACCESS gain score. One explanation is that teacher retention rates are influenced by unemployment trends, such that students may benefit from relative stability in school staffing brought about by relatively high unemployment rates. This pattern aligns with Papay et al., 2017. All district trends are absorbed by district-year fixed effects, however, including any correlation with unemployment.

[45] Future analyses may consider examining Bilingual-Bicultural teacher attrition specifically, following a similar approach to Sorenson & Ladd (2020), but these analyses may be constrained by the very small sample sizes involved.

Teacher Retention Rate

Turning now to the coefficient on teacher retention rate, we see it is small but positive and statistically significant across nearly all specifications. In my preferred model, which includes both school and district-year fixed effects to account for potential changes in district-level policy shifts (such as Act 10), moving the school-level teacher retention rate from 0 to 100% is associated with an additional 4.28 Composite Scale Score points of growth on ACCESS, about one quarter of the average 17 points in annual growth of academic English proficiency for ELs in this sample. Adding student fixed effects reduces the size of the coefficient somewhat, but it remains highly significant.

Individual student growth rates vary considerably, so the standard deviation for composite scale score growth is 20 points. This relatively large standard deviation makes it difficult to directly compare the coefficient here to other studies linking teacher retention to student outcomes, which usually report effect sizes in standard deviations of student achievement. In addition, other studies typically use achievement on state standardized tests as their outcome variable, which is generally not the result of a growth process in the same way that English acquisition rates are specified here. Relative to other studies of the relationship between teacher attrition and student outcomes, though, the results in this study are similar in magnitude or larger than the effect sizes found using similar approaches. The coefficient in Model 8, for example, suggests that a reduction in teacher retention from 100% to 0% is associated with a decrease of 0.22 standard deviations (SD) in CSS gain score.

Leveraging school-by-grade fixed effects in a study of teacher turnover in New York City, Ronfeldt, Loeb & Wyckoff (2013) find that a decrease in school-by-grade teacher retention from 100% to 0% is associated with a 0.08 SD decrease in math performance and 0.05 SD decrease in ELA performance. Using school-by-year fixed effects results in somewhat smaller estimates of a 0.07 SD reduction in math scores and a 0.06 SD reduction in ELA scores, again corresponding to a decrease from 100% to 0% in grade-level retention. In another study of teacher turnover (with more complex controls for teacher value-added and potential year-to-year grade reassignments), Hanushek, Rikvin & Schiman (2019) report that school-by-grade annual attrition rate predicts a 0.05 SD reduction in achievement gains using a model with school fixed effects.[46] Meanwhile, Sorenson & Ladd (2020) find that reducing the 3-year running average teacher retention rate from 100% to 0% corresponds to a 0.07 SD reduction in reading scores and a 0.13 SD reduction in math. In comparison, the coefficient of 0.22 SD identified in this study is relatively larger and closer to average effect sizes reported in many studies of class size reductions from 25 to 15 (Hattie, 2005), though the correlation measured in this study should not be interpreted as an effect.

Putting this correlation in conversation with other variables in the data, teacher retention is more positively associated with EL students' gain scores than the percentage of bilingual-certified staff at their school—and more highly significant for all models. However, within the context of Wisconsin K-12 schools, bilingual certification for teachers is relatively rare, and few schools have Bilingual-Bicultural programs supported by the state. In fact, the significance of teacher retention in predicting academic English proficiency gains for EL students may be related to the relative scarcity of bilingual-certified educators in Wisconsin. If schools that lose EL teachers find it difficult to hire similarly qualified instructors to replace them, then EL students may be negatively affected after high-turnover years. Retention rate is also more strongly associated with EL student gains in academic English proficiency than individual students' FRL eligibility, high absenteeism, mid-year transfer, or grade-level retention status (in Model 9), as well as school-based predictors like locale and Title I status. Factors that exceed teacher retention in strength of correlation with

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[46] Both studies find even larger estimated effects in alternative specifications that analyze the proportion of new faculty instead of lagged attrition. Because my theory of action assumes that departures drive negative shocks for ELs, I leave this specification for future analysis, but preliminary results show statistically significant coefficients of opposite sign.

ACCESS score gains include ever-IEP status, relative diversity of racialized identities, and the proportion of proficient peers (with student fixed effects included). In models that do not include district-year fixed effects, stronger statistical relationships include district unemployment rate and relative socioeconomic diversity. In the model with student fixed effects, both relative diversity of racialized identities and the proportion of peers who demonstrate proficiency on content tests also correlate more strongly with individuals' CSS gain scores (positively and negatively, respectively).

Robustness Checks

To test whether the statistical significance of the findings results from selection bias in the analytical sample, I perform several robustness checks. I first replicate the results using the full population of English learners with calculable CSS gain scores and grade-peer proficiency rates, no longer dropping students who transfer schools between years or schools with data quality issues. These results are reported in Table 11 of the Appendix. Findings are generally similar; while the coefficients on teacher retention rate are somewhat smaller, they retain statistical significance. I next replicate the results with a much larger sample of English learner students by dropping the proportion of peers who demonstrate proficiency in state standardized tests. This allows me to include English learners in early elementary and high school grades, but it eliminates the important (theoretically relevant and statistically significant) covariate of peer effects. These results are also largely similar to my main findings and reported in Table 12 of the Appendix.

To test whether the statistical significance of the estimated coefficient on teacher retention results from confoundedness with some other relationship, rather than a valid relationship between prior-year teacher retention rate and EL students' English proficiency gains, I also estimate the same models using retention rates from alternative years. The reasoning behind this falsification test is that, for example, a statistically significant correlation between a school's teacher retention rate in 2012 and students' average ACCESS score gains from 2010 to 2011 could not possibly be evidence of a valid relationship, since student outcomes cannot be driven by retention rates in the future. I therefore estimate each model using, in addition to the school's prior-year retention rate as the primary predictor of interest, school-level retention rate lagged by an additional one or two years (t-2 and t-3), as well as the school's current-year retention rate (t), and also the retention rate one year in the future (t+1). Appendix Tables 13 to 15 document the placebo tests.

The columns for (t-1) replicate the main results. Interestingly, one additional year of lag in the retention rate (t-2) produces statistically significant coefficients in all models except those with fixed effects, and those coefficients are highly statistically significant in more basic specifications. The similarity in the magnitude of the coefficients for Models 1-7 at (t-1) and at (t-2)—and to a lesser extent at (t-3)—may be evidence of a general relationship between teacher retention and EL student outcomes. In other words, students in schools with generally higher teacher retention rates may acquire English more quickly. After including school fixed effects, however (i.e., examining only *within* a school how teacher retention rates predict ELs' English acquisition rates), only the prior-year retention rate demonstrates statistical significance. Similarly, an additional lag at (t-3) shows statistically significant coefficients only for the most basic models, and only at the $p < 0.05$ level. Retention rates at (t) and (t+1) show no statistical significance. I interpret these results as evidence in favor of using fixed effects to examine the specific within-school correlation between teacher retention and EL outcomes. These patterns generally persist in falsification tests using the full sample of ELs (Table 14) and the alternative specification (Table 15): only specifications using retention rate at (t-1) provide statistically significant results in preferred models, except Model 8 in the full sample. This suggests that prior-year teacher retention rate conveys statistically relevant information that helps explain individual EL students' ACCESS score gains in a way that retention rates in other years do not. I therefore argue that the placebo tests provide evidence that my main results identify a statistically meaningful correlation between school-level retention and EL growth in academic English proficiency. Furthermore, while teacher retention rates vary between schools in systematic ways, within-school variation in teacher retention also predicts EL student outcomes.

Summary

The general consistency of coefficients across models and their alignment with established evidence on academic English proficiency development for EL students together encourage high confidence in these findings—not only for variables assumed to fundamentally predict students' ACCESS gain score, including lagged Composite Scale Score and time-in-program, but also for teacher retention rate as the predictor of interest. In addition to high statistical significance in the naïve model and specifications with time-variant controls at the student, school, and district level, the coefficient on retention rate is significant at the $p < 0.01$ level in my preferred model. Including both school and district-year fixed effects increases the confidence that the statistical relationship is not merely a product of differences in the student populations enrolled across different schools, while statistical significance with student fixed effects increases the confidence that the correlation exists independent of selection patterns in how families enroll their children into schools. Further, replacing prior-year with current-year retention as a robustness check yields insignificant results across all except the naïve model. Although the potential for bias remains, the measured correlation captures a credible relationship between teacher retention and ACCESS gain scores. Because ELs generally access instruction only insofar as they develop English proficiency, ACCESS scores also represent the access emergent bilingual students have to educational opportunity in public schools. I therefore argue that increases in school-level teacher attrition are significantly correlated with increased opportunity gaps for EL students in Wisconsin K-12 public schools.

CHAPTER SEVEN: DISCUSSION

Introduction

Despite disagreement over the right way to provide it, policymakers all along the American political spectrum agree about the importance of equal access to high-quality education. Leading up to the 2016 presidential election, the Democratic Party platform advocated for "access to a high-quality education, from preschool through high school and beyond" for "every child, no matter who they are, how much their families earn, or where they live" (Democratic Platform, 2018). Similarly, the Republican Party wanted to "provide greater opportunities to children regardless of their zip code," so that "lower income families have the chance to rise up and break the cycle of poverty" (Republican Platform, 2018).[47] We care about equal access to educational opportunity because it is thought to be the key to socioeconomic mobility, providing the bootstraps by which people are supposed to be able to lift themselves up.[48]

In pursuing educational opportunity, however, many students face unfair disadvantages—challenges and barriers that limit their access to resources and support, relative to peers with similar abilities and effort.[49] The disadvantages matter because education is, in part, a positional good: its value depends not only on how much a person has, but also how much they have relative to others. For example, students with better mathematics preparation may be more competitive in applying to college, or more likely to succeed once they matriculate. The positional nature of education is particularly salient within meritocratic systems, which are meant to reward individuals based on their ability and effort. If education is supposed to facilitate social mobility, unearned disadvantage

[47] This language was subsequently dropped from the platform, which now states "A young person's ability to succeed in school must be based on his or her God-given talent and motivation, not an address, ZIP code, or economic status."
[48] There is a certain irony in relying on a social good—regulated by the state—as one's basis for individualism, but the bootstrap metaphor persists nonetheless in our public discourse.
[49] For a thorough discussion of a fair system of educational opportunity for a democratic society, see Anderson (2007).

threatens the fairness and integrity of that system by returning unequal benefits for people who apply similar levels of ability and effort. English learners who are denied an equal opportunity to succeed academically—perhaps due to deficiencies in the school resources necessary for them to overcome linguistic barriers to full participation in instruction—would then be at risk of unfairly losing not only important civil rights guaranteed by the Constitution and federal law, but also the equal opportunity to pursue college and career success after graduation.

In the previous two chapters of analysis, I provided empirical evidence that English learner students in Wisconsin are disproportionately exposed to a potential source of unfair disadvantage: high teacher attrition within K-12 public schools. I documented how ELs are disproportionately exposed to higher annual attrition rates and chronic staff instability, patterns that correlate with lower average teacher experience and lower student performance on standardized tests. Examining whether higher attrition rates are associated with English acquisition rates, I also documented how increases in teacher attrition at the school level are significantly correlated with slower growth in academic English proficiency for EL students. Because access to instruction within public schools depends on academic English proficiency, my findings suggest that English learners experience greater disadvantages in access to educational opportunity when teacher attrition rates are higher.

Teacher attrition is not a new problem. Researchers have long known that turnover can contribute to disparities between schools in the quality of instruction for students. In identifying a significant correlation between school-level retention rates and differential English acquisition, however, the results I presented suggest that there may be additional within-school differences in how teacher attrition can affect access to instruction. These findings point to additional layers for policymakers to consider in evaluating policies that promote staff retention. If greater staff stability contributes to more equality within and between schools in how students access instruction, then policies aimed at retention could make a real difference in dismantling the entrenched barriers many students face within public education. Particularly because many other features of the system are difficult or impossible to change—whether due to lack of resources or lack of political will—teacher retention may be one of the more malleable policy levers we possess. I therefore address potential policy alternatives to promote retention in the subsections below. Given the potentially salient role teacher retention may play in educational opportunity, I also consider limitations and implications of my findings within the broader context of English learner education—focusing on data and future directions, funding and financial incentives, teacher preparation and induction, Bilingual-Bicultural education, special education and dual-identification, intersectionality, and cumulative disadvantage.

Data Limitations and Future Research

The relationship between annual teacher attrition and chronic staff instability is one area where additional research is needed. Especially if exposure to teacher attrition functions similar to exposure to poverty, as some researchers have suggested, then the negative externalities of higher attrition rates may accumulate for disadvantaged students—not only due to differential teacher attrition and how it contributes to disadvantages between schools, but potentially also due to how higher attrition may exacerbate disadvantages within schools. It is therefore crucial to understand how these multiple layers function both separately and together in potentially contributing to the inequalities in educational opportunity that many EL students face.[50] If educators are interested in realizing equal access to educational opportunity for all students, then the role of teacher attrition in influencing the distribution of teacher quality must be more fully understood—especially how chronic attrition may contribute to persistent inequalities in access to high-quality instruction.

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[50] Although my dissertation focuses on EL status, similar arguments and analyses could be made for IEP status.

While the underlying relationship between school-level teacher retention and EL students' English acquisition remains unclear, I have suggested several plausible mechanisms through which staff instability might negatively impact student learning for ELs. The significant findings from this study therefore point to the need for additional research examining whether EL students are disproportionately exposed to negative externalities associated with school-level teacher attrition. Contextualizing the findings from this study within the larger body of research on teacher attrition, it is clear that additional research is especially needed on potential within-school effects, not only for English learners but also other subgroups of disadvantaged students. While my study presents some of the first quantitative analysis on within-school heterogeneity in student outcomes and how they correlated with teacher retention, important limitations exist in how my findings can inform our understanding of this relationship. Clarifying those limitations points to where additional study would be informative and helpful for policymakers who value educational quality and equity.

Several limitations of the work I have presented are related to limitations of the data itself. Most notably, students in the state data are not connected to individual teachers. I therefore do not observe whether English learner students are disproportionately assigned to replacement teachers, teachers with less experience, or more seasoned instructors—nor whether higher teacher attrition correlates with changes in those patterns. If students were connected to individual teachers, future studies could more deeply investigate predictors of teacher attrition, within-school differences in exposure, and potentially heterogeneous effects, controlling more precisely for teacher experience. Causal analyses could also be explored, leveraging grade-level teacher attrition differences as in Hanushek, Rivkin & Schiman (2019) or Ronfeldt, Loeb & Wyckoff (2013). Another possibility is exploring the potential within-school effects that differ by teacher type, comparing ELD teacher attrition to non-ELD teachers, following Sorenson & Ladd (2020). Such approaches could help identify the underlying reasons that teacher attrition is correlated with student outcomes but would require more detailed data from the classroom level of analysis.

Analyzing retention at the school level also obscures any systematic grade-level differences within the school that may be related to both teacher retention and student outcomes, particularly because the negative impact of attrition may be attributable to grade-level teacher reassignments (Hanushek, Rivkin & Schiman, 2016). Classroom-level connections could therefore help identify whether grade-level reassignments play a role in how schools manage attrition and whether those decisions mitigate negative effects. Those connections would also permit value-added models to examine teacher exits in more detail. As noted by Rivkin et al. (2005), "Even if attrition and quality are uncorrelated, if teachers in the tails of the distribution are more likely to exit, higher turnover schools will tend to have higher cohort differences in achievement gains," biasing correlations between attrition and student outcomes. My analysis is limited by similar assumptions, whereas more advanced causal models could test more specific hypotheses and more rigorously identify the extent to which retention may drive student test score gains.

To the extent that subgroup averages in standardized test scores inform policies around English learner education, causal analyses could also explore whether teacher attrition rates drive disparities in academic content proficiency. There are also other important student outcomes that future studies could examine, especially indicators of college and career readiness that could better represent EL student success—outcomes such as graduation rate, college acceptance (as well as matriculation and persistence), and so-called non-cognitive outcomes like socioemotional skills. Whether teacher retention drives patterns in those outcomes is an empirical question to be studied, but further qualitative research is also needed to understand the underlying mechanisms of how retention may improve student learning. Mixed-method studies can also examine what policies, programs, or practices are most conducive to improving teacher retention and helping educators manage both short-term and chronic staff instability. These questions are outside the scope of my current analysis, but my findings point to them as next steps for educators to invest in improving equal access to educational opportunity.

Another limitation of my approach is that I examined only the average correlation between teacher retention and English acquisition. Schools do not experience uniform teacher retention, so future analyses should examine the extent to which that relationship varies at the school level—recognizing that school context matters in why teachers leave, how difficult it is to replace them, and how chronically school leaders face those challenges. Because higher-level management likely influences teacher exits as well as student learning, future studies should also examine the role of principal turnover in how EL students are assigned to classes and whether there are short-term or long-term changes in English acquisition rates. I do not control for principal turnover and therefore fail to observe a potentially important explanatory variable.

Another limitation of the data is related to errors in how teachers are tracked longitudinally. Prior to 2009, teachers were not assigned unique identifiers that were consistent across time, and reporting inaccuracies introduce measurement error in the predictor of interest. Although I have dropped the most obvious cases where teachers are erroneously connected, errors in teacher data decrease the precision of my estimates. Improving data quality at the school and state levels could help increase the validity and reliability of similar analyses in the future. DPI could also consider again presenting public state-wide teacher attrition reports, as it once did—ideally adding sections attending to the potential subgroup disparities in how students are exposed to annual and chronic teacher attrition. Especially if continued research reveals evidence that attrition is causally related to student outcomes and within-school disparities, the state should consider disaggregating data to identify opportunities to support schools in retaining more teachers or focusing on specific teacher types—for example, if ELD teacher attrition specifically is found to drive patterns in EL outcomes.

The current study is also limited, as many are, because of its inability to disentangle results by student ethnicity or racialized identity, as well as home language ability. Although my findings suggest that Black EL students typically demonstrate slower annual gains in academic English proficiency, this simple correlation does not tell us anything about why that might be the case. Further, EL student identity is complex, nuanced, and influenced by important contextual factors, not reducible to categorical demographic variables. These limitations speak to the importance of qualitative research to include the perspectives of ELD teachers and EL students and understand how teacher retention may play a role in increasing marginalized students' access to educational opportunity. Although the quantitative studies I have suggested can help justify a grounded theory study, for example, of how teacher retention operates at the within-school level, ultimately it is that ground-truthing process that will provide meaningful analysis of any underlying mechanisms (Tabron & Thomas, 2023). The state may therefore also benefit by tracking additional student outcomes beyond standardized test scores.

Funding and Financial Incentives

While the improvements to data quality and reporting that I have suggested would demand relatively low financial investment, ultimately the state's obligation to provide equal educational opportunity for English learners in public schools will require significant additional investment of financial resources. Studies repeatedly confirm that under-resourced schools—the kind typically serving higher proportions of marginalized students who may be disproportionately harmed by teacher attrition—already struggle to retain qualified staff, while schools with better funding are more able to attract and retain experienced educators (Clotfelter et al., 2010; Knight, 2019). My findings reflect how high poverty and disadvantaged student enrollment are correlated with low teacher retention in Wisconsin schools. The disparities arguably derive from the ubiquitous policy choice to fund public K-12 education primarily through local property taxes, a system which likely reinforces racialized and socioeconomic segregation and the resultant inequalities in educational opportunity. Although it may be possible to change financial incentives and encourage teachers to remain in marginalized schools—with the goal of disrupting patterns of systemic disadvantage—this would likely involve a concerted effort at the state level to equalize teacher retention rates and, in all likelihood, significant increases to the state education budget.

Unfortunately, school funding in Wisconsin is already deeply inadequate.[51] According to one study of funding inequality across the country, Wisconsin's legislature would have to approve a $745 million increase in categorical aid to bring standardized test scores in line with the national average (Baker, Di Carlo & Weber, 2022). That increase would only be expected to raise outcomes averaged across all students, however. English learners typically demonstrate content proficiency (often advanced proficiency) only after becoming Fluent English Proficient, meaning EL-specific aid would likely be required to help schools overcome program costs involved in supporting ELs as they learn English. Further, as noted by Xu, Solanki & Fink (2021), additional funding by itself is insufficient for schools to help students overcome systemic barriers to educational opportunity. The state would likely also have to increase categorical aid for Bilingual-Bicultural programming, professional development, and other resources for disadvantaged students. Altogether, this would require substantial state financial investment—on a level that may not be politically feasible within Wisconsin. According to the nonpartisan Legislative Fiscal Bureau, the Wisconsin state legislature underfunded public K-12 education by $4 billion over the last six budget cycles, relative to budget

[51] That is to say, deeply inadequate for providing all students an equal opportunity for a sound basic education.

requests by former DPI superintendent and current governor Tony Evers (Kelly & Girard, 2022).[52] The inadequacy of education funding over the last decade does not bode well for BLBC increases.

If high teacher attrition specifically predicts increases in educational disparities, however, the state could dedicate more narrow programs and resources toward teacher retention incentives as one way to equalize access to educational opportunity. Whether overall teacher retention or ELD-specific teacher retention is more closely associated with English learner outcomes remains an empirical question for future research, but some studies have found significant positive effects related to incentives for teacher retention. Using a difference-in-difference-in-difference strategy leveraging both time and teacher eligibility, Clotfelter, Glennie, Ladd & Vigdor (2017) found that an annual $1800 bonus payment reduced school-average teacher attrition rates by 17% for certified math, science or special education teachers in North Carolina public secondary schools with either high poverty rates or low average test scores. Leveraging a fuzzy regression discontinuity design, Springer, Swain & Rodriguez (2016) found that a $5000 bonus payment significantly increased retention rates for highly effective teachers in low-performing schools in Tennessee. A follow-up difference-in-difference study from Swain, Rodriguez & Springer (2019) found that the program increased average standardized test scores by 0.06-0.07 SD in math and 0.08-0.12 SD in reading, depending on the inclusion of student fixed effects. Meanwhile, Feng & Sass (2018) found that a loan forgiveness program in Florida was effective in reducing attrition by 27% for teachers of English as a Second Language.

These findings speak to the potential for increased teacher retention to positively affect EL learning. The studies are also significant from a policy perspective because retention is one of the

[52] Exercising partial veto powers in 2023, Evers amended the state budget to expand revenue limits by $325 per pupil through 2045, allowing districts to raise local property taxes to further supplement to state aid. The increased revenue limit is still $75 per student less than what schools would need to keep up with inflation, however (Hess, 2023a).

few malleable factors I found to be significantly correlated with English acquisition rate. After all, at least two-thirds of teacher attrition is “voluntary, unrelated to retirement, and may be amenable to intervention” (Billingsley & Bettini, 2019). Not all evidence related to financial incentives is positive, however. A comparative interrupted time series study in Colorado found no effect for a Denver Public School plan to incentivize teacher retention in schools serving larger proportions of EL students and students racialized as non-white (Atteberry, Engel, Doughty & Mangan, 2020). Analyzing quasi-experimental evidence and additional results from a randomized control trial, a recently released working paper also reported that the federal Teacher Loan Forgiveness program had no effect on teacher retention rates (Jacob, Jones & Keys, 2023).[53] A similar program has been introduced at the state level in Wisconsin, where the University of Wisconsin-Madison promises reimbursed loans for new graduates who commit to teaching in the state for at least four years. The commitment is reduced to three years for teachers in high-need areas, including ELD education. The program is privately funded, however, rather than state-sponsored, and does not require that teachers commit to a specific school. Arguably, programs like this are more focused on recruitment than retention, but a privately funded program represents continued innovation in an already very heterogenous policy space (Kolbe & Strunk, 2012). Unfortunately, the Wisconsin Teacher Pledge program was only first opened in the fall of 2020, so it will likely take several years at least until its impact can be evaluated.[54] If school-specific retention is an important component of how new retention initiatives can improve student learning, then future program evaluations should consider the potential effects of the Teacher Pledge program both within and across Wisconsin schools—especially in how the program influences opportunity gaps and subgroup disparities in outcomes.

[53] The authors speculate that administrative barriers may have reduced the program’s otherwise promising potential.
[54] Private donations have extended the program through at least the 2026-2027 academic year.

Ultimately, financial incentives for teachers are expensive and not always well-aligned to districts' actual staffing needs (Strunk & Zeehandelaar, 2015). Furthermore, incentive programs may conflict with teacher union priorities, such as solidarity between teachers of different subjects (Strunk & Zeehandelaar, 2011). Although the influence of teacher unions has been significantly reduced in Wisconsin since Act 10, school leaders and district administrators may nonetheless be reluctant to pursue incentive policies—especially given the mixed evidence on their effectiveness. If future studies of the potential within-school effects of teacher attrition reveal strong evidence that retention reduces disparities for marginalized groups, however, states and districts would have ample reason to explore more policies aimed at teacher retention. It is also possible that retention interventions may actually be cost-effective ways to help under-resourced schools in the long run, due to the potential cost savings associated with higher retention. Based on my findings, improving teacher retention may be more cost-effective than reducing class size by hiring additional teachers, though additional causal research and cost-benefit analysis would have to confirm this. Either way, retention policy should emphasize the stability and continuity of experienced, effective teachers in marginalized schools—especially if those are the contexts in which retention rates most directly contribute to improved equality in access to educational opportunity.

Teacher Preparation and Induction

States and districts often already pursue policies and practices to increase teacher retention, of course—and, even with more funding and policies aimed at teacher retention, this would be just one piece of the puzzle in eliminating the opportunity gap. Many researchers highlight teacher preparation and induction strategies to help new staff develop critical skills, emphasizing in some cases the importance of differentiating instruction for ELs and other students marginalized within traditional education practices. Better preparation may itself facilitate increased teacher retention by helping teachers develop the skills they need to be effective and avoid burnout. Unfortunately, Heineke (2016) notes that new teachers often “entered ELD classrooms unprepared, despite being deemed highly qualified by state qualifications,” suggesting that states should pay close attention to whether existing preparation programs actually result in improved outcomes for students. For example, UW-Madison recently instituted an expedited program for new teachers to earn their Bilingual-Bicultural certification in just one year, but it will likely take several years to evaluate the effectiveness of the program in improving student outcomes—and, currently, it only addresses certifications for Spanish speakers, even though more than 200 languages are represented within Wisconsin’s emergent bilingual population.

As important a role that teacher preparation plays in improving both retention and student outcomes, however, studies also point to induction policies as critical for teachers’ early-career success. A 2016 study by Papay, Taylor, Tyler & Laski provides evidence from a field experiment that mentoring greatly improves teacher effectiveness, raising test scores by 0.12 SD. There is little evidence to date about our ability to implement such programs on a large scale, unfortunately, nor did the study examine mentoring for ELD education specifically. Evidence suggests, though, that feedback from teacher evaluations leads to improvements even among more experienced teachers (Taylor & Tyler, 2012). Additional work is needed to understand the role of teacher induction and mentoring for EL education, but existing evidence suggests that these are malleable practices that could improve both teacher retention and student outcomes. Especially if higher teacher attrition disrupts effective EL education within schools by reducing institutional knowledge and continuity, as I have suggested, then better preparation and induction could help new teachers overcome the negative externalities of high attrition—regardless of whether better preparation and induction are directly improve teacher retention.

Bilingual-Bicultural Education

While teacher preparation and induction policies do seem to contribute to better retention, school culture and administrative support have also been found to significantly predict attrition for many staff—especially those working with disadvantaged students (Billingsley & Bettini, 2019). Despite evidence favoring bilingual programs over ESL (U.S. Department of Education, 2012), Wisconsin has historically underfunded and deprioritized Bilingual-Bicultural education, leading to significant constraints in the resources available to hire qualified instructors and support staff. As noted, substantial increases in investment for English learner education would help equalize access to educational opportunity for ELs. The state could expand resources not only for recruiting, training, onboarding, and retaining qualified ELD educators, but also for expanding and improving Bilingual-Bicultural education programs across the state—especially for students who speak home languages other than Spanish, who almost never have access to bilingual programs in Wisconsin.[55]

This may involve changing statutory minimums for BLBC categorical aid, sliding scale funding options for schools that do not meet the specified thresholds but still enroll ELs, and expanding the kinds of ongoing professional development that teachers have access to—not only for ELD teachers, but also for subject-specific and general educators who work with students in integrated classrooms. Incorporating more professional development around EL education could improve access to instruction across different classroom contexts. Unfortunately, mirroring the dysfunctional policies still affecting EL students in many schools, ELD teachers in some cases are pulled out of school-wide professional development trainings to learn more narrow skills related to ELD education, reducing both the agency of individual teachers in professional development

[55] Attention must be paid to avoid the "gentrification" of bilingual education, however, which scholars highlight as potentially counterproductive to the goal of reducing inequalities for ELs and other frequently marginalized students (Menken, Espinet & Avni, 2024; Valdez, Freire & Delavan, 2016).

opportunities and contributing to feelings of isolation (Heineke, 2016). Segregating professional development for ELD teachers also reduces the benefit that could be realized if other teachers also learned how to more effectively support EL students.

Finally, the state could shift emphasis away from English-only education and prioritize the Bilingual-Bicultural education programs that best support EL student flourishing in K-12 schools. Valuing students' home language skills and sociocultural assets could improve ELs' access to instruction as well as socio-emotional skills, creating a more inclusive classroom environment that benefits all students. Recently, however, the state legislature passed new regulations that require schools to implement science-based literacy curricula that prioritize reading in English (Act 20). The new state law is aimed at improving average reading scores across Wisconsin by increasing the frequency of testing, labeling students as "at risk" if they score below certain thresholds, and mandating personalized reading curricula or even summer school until demonstrating proficiency. Moreover, the new law offers no flexibility for families to opt out—even for ELs new to the state. Advocates for Bilingual-Bicultural education have voiced concerns about EL students' civil rights, interpreting the law as a shift even further toward English-only education by further deprioritizing literacy in students' home languages (Hess, 2023b). Although a "trailer bill" is expected to clarify how the law will impact EL education in the state, advocates feel that the literacy law was passed without emergent bilingual students' assets in mind (McCarthy, 2023). If lawmakers are serious about providing equal access to a sound basic education for all Wisconsinites, they could invest in evidence-based dual-language and bilingual LIEPs instead of currently-dominant ESL options.

Special Education and Dual-Identification

In honoring its obligation to provide equal access to educational opportunity for all students within Wisconsin's public schools, the state must also pay close attention to the overlap between

EL status and disability status. My findings suggest that dual-identified students demonstrate much slower annual growth on average, compared to ELs who do not have IEPs. I do not analyze whether teacher retention is more strongly correlated with growth for this specific subgroup. This is another area for additional research, as special education teacher attrition also remains underexamined (Billingsley & Bettini, 2019). Because disparities for dual-identified students are among the most dramatic, it is critical to understand the overlapping policies and practices that together influence the resources and supports available to ELs with disabilities. If attrition rates are often highest for ELD teachers and special educators, the subset of teachers who work with dual-identified students may face compounding pressures and even higher attrition. For that reason, future quantitative, qualitative, and mixed-methods studies should focus on these multiply-marginalized students and the educators who support them.

Intersectionality and Cumulative Disadvantage

In exploring the potential within-school differences in how teacher attrition correlates with student learning, I have underscored the importance of context. Context is important because of the many overlapping layers of individual and institutional factors that can affect student learning, especially for ELs. Many EL students face intersectional disadvantages—not only in terms of how disability status can shape their access to instruction, but also racialized identity, home language, socioeconomic status, and other individual factors associated with institutional barriers to equal access to educational opportunity.[56] For example, the ongoing effects of segregation and persistent school funding inequality likely contribute to further disadvantage for marginalized students—and teacher attrition may exacerbate these disadvantages. The schools that serve high proportions of marginalized students also tend to have the highest teacher attrition.

[56] For instance, it is local context that determines which mechanisms of disadvantage play a role in disparities.

For that reason, disproportionate exposure to teacher attrition may be one way in which disadvantages for English learners are exacerbated within the K-12 public education system. These findings are significant because teacher retention is one of the few malleable factors available to policymakers who are interested in advancing equal educational opportunity. If better retention reduces within-school disparities in access to instruction, as well as between-school disparities in the quality and continuity of teaching staff, teacher retention policies may be one promising way to reduce cumulative disadvantage for marginalized students. Although I have not examined how teacher retention correlates with intersectional student identity, future studies could perform more subgroup analyses and explore the nuances within this relationship.[57] Because of the complexities involved, "this work will require moving beyond the simplistic use of the racial/ethnic categories from the U.S. census, and [it] will probably require qualitative and mixed methods approaches" (Billingsley & Bettini, 2019). The combination of more rigorous critical quantitative analysis and context-rich qualitative evidence could help expand our understanding of the mechanisms behind cumulative disadvantage. More nuanced explorations of how teacher retention rates influence the educational outcomes of multilingual learners and other marginalized students are crucial because context-neutral policy recommendations and "one-size-fits-all" approaches are likely to reinforce existing dominant practices (Milner, 2010). In order to promote more equitable outcomes for all students, we need to understand how teacher retention contributes to educational experiences in context-dependent ways for students of different backgrounds in diverse school contexts. We may find, for example, that differences in teacher labor markets between urban and rural areas intersect with localized differences in enrollment to shape how retention affects disparities for EL students.

[57]For example, Sahakyan (2024) explores the impact of the COVID-19 pandemic on English learners' proficiency and disparities for various subgroups within the EL population, with an emphasis on intersections that include the overlap between racialized identity and Hispanic ethnicity.

Furthermore, the significance of a relationship between teacher retention and educational opportunity has important implications for cumulative disadvantage because of how its effects may accumulate over time. Because schools with low retention in one year are also likely to have low retention in other years, delays in academic English acquisition may accumulate for students over time—potentially leading to significant delays in attaining reclassification-level proficiency. Although this analysis does not examine the cumulative effect of exposure to high annual attrition, studies suggest that cumulative exposure may indeed operate in this way. Conversely, benefits of increased retention may accrue over time for individuals by increasing the resources and support available to them, reducing the overall barriers they face over the course of their education. Future studies should explore these potential cumulative effects and connect them to critical inquiry about structural disadvantages for marginalized students. I now consider some of the ways that future studies could apply critical quantitative methodologies in order to further illuminate the connection between teacher retention and disparities for marginalized students.

Critical Quantitative Research

This dissertation centers as evidence both individual and aggregated student performance on standardized proficiency assessments. In reviewing the history of how English learners have historically been marginalized by a public education system that devalues their linguistic, cultural, and academic assets, I described the tensions inherent within high-stakes standardized testing for EL students. Critiques of standardized content tests argue that these test scores fail to meaningfully represent student learning or students' lived experiences; some contend that standardized tests are rooted in white supremacist history and uphold racism (Russel, 2023). I nonetheless argue that it can be appropriate to utilize state standardized test data to study opportunity gaps. While scholars criticize the validity of test data—not only how it is constructed, but also how it is used to promote deficit-minded perspectives of students from marginalized backgrounds and reinforce the barriers students face—those test data are also a primary source of evidence for educators pursuing more equitable policies and programs aimed at expanding EL access to educational opportunities.

In particular, the ACCESS test is an English language proficiency assessment measuring a student's access to the dominant language of instruction. Insofar as the ACCESS test is a valid and reliable assessment tool for measuring the extent to which a student can engage with academic content in schools that predominantly teach in English, students' performance on that test can be taken as a measure of their opportunity to learn. This measure can be used to identify patterns in how students face disparities in equal access to educational opportunity—a right constitutionally guaranteed by the state (and therefore federal government) and, if interpreted as a fair opportunity for education, an ethical obligation some argue that we owe to all students (Anderson, 2007).

Further, school leaders use standardized test data to make decisions about the opportunities students can access. The ACCESS test largely determines what resources and support services an EL-identified student will receive and when or whether they will be reclassified. The test therefore determines, whether directly or indirectly, what opportunities to learn will be made available to English learners. If the school also uses ACCESS or other standardized test data to place students into academic tracks—which many schools do—then standardized test data have consequential validity for how students access appropriately challenging coursework and opportunities to learn. Disparities in ELs' scores can therefore inform our understanding of educational disadvantage.

As a scholar trained in quantitative research for educational policy, my work focuses on quantifying inequalities and identifying sources of disadvantage that produce them. I am drawn to critical quantitative inquiry as a (relatively) new paradigm within educational research. Critical quantitative scholars use data to represent educational processes and identify large-scale inequities, aiming to understand how those systemic inequities are reproduced and perpetuated by social and institutional processes. They interrogate the common models, measures, and analytic processes of quantitative research to offer alternatives that more accurately represent the experiences of those who have been marginalized by social systems. This work requires an interdisciplinary approach that seeks to understand and combat racialized inequity in society (Garcia, López & Vélez, 2017).

Although a full account of critical quantitative research is beyond the scope of this project, several thematic features are worth emphasizing. First, critical approaches are aimed at exposing racism in its various permutations. They examine relationships between racism and power within social institutions with the goal of disrupting the dominant ideologies, policies and practices that uphold oppression of marginalized groups. They center social justice, democracy, and the role of education in reproducing or interrupting racist practices (Ladson-Billings, 1998). Toward this end, critical quantitative researchers reject deficit-based perspectives of marginalized students, resist positivism and the oversimplification of data, embrace experiential knowledge and narrative, explore within-group differences rather than comparisons between racialized groups, and ground analyses in both expert quantitative methods and critical perspectives (Tabron & Thomas, 2023).

In analyzing the relationship between teacher retention and opportunity gaps for emergent bilingual students, I have focused on administrative data available from the state. These data are limited by many of the normative assumptions that critical quantitative scholars reject, including the idea that individuals can be assigned to discrete categories of racialized identity and the idea that educational experiences can be reduced to simplistic metrics. I have also leveraged research methods common within the "normal science" of positivist research paradigms. Despite how these constraints have limited this dissertation, I argue that its contributions lay the groundwork for future research on teacher attrition that is more aligned with critical quantitative research.

My goal is to leverage the kind of data privileged in policy discussions to identify potential mechanisms of disadvantage. I focus on the structural disadvantages that multilingual learners overcome in bringing their unique assets to an educational system that, all too often, devalues their many strengths and perspectives. Although additional work is required to fully integrate critical perspectives into my findings and analysis, my epistemological understanding of teacher attrition and its impact draws on insights from the QuantCrit literature, and in particular the following principles enumerated by Gillborn, Warmington & Demack (2018):

1. *The centrality of racism*, which is deeply rooted both in the disadvantages that emergent bilinguals face within schools and differential teacher attrition rates between schools;
2. *The non-neutrality of numbers*, which are used to obscure systematically biased processes, such as teacher attrition, as "race neutral" despite their role in reifying racialized injustices;
3. *The socially constructed nature of categories*, such as race or English learner status;
4. *The recognition that voice and insight are vital*; since data cannot "speak for itself," the experiential knowledge of marginalized groups is critical in understanding and dismantling racist practices;
5. *The understanding that statistical analyses have no inherent value*, but can play a role in the struggle for social justice by identifying and dismantling unjust policies and practices, including those which promote attrition patterns that disadvantage marginalized students.

In short, this dissertation conceptualizes differential teacher attrition as a phenomenon that both exists within and contributes to racialized injustice in a mutually-reinforcing cycle as teachers disproportionately exit disadvantaged schools and, in doing so, systematically leave them further disadvantaged. Teacher preferences to work in advantaged schools are informed by disparities in funding and resources, average student academic achievement, and exclusionary discipline rates—all patterns linked to intersections of racialized and socioeconomic segregation. The reasons that teachers differentially exit disadvantaged schools are deeply rooted in long (ongoing) histories of segregation and racism, which continue to reinforce persistent disparities between schools and for the students they serve. In addition, discriminatory practices in school ratings and rankings may reinforce the disparities between schools, likely contributing to further inequalities (Mizrav, 2023).

In addition to documenting disproportionality in exposure to attrition, I further documented its differential effect within schools, previously underexplored, despite being strongly grounded in existing research on the experiences of emergent bilingual students. By identifying evidence of a relationship between "race-neutral" teacher attrition and within-school opportunity gaps, I expand our understanding of teacher attrition and how it may exacerbate disadvantages for marginalized students within the K-12 public school system. Quantifying that relationship may help identify policies and practices to mitigate the disadvantages that marginalized students face. Future work, however, can take this study further in applying a critical perspective. For instance, future research might identify alternative student outcomes that more fully illuminate the ways in which teacher attrition contributes to within-school opportunity gaps for marginalized students. Future work may also benefit from applying an intersectional lens, examining the overlapping identities of students and how they are affected by chronic teacher attrition, including in ways that intersect with broader systems of inequality and racialized injustice.[58] Finally, centering the underrepresented voices of marginalized students and educators into the research will help understand not only how teacher attrition might play a role in cumulative disadvantage, but also what educators and policymakers can do to counteract these patterns and promote more equal access to educational opportunity for marginalized students.

[58] One example of how school practices intersect with broader systems of racialized oppression is the school-prison nexus (Turner, Timberlake, Beneke & Velázquez, 2021). This is especially concerning for EL students, who are more likely to be undocumented immigrants at risk of detention and deportation—risks that could be potentially amplified by the school-prison nexus.

CHAPTER EIGHT: CONCLUSION

I have outlined the reasons that teacher attrition is likely to exacerbate existing opportunity gaps within schools, as well as between them. Despite the plausibility of this hypothesis, as noted previously, few if any studies have even attempted to evaluate the potentially differential effects of teacher attrition between subgroups of students at the same school. I have proposed three studies that explore the relationship between school-level teacher attrition and opportunity gaps between English learners and their peers in Wisconsin K-12 public schools. If teacher attrition does in fact reduce EL students' access to high-quality instruction, even relative to never-EL peers in the same school, it could be contributing to the kind of negative feedback loop implicated in discussions of mutually reinforcing institutional and perceptual factors that keep English learners in cycles of under-preparation. Identifying those patterns could help inform our understanding of persistent opportunity gaps between subgroups of students, especially over time, and how they contribute to education debt (Ladson-Billings, 2006). Given the relevance to educational opportunity, studies ought to consider potential within-school heterogeneity in the negative effects of teacher attrition.

This dissertation therefore fills an important gap in the literature on teacher attrition and educational disadvantage: namely, how a known contributor to opportunity gaps between schools may also function to exacerbate opportunity gaps within schools. Uncovering evidence of this relationship is vital for understanding the true impact of teacher attrition on educational inequality. This evidence could also help identify policy alternatives that would more effectively mitigate the problem of differential teacher attrition. For instance, developing more effective professional development for teachers who work with support staff may improve instructional cohesion more quickly after high attrition years, making it easier for teachers to support the students who most need resources that require collaboration among staff.

For far too long, our educational systems have failed to fully support English learners and other marginalized students, especially in our most disadvantaged schools. As the population of English learners continues to grow rapidly, it is more important than ever to understand the full picture of how education debt accumulates and how purportedly neutral policies disproportionately disadvantage students already facing disadvantages. This is especially true when thinking about differential teacher attrition. We know that in the wake of the COVID-19 pandemic, many schools are currently facing more extreme teacher shortages than ever. In order to prepare policies that address the full scope of this problem, we first have to understand all of its layers; for differential teacher attrition, that means exploring its effects within schools, as well as between them.

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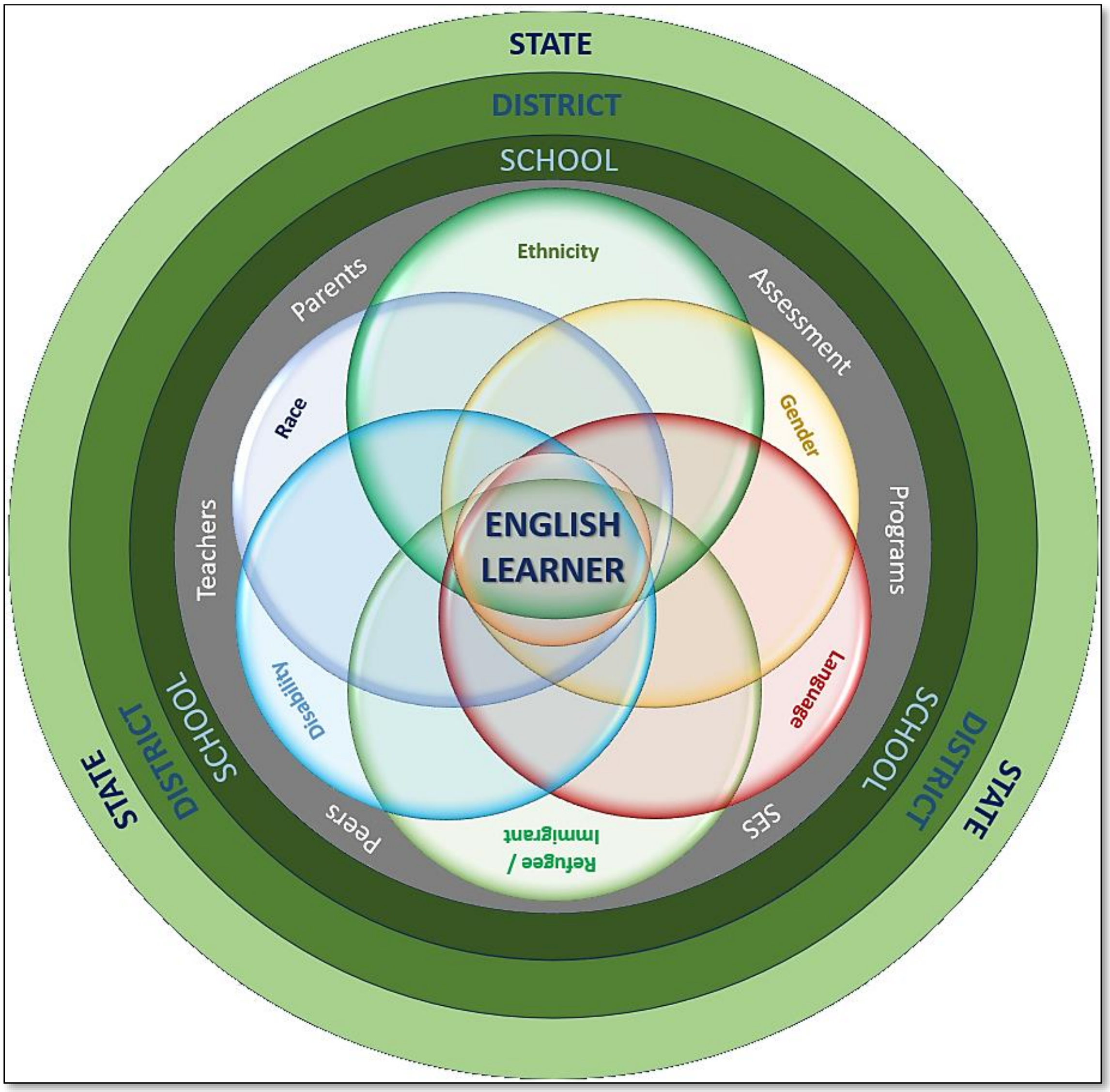
APPENDIX

Intersectional Context of English Learner Proficiency / Status

Picture 1 – English learners' intersectionality in the context of individual and institutional factors (Sahakyan, 2024)



Analytical Measures

Table 1 Variables Used in Regression Analysis

Variable	Source	Type	Construction
Composite Scale Score Growth	DPI All-Staff	Ratio	Subtract student's Composite Scale Score in year "t-1" from Composite Scale Score in year "t"
Retention	DPI All-Staff	Ratio	Calculate the proportion of teachers employed by the school in year "t-1" are still employed by the school in year "t"
Lagged CS	DPI Students	Continuous	Composite Scale Score in year "t-1"
Years EL	DPI Students	Ratio	Calculate running sum of observation count, sorted by time within student
Years^2	DPI Students	Ratio	Multiply "Years EL" variable by itself
Locale	Common Core of Data	Categorical	Assigned based on CCD locale codes for each school-year combination (Urban, Suburban, Town, Rural)
Title I	Common Core of Data	Binary	Assigned based on CCD Title I indicator for each school-year combination
Charter	Common Core of Data	Binary	Assigned based on CCD charter school indicator for each school-year combination
Female	DPI Students	Binary	Recode as binary; interpolate missing data based on student's demographic information in other years
Ever-IEP	DPI Students	Binary	Recode IEP status as binary; calculate whether the student ever has an IEP in any year in the dataset
Grade Repeated	DPI Students	Binary	Recode as binary
FRL Status	DPI Students	Binary	Recode as binary
Migrant Status	DPI Students	Binary	Recode as binary
Mid-Year Transfer	DPI Students	Binary	Identify whether a student has multiple enrollments in the same year
Chronic Absenteeism	DPI Students	Binary	Calculate whether a student has been absent for more than 10% of days and was enrolled for more than 90 days
Race	DPI Students	Categorical	Recode as categorical (Native American, Asian, Black, Hawaiian/Pacific Islander, Multiracial, White, and Hispanic as the reference group)
Home Language	DPI Students	Categorical	Recode as categorical (Arabic, Chinese, Hmong, Somali, and “Other,” with Hispanic as the reference group)
% Shared Home Language	DPI Students	Ratio	Calculate proportion of Ever-ELs in the same school with the same home language
Interaction: Home Language x % Shared Home Language	DPI Students	Ratio	Interact categorical variable "Race" with ratio variable "% Shared Home Language" for five separate interaction variables, with "% Shared Home Language - Spanish" as reference group
% ST Proficient	DPI Students	Ratio	Calculate proportion of peers who demonstrate proficiency on state standardized tests, averaged across math and English language arts, in the same school-year-grade combination

% IEP	DPI Students	Ratio	Calculate the proportion of students with IEPs in the same school-year combination
% EL	DPI Students	Ratio	Calculate the proportion of ELs in the same school-year combination
Rel. Diversity - Race	DPI Students	Ratio	Calculate a Hirschman-Herfindahl Index for the seven race/ethnicity categories in each school-year combination
% FRL Eligible	DPI Students	Ratio	Calculate the proportion of FRL-eligible students in the same school-year combination
Logged School-Mean Student Teacher Ratio	DPI Students	Ratio	Calculate the natural log of the ratio of students to teachers in the same school-year combination
Logged Total Enrollment	DPI Students	Ratio	Calculate the natural log of the number of students in the same school-year combination
% MA+	DPI All-Staff	Ratio	Calculate the proportion of teachers who have advanced degrees in the same school-year combination
Logged Average Teacher Salary	DPI All-Staff	Ratio	Calculate the natural log of the average salary of teachers in the same school-year combination, inflation-adjusted to 2019 dollars
Average Teacher Experience in Years	DPI All-Staff	Ratio	Calculate the average years of experience for teachers in the same school-year combination
% BLBC certified	DPI All-Staff	Ratio	Calculate the proportion of teachers who have Bilingual-Bicultural certifications in the same school-year combination
Logged District Per-Pupil Expenditures	Common Core of Data	Ratio	Calculate the natural log of district total current expenditures per pupil on elementary and secondary programs, inflation-adjusted to 2019 dollars
District % EL	SEDA	Ratio	Download from SEDA, match to DPI data via NCES from CCD data
District-Average SES	SEDA	Continuous	Download from SEDA, match to DPI data via NCES from CCD data
District Unemployment	SEDA	Ratio	Download from SEDA, match to DPI data via NCES from CCD data
Rel. Diversity – FRL Eligibility	SEDA	Ratio	Download from SEDA, match to DPI data via NCES from CCD data

Descriptive Statistics

Table 2 Descriptive Statistics of the Population – Student Level

	Observations			Students		
	Never-EL	Ever-EL	All Obs.	Never-EL	Ever-EL	All Students
Total Obs.	10,548,165	947,612	11,495,777	1,773,457	171,300	1,944,757
Female	48.7%	48.1%	48.6%	48.8%	48.2%	48.8%
Ever-IEP	20.6%	17.5%	20.3%	18.1%	14.8%	17.9%
FRL Eligible	34.0%	75.3%	37.4%	43.6%	82.1%	47.0%
Nat. Am.	1.1%	0.2%	1.0%	1.2%	0.2%	1.1%
Asian	1.2%	28.1%	3.4%	1.7%	28.6%	4.0%
Black	9.3%	2.3%	8.8%	10.8%	3.5%	10.2%
HPI	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Hispanic	4.1%	58.4%	8.6%	5.0%	57.1%	9.6%
Multiracial	5.5%	4.3%	5.4%	4.7%	3.1%	4.5%
White	78.7%	6.7%	72.8%	76.6%	7.3%	70.5%
ELA Prof.	60.1%	37.2%	58.2%			
Math Prof.	47.3%	26.8%	45.6%			
Attendance	94.4%	94.1%	94.3%			
Chr. Abs.	11.5%	12.6%	11.6%			
Ever-EL		100.0%	8.2%		100.0%	8.8%
Current EL		72.3%	6.0%			
Long-Term EL		46.3%	2.9%		39.8%	1.8%
Initial CPL		1.99			2.09	
Arabic		1.1%			1.4%	
Chinese		1.5%			1.9%	
Hmong		16.2%			13.5%	
Somali		0.7%			1.3%	
Spanish		50.2%			45.8%	
Other		30.3%			36.0%	
City	25.2%	53.4%	27.6%			
Suburb	26.7%	23.5%	26.5%			
Town	20.9%	12.7%	20.2%			
Rural	27.2%	10.4%	25.8%			
Avg. Exp.	14.8	14.1	14.7			
Avg. Sal.	$57,976	$59,231	$58,080			
Adv. Deg.	53.3%	53.8%	53.4%			
Retention	83.9%	81.8%	83.7%			
School Size	651	724	657			

Table 3 Descriptive Statistics of the Population – School Level

	< 15% EL	>= 15% EL	*t*	*dF*	*p*
School-Year Observations	26,072	2,816			
% Female	0.484	0.486	-1.466	28,886	0.143
% Ever-IEP	0.212	0.231	-13.384	28,886	0.000
% FRL Eligible	0.373	0.655	-67.214	28,886	0.000
% Native American	0.013	0.007	5.581	28,886	0.000
% Asian	0.021	0.084	-73.049	28,886	0.000
% Black	0.076	0.127	-13.207	28,886	0.000
% Hawaiian / Pacific Islander	0.000	0.000	-0.564	28,886	0.573
% Hispanic	0.052	0.297	-1,300.000	28,886	0.000
% Multiracial	0.053	0.082	-39.530	28,886	0.000
% White	0.785	0.403	82.296	28,886	0.000
% English Proficient	0.647	0.517	30.432	25,440	0.000
% Math Proficient	0.456	0.331	35.150	25,881	0.000
Average Attendance Rate	0.944	0.941	3.306	28,879	0.001
% Chronically Absent	0.109	0.132	-10.192	28,886	0.000
% Ever-EL	0.043	0.323	-2,200.000	28,886	0.000
% Current EL	0.029	0.287	-2,400.000	28,886	0.000
% Long-Term EL	0.398	0.531	-22.164	22,822	0.000
Average Initial Proficiency	2.43	1.86	31.106	20,664	0.000
% Arabic ELs	0.008	0.010	-2.794	24,462	0.005
% Chinese ELs	0.025	0.009	9.445	24,462	0.000
% Hmong ELs	0.117	0.178	-13.180	24,462	0.000
% Somali ELs	0.004	0.011	-7.075	24,462	0.000
% Spanish ELs	0.406	0.578	-26.469	24,462	0.000
% Other ELs	0.439	0.214	37.686	24,462	0.000
% City	0.190	0.649	-57.662	28,886	0.000
% Suburb	0.199	0.154	5.789	28,886	0.000
% Town	0.196	0.105	11.678	28,886	0.000
% Rural	0.425	0.092	34.200	28,886	0.000
Average Experience	15.0	13.7	21.139	28,886	0.000
Average Salary	$56,071	$58,189	-14.304	28,886	0.000
Advanced Degree Rate	0.500	0.520	-5.459	28,886	0.000
Teacher Retention Rate	0.830	0.792	15.445	28,535	0.000
Average School Size	407	443	-5.724	28,886	0.000

Table 4 Descriptive Statistics of Analytical Sample – Demographics

		Potential		Preferred		Reduced	
		N	%	*N*	%	*N*	%
EL Obs.		225,162		186,375	82.77	159,379	70.78
Locale	Urban	126,534	56.20	111,015	59.57	96,520	60.56
	Suburban	49,388	21.93	32,971	17.69	27,287	17.12
	Town	27,926	12.40	24,064	12.91	20,515	12.87
	Rural	21,314	9.47	18,325	9.83	15,057	9.45
Title I	No	105,375	46.80	88,865	47.68	75,513	47.38
	Yes	119,787	53.20	97,510	52.32	83,866	52.62
Charter	No	215,920	95.90	178,928	96.00	153,076	96.05
	Yes	9,242	4.10	7,447	4.00	6,303	3.95
Gender	Male	120,455	53.50	99,844	53.57	86,078	54.01
	Female	104,707	46.50	86,531	46.43	73,301	45.99
Ever-IEP	No	174,363	77.44	144,345	77.45	121,087	75.97
	Yes	50,799	22.56	42,030	22.55	38,292	24.03
Race	Native American	196	0.09	177	0.09	136	0.09
	Asian	55,897	24.83	48,672	26.12	41,194	25.85
	Black	4,799	2.13	4,044	2.17	3,152	1.98
	Haw./Pac. Islander	87	0.04	78	0.04	50	0.03
	Hispanic	144,526	64.19	116,977	62.76	101,364	63.60
	Two or More Races	8,792	3.9	7,231	3.88	6,190	3.88
	White	10,865	4.83	9,196	4.93	7,293	4.58
Home Lang.	Arabic	2,794	1.24	2,226	1.19	1,760	1.10
	Chinese	2,273	1.01	1,941	1.04	1,418	0.89
	Hmong	40,282	17.89	35,245	18.91	31,010	19.46
	Somali	1,545	0.69	1,265	0.68	957	0.60
	Spanish	136,705	60.71	111,121	59.62	96,877	60.78
	Other	41,563	18.46	34,577	18.55	27,357	17.16

Table 5 Descriptive Statistics of Analytical Sample – Student Characteristics

				Potential		Preferred		Reduced	
	Min.	Max.	Missing	Mean	SD	Mean	SD	Mean	SD
CSS Gain Score	-209	218	0.00%	17.392	19.612	17.289	19.627	16.016	18.917
Lagged CSS	160	444	0.00%	339.661	32.280	340.046	32.150	340.699	30.871
Years EL	1	11	0.00%	5.143	1.690	5.167	1.687	5.390	1.663
Grade Repeated	0	1	0.00%	0.004	0.060	0.003	0.056	0.003	0.053
FRL Eligibility	0	1	0.00%	0.837	0.369	0.833	0.373	0.845	0.362
Migrant Student	0	1	0.00%	0.003	0.057	0.003	0.057	0.003	0.052
Mid-Year Transfer	0	1	0.00%	0.034	0.181	0.012	0.108	0.011	0.105
Chronic Absenteeism	0	1	0.00%	0.092	0.289	0.085	0.280	0.081	0.273

Table 6 Descriptive Statistics of Analytical Sample – School Characteristics

				Potential		Preferred		Reduced	
	Min.	Max.	Missing	Mean	SD	Mean	SD	Mean	SD
Retention Rate	0.000	1.000	0.29%	0.810	0.112	0.813	0.108	0.813	0.103
Student Teacher Ratio	6	3,120	0.00%	18.377	98.531	18.046	96.923	16.202	78.726
Total Enrollment	22	2,543	0.00%	545.763	294.288	545.235	290.534	534.368	259.634

Table 7 Descriptive Statistics of Analytical Sample – Teacher Characteristics

				Potential		Preferred		Reduced	
	Min.	Max.	Missing	Mean	SD	Mean	SD	Mean	SD
% MA+	0.000	1.000	0.00%	0.535	0.164	0.533	0.164	0.533	0.163
Average Salary	$15,405	$86,888	0.00%	$58,837	$7,045	$59,078	$6,173	$59,046	$6,135
Average Experience	1.000	29.667	0.00%	13.990	2.766	14.034	2.745	14.016	2.736
% BLBC	0.000	1.000	0.00%	0.052	0.095	0.052	0.094	0.054	0.094

Table 8 Descriptive Statistics of Analytical Sample – Peer Characteristics

				Potential		Preferred		Reduced	
	Min.	Max.	Missing	Mean	SD	Mean	SD	Mean	SD
% EL	0.001	0.898	0.00%	0.217	0.178	0.222	0.180	0.224	0.179
% Same Home Language	0.002	1.333	0.00%	0.600	0.256	0.600	0.256	0.603	0.254
% Shared x Arabic	0.002	1.000	0.00%	0.136	0.123	0.136	0.122	0.136	0.124
% Shared x Chinese	0.002	1.000	0.00%	0.121	0.134	0.123	0.128	0.114	0.110
% Shared x Hmong	0.003	1.000	0.00%	0.521	0.258	0.525	0.258	0.523	0.258
% Shared x Somali	0.002	1.000	0.00%	0.244	0.247	0.245	0.249	0.241	0.245
% Shared x Spanish	0.005	1.333	0.00%	0.697	0.200	0.696	0.200	0.697	0.197
% Shared x Other	0.013	1.000	0.00%	0.430	0.241	0.436	0.244	0.428	0.241
% Peers Proficient	0.000	1.000	0.02%	0.475	0.206	0.475	0.208	0.469	0.205
% IEP	0.000	0.506	0.00%	0.149	0.045	0.151	0.045	0.151	0.044
Rel. Diversity - Race	0.187	0.985	0.00%	0.494	0.186	0.495	0.186	0.489	0.184
% FRL	0.000	1.000	0.00%	0.577	0.249	0.577	0.249	0.583	0.244

Table 9 Descriptive Statistics of Analytical Sample – District Characteristics

				Potential		Preferred		Reduced	
	Min.	Max.	Missing	Mean	SD	Mean	SD	Mean	SD
Per-Pupil Exp.	$6,418	$34,085	0.11%	$13,012	$1,419	$13,031	$1,450	$13,023	$1,445
District % EL	0.000	0.411	0.09%	0.104	0.060	0.106	0.061	0.107	0.061
Dist. Average SES	-1.895	2.521	0.10%	0.092	0.871	0.111	0.871	0.106	0.854
Dist. Unemployment	0.006	0.150	0.10%	0.070	0.029	0.068	0.028	0.069	0.028
Rel. Diversity - FRL	0.000	0.326	0.10%	0.078	0.063	0.075	0.063	0.076	0.063

Table 10 Summary of Regression Analysis of CSS Growth – Preferred Sample

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Retention	2.258	3.227**	3.104**	2.484*	2.220	2.130	2.147	4.282**	4.179**
	(1.278)	(1.041)	(0.984)	(1.169)	(1.172)	(1.176)	(1.318)	(1.535)	(1.450)
Lagged CS	-0.225***	-0.200***	-0.254***	-0.256***	-0.256***	-0.257***	-0.270***	-0.269***	-0.942***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)
Years EL	-2.375***	-3.444***	-2.215***	-2.255***	-2.273***	-2.249***	-1.988***	-2.096***	
	(0.284)	(0.206)	(0.195)	(0.192)	(0.192)	(0.191)	(0.189)	(0.189)	
Years^2	0.061*	0.175***	0.113***	0.119***	0.121***	0.119***	0.099***	0.110***	-0.489***
	(0.026)	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.017)	(0.032)
Locale									
Suburban	2.269***	1.433***	1.057***	0.696*	0.721*	0.124	1.330	2.142	2.965
	(0.455)	(0.276)	(0.263)	(0.299)	(0.294)	(0.369)	(1.294)	(1.823)	(1.526)
Town	0.482	-0.119	0.196	-0.176	-0.039	-0.638	1.860	2.235	-0.419
	(0.417)	(0.264)	(0.274)	(0.327)	(0.340)	(0.396)	(1.385)	(1.836)	(1.725)
Rural	0.458	-0.048	0.124	-0.486	-0.292	-0.812	0.998	1.956	0.721
	(0.398)	(0.281)	(0.290)	(0.412)	(0.427)	(0.462)	(1.328)	(1.528)	(1.048)
Title I	-0.405	-1.509***	-1.149***	-0.749**	-0.740**	-0.775**	-0.838	-2.072***	-2.410***
	(0.338)	(0.236)	(0.236)	(0.270)	(0.273)	(0.291)	(0.505)	(0.560)	(0.663)
Charter	0.804	1.444**	1.431**	0.999	1.050	1.157*	3.339*	2.744	1.162
	(0.615)	(0.507)	(0.496)	(0.538)	(0.549)	(0.551)	(1.329)	(1.420)	(1.442)
Female			1.040***	1.038***	1.038***	1.046***	1.052***	1.049***	
			(0.074)	(0.074)	(0.074)	(0.074)	(0.075)	(0.076)	
Ever-IEP			-7.169***	-7.211***	-7.219***	-7.258***	-7.600***	-7.551***	
			(0.144)	(0.140)	(0.139)	(0.139)	(0.142)	(0.140)	
Grade Repeated			-4.691***	-4.603***	-4.578***	-4.640***	-4.500***	-5.098***	-3.763***
			(0.863)	(0.787)	(0.776)	(0.768)	(0.685)	(0.622)	(0.863)
FRL Eligibility			-2.117***	-1.918***	-1.904***	-1.848***	-1.783***	-1.843***	0.171
			(0.150)	(0.143)	(0.143)	(0.142)	(0.137)	(0.132)	(0.244)
Migrant Student			0.471	0.406	0.458	0.470	0.448	0.730	1.458
			(0.854)	(0.820)	(0.814)	(0.817)	(0.860)	(0.805)	(1.410)
Mid-Year Transfer			-2.148***	-2.157***	-2.146***	-2.155***	-2.051***	-1.970***	-0.879
			(0.431)	(0.434)	(0.435)	(0.434)	(0.448)	(0.446)	(0.495)
Chronic Absenteeism			-3.077***	-2.976***	-2.974***	-2.955***	-2.858***	-2.796***	-1.863***
			(0.213)	(0.207)	(0.206)	(0.204)	(0.191)	(0.188)	(0.230)

Race							
Native American	-2.166	-1.925	-1.888	-1.885	-1.890	-1.593	
	(1.132)	(1.120)	(1.120)	(1.101)	(1.196)	(1.171)	
Asian	-0.233	0.011	0.046	0.201	-0.051	-0.063	
	(0.343)	(0.289)	(0.285)	(0.285)	(0.270)	(0.272)	
Black	-1.807***	-1.492***	-1.403**	-1.141**	-1.301**	-1.205**	
	(0.448)	(0.427)	(0.430)	(0.436)	(0.424)	(0.430)	
Haw. / Pac. Islander	-0.979	-0.922	-0.851	-0.726	-0.211	-0.457	
	(1.885)	(1.890)	(1.877)	(1.806)	(1.819)	(2.095)	
Two or More Races	0.317	0.394	0.417*	0.480*	0.284	0.317	
	(0.225)	(0.212)	(0.212)	(0.213)	(0.214)	(0.211)	
White	0.307	0.405	0.406	0.445	0.343	0.403	
	(0.278)	(0.277)	(0.277)	(0.278)	(0.270)	(0.270)	
Home Language							
Arabic	1.539**	1.576*	1.514*	1.182	2.025*	1.821*	
	(0.554)	(0.749)	(0.741)	(0.731)	(0.786)	(0.797)	
Chinese	5.964***	4.160***	4.090***	3.647***	4.785***	4.367***	
	(0.554)	(0.743)	(0.739)	(0.743)	(0.743)	(0.714)	
Hmong	0.601	-0.781	-0.769	-1.137*	0.266	-0.248	
	(0.345)	(0.484)	(0.478)	(0.478)	(0.577)	(0.581)	
Somali	-0.065	-0.941	-0.940	-1.454	0.237	0.766	
	(0.723)	(0.895)	(0.888)	(0.907)	(0.933)	(0.821)	
Other	1.879***	1.408**	1.376**	0.899	1.840***	1.388*	
	(0.188)	(0.525)	(0.514)	(0.513)	(0.542)	(0.547)	
% Same Home Language		-0.660	-0.699	-1.378**	0.206	-0.406	-2.512
		(0.512)	(0.514)	(0.525)	(0.635)	(0.661)	(1.591)
Home Lang. x % Shared							
Arabic		-2.322	-2.226	-1.349	-2.440	-2.200	-5.988
		(5.179)	(5.016)	(4.737)	(5.559)	(5.404)	(9.415)
Chinese		8.974*	9.138*	10.095*	5.364	6.684	-10.935
		(4.414)	(4.434)	(4.554)	(3.708)	(3.985)	(11.216)
Hmong		2.069**	1.985*	2.518**	-1.084	0.181	4.587
		(0.776)	(0.777)	(0.779)	(1.109)	(1.096)	(2.906)
Somali		2.817	2.780	4.297	-1.393	-3.517	-2.184
		(3.138)	(3.138)	(3.316)	(3.306)	(2.417)	(7.115)
Other		0.502	0.513	1.372	0.066	1.005	0.868
		(1.174)	(1.137)	(1.123)	(1.121)	(1.163)	(3.070)
% EL		3.583***	2.843**	4.384***	4.458	7.806*	0.139
		(0.899)	(1.056)	(1.240)	(3.326)	(3.573)	(4.748)

% Peers Proficient				2.138**	2.109**	1.846**	-2.498***	-4.319***	-6.071***
				(0.711)	(0.707)	(0.711)	(0.701)	(0.634)	(0.730)
% IEP				0.170	-0.289	0.628	4.125	1.032	7.691
				(2.947)	(2.960)	(2.951)	(4.471)	(5.22)	(6.031)
Rel. Diversity - Race				2.523***	2.313**	1.993*	5.544	11.353**	19.464***
				(0.677)	(0.703)	(0.879)	(3.063)	(3.750)	(4.374)
% FRL				-1.590*	-1.567	-1.682	0.066	-6.219*	-6.417
				(0.788)	(0.799)	(1.007)	(1.756)	(2.990)	(3.600)
Student Teacher Ratio				-0.457	-0.510	-0.534	-0.866	-0.885	1.172
				(0.345)	(0.371)	(0.374)	(0.933)	(0.990)	(1.289)
Logged Enrollment				-0.152	-0.258	-0.224	0.154	0.083	-3.507
				(0.257)	(0.255)	(0.260)	(1.083)	(1.299)	(1.929)
% MA+					0.476	0.114	-0.823	1.029	1.940
					(0.693)	(0.689)	(0.985)	(1.589)	(1.742)
Average Salary					1.327	-0.171	7.677**	8.940*	7.238
					(1.164)	(1.280)	(2.865)	(4.239)	(4.763)
Average Experience					0.005	0.074	-0.102	-0.087	-0.097
					(0.040)	(0.040)	(0.077)	(0.101)	(0.123)
% BLBC					2.441	2.751	4.327	4.026	2.039
					(2.030)	(2.060)	(2.681)	(2.547)	(3.910)
Per-Pupil Expenditures						-3.111**	-5.954*		
						(1.205)	(2.947)		
District % EL						-1.951	-14.684*		
						(2.346)	(6.447)		
District Average SES						1.178**	1.983		
						(0.371)	(1.082)		
District Unemployment						52.189***	75.765***		
						(10.766)	(16.962)		
Rel. Diversity - FRL						-4.312	-10.537*		
						(2.736)	(4.445)		
Grade + Year FE	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Student FE	-	-	-	-	-	-	-	-	Yes
School FE	-	-	-	-	-	-	Yes	Yes	Yes
District-Year FE	-	-	-	-	-	-	-	Yes	Yes
Constant	102.249***	94.552***	110.171***	111.011***	97.268***	139.968***	85.670*	17.936	286.217***
	(1.818)	(1.775)	(1.776)	(2.614)	(12.440)	(16.600)	(40.159)	(45.387)	(51.712)
Observations	186,375	186,375	186,375	186,375	186,375	186,375	186,281	185,927	159,379
R2	0.206	0.293	0.321	0.323	0.323	0.323	0.341	0.363	0.701
Adjusted R2	0.206	0.293	0.321	0.322	0.322	0.323	0.336	0.348	0.551

Robust standard errors, clustered at the school level, are given in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Robustness Checks

Table 11 Summary of Regression Analysis of CSS Growth – Full Sample

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Retention	2.141	3.370***	3.008***	2.159*	1.939	1.873	2.228	3.209*	2.803*
	(1.093)	(0.944)	(0.888)	(1.021)	(1.025)	(1.024)	(1.150)	(1.326)	(1.262)
Lagged CS	-0.228***	-0.202***	-0.257***	-0.259***	-0.258***	-0.260***	-0.272***	-0.272***	-0.940***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
Years EL	-2.267***	-3.252***	-2.076***	-2.115***	-2.139***	-2.117***	-1.860***	-1.948***	
	(0.247)	(0.192)	(0.182)	(0.179)	(0.179)	(0.179)	(0.177)	(0.174)	
Years^2	0.056*	0.162***	0.104***	0.110***	0.113***	0.111***	0.091***	0.100***	-0.490***
	(0.023)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.016)	(0.029)
Locale									
Suburban	1.585***	1.012***	0.772**	0.587*	0.611*	-0.036	1.192	2.523	3.224*
	(0.441)	(0.265)	(0.254)	(0.271)	(0.271)	(0.310)	(1.263)	(1.726)	(1.470)
Town	0.590	0.013	0.356	-0.051	0.059	-0.588	1.942	2.099	0.191
	(0.407)	(0.262)	(0.274)	(0.316)	(0.321)	(0.363)	(1.295)	(1.647)	(1.54)
Rural	0.365	-0.106	0.107	-0.536	-0.381	-0.901*	0.959	1.930	0.885
	(0.383)	(0.277)	(0.285)	(0.392)	(0.396)	(0.419)	(1.236)	(1.386)	(0.937)
Title I	-0.696*	-1.690***	-1.253***	-0.706**	-0.691*	-0.727*	-0.520	-1.586**	-1.899**
	(0.328)	(0.223)	(0.223)	(0.270)	(0.272)	(0.285)	(0.489)	(0.541)	(0.616)
Charter	0.946	1.567***	1.502***	1.069*	1.125*	1.252*	3.160**	2.378*	0.486
	(0.611)	(0.462)	(0.445)	(0.479)	(0.488)	(0.497)	(0.992)	(0.997)	(1.152)
Female			1.000***	0.998***	0.998***	1.003***	1.009***	1.008***	
			(0.070)	(0.070)	(0.070)	(0.070)	(0.071)	(0.072)	
Ever-IEP			-7.237***	-7.295***	-7.301***	-7.333***	-7.664***	-7.648***	
			(0.136)	(0.133)	(0.132)	(0.132)	(0.134)	(0.132)	
Grade Repeated			-4.135***	-4.102***	-4.075***	-4.098***	-3.950***	-4.625***	-3.495***
			(0.754)	(0.700)	(0.698)	(0.694)	(0.625)	(0.581)	(0.858)
FRL Eligibility			-2.131***	-1.920***	-1.907***	-1.862***	-1.779***	-1.869***	0.134
			(0.141)	(0.140)	(0.141)	(0.140)	(0.129)	(0.124)	(0.218)
Migrant Student			0.359	0.311	0.354	0.388	0.367	0.746	0.461
			(0.743)	(0.716)	(0.712)	(0.714)	(0.740)	(0.704)	(1.158)
Mid-Year Transfer			-2.055***	-2.036***	-2.028***	-2.031***	-1.974***	-1.874***	-0.931***
			(0.235)	(0.234)	(0.234)	(0.234)	(0.232)	(0.236)	(0.253)
Chronic Absenteeism			-3.167***	-3.064***	-3.063***	-3.042***	-2.967***	-2.915***	-1.838***
			(0.188)	(0.182)	(0.181)	(0.180)	(0.169)	(0.166)	(0.197)

Race							
Native American	-1.810	-1.613	-1.598	-1.565	-1.532	-1.430	
	(1.059)	(1.045)	(1.047)	(1.03)	(1.102)	(1.076)	
Asian	-0.277	-0.092	-0.062	0.058	-0.141	-0.088	
	(0.339)	(0.277)	(0.273)	(0.271)	(0.249)	(0.251)	
Black	-1.776***	-1.500***	-1.423***	-1.176**	-1.287**	-1.176**	
	(0.41)	(0.390)	(0.391)	(0.399)	(0.392)	(0.396)	
Haw. / Pac. Islander	-0.864	-0.881	-0.833	-0.814	-0.073	-0.623	
	(1.779)	(1.79)	(1.780)	(1.709)	(1.683)	(1.900)	
Two or More Races	0.314	0.349	0.368	0.414*	0.218	0.258	
	(0.207)	(0.192)	(0.192)	(0.193)	(0.192)	(0.189)	
White	0.462	0.486	0.481	0.496*	0.333	0.398	
	(0.254)	(0.252)	(0.252)	(0.253)	(0.249)	(0.249)	
Home Language							
Arabic	1.176*	1.087	1.030	0.752	1.610*	1.286	
	(0.495)	(0.667)	(0.664)	(0.648)	(0.69)	(0.713)	
Chinese	5.950***	4.526***	4.458***	4.069***	5.166***	4.313***	
	(0.540)	(0.709)	(0.704)	(0.707)	(0.686)	(0.669)	
Hmong	0.794*	-0.688	-0.684	-0.985*	0.373	-0.205	
	(0.341)	(0.468)	(0.460)	(0.458)	(0.541)	(0.542)	
Somali	0.643	-0.098	-0.102	-0.542	0.622	1.102	
	(0.651)	(0.850)	(0.844)	(0.849)	(0.864)	(0.797)	
Other	1.951***	1.427**	1.384**	0.971*	1.922***	1.365**	
	(0.174)	(0.502)	(0.492)	(0.486)	(0.501)	(0.503)	
% Same Home Language		-0.739	-0.791	-1.385**	0.172	-0.548	-1.709
		(0.487)	(0.488)	(0.483)	(0.584)	(0.607)	(1.235)
Home Lang. x % Shared							
Arabic		-1.813	-1.563	-0.958	-1.213	-0.558	5.173
		(4.392)	(4.257)	(3.969)	(4.565)	(4.636)	(7.474)
Chinese		5.474	5.636	6.628	1.761	6.380	-13.622
		(4.372)	(4.385)	(4.542)	(3.406)	(3.667)	(8.06)
Hmong		2.241**	2.181**	2.591***	-1.021	0.278	3.099
		(0.749)	(0.746)	(0.758)	(1.043)	(1.035)	(2.266)
Somali		2.167	2.157	3.501	0.677	-1.145	-0.237
		(2.735)	(2.729)	(2.810)	(2.343)	(2.334)	(6.363)
Other		0.535	0.596	1.362	0.016	1.149	0.353
		(1.139)	(1.107)	(1.085)	(1.048)	(1.085)	(2.504)
% EL		3.410***	2.748**	4.170***	3.697	6.997*	1.158
		(0.930)	(1.047)	(1.176)	(3.036)	(3.237)	(4.02)

% Peers Proficient				2.334***	2.288***	2.029**	-2.194***	-4.114***	-6.241***
				(0.657)	(0.653)	(0.655)	(0.645)	(0.578)	(0.613)
% IEP				0.718	0.403	1.134	3.740	1.910	7.472
				(2.707)	(2.684)	(2.673)	(4.156)	(4.741)	(5.255)
Rel. Diversity - Race				2.742***	2.563***	2.158*	4.688	9.322**	18.044***
				(0.693)	(0.734)	(0.860)	(2.830)	(3.294)	(3.785)
% FRL				-1.615*	-1.584*	-1.514	-0.342	-5.536*	-5.863*
				(0.802)	(0.807)	(0.895)	(1.602)	(2.459)	(2.827)
Student Teacher Ratio				-0.504	-0.541	-0.540	-1.074	-0.972	0.260
				(0.331)	(0.360)	(0.371)	(0.879)	(0.907)	(1.149)
Logged Enrollment				-0.164	-0.245	-0.210	-0.103	-0.289	-2.110
				(0.237)	(0.240)	(0.244)	(0.928)	(1.103)	(1.519)
% MA+					0.438	-0.018	0.039	1.763	2.662
					(0.667)	(0.656)	(0.922)	(1.458)	(1.47)
Average Salary					0.964	0.438	0.538	6.365*	5.458
					(0.546)	(0.528)	(0.610)	(2.843)	(3.496)
Average Experience					0.014	0.062	-0.021	-0.070	-0.062
					(0.036)	(0.035)	(0.059)	(0.084)	(0.103)
% BLBC					2.261	2.581	3.725	4.498*	0.825
					(1.835)	(1.843)	(2.378)	(2.174)	(3.257)
Per-Pupil Expenditures						-3.362**	-4.496		
						(1.244)	(2.628)		
District % EL						-2.062	-14.068*		
						(2.226)	(6.449)		
District Average SES						0.977**	2.340*		
						(0.341)	(0.986)		
District Unemployment						42.633***	69.065***		
						(10.218)	(16.753)		
Rel. Diversity - FRL						-5.522*	-10.862*		
						(2.167)	(4.394)		
Grade + Year FE	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Student FE	-	-	-	-	-	-	-	-	Yes
School FE	-	-	-	-	-	-	Yes	Yes	Yes
District-Year FE	-	-	-	-	-	-	-	Yes	Yes
Constant	103.162***	94.706***	110.915***	111.955***	101.843***	137.252***	152.140***	50.041	297.986***
	(1.687)	(1.608)	(1.628)	(2.540)	(6.594)	(12.673)	(25.553)	(30.861)	(36.788)
Observations	224,103	224,103	224,103	224,103	224,103	224,103	224,013	223,674	197,904
R2	0.206	0.288	0.317	0.319	0.319	0.320	0.337	0.357	0.690
Adjusted R2	0.206	0.288	0.317	0.319	0.319	0.320	0.332	0.344	0.548

Robust standard errors, clustered at the school level, are given in parentheses. * p < 0.05; ** p < 0.01; *** p < 0.001

Table 12 Summary of Regression Analysis of CSS Growth – Alternative Specification

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Retention	3.896**	4.951***	4.734***	3.895***	3.375**	3.367**	2.444*	4.409**	3.237**
	(1.407)	(1.119)	(1.036)	(1.099)	(1.133)	(1.151)	(1.159)	(1.341)	(1.131)
Lagged CS	-0.370***	-0.396***	-0.445***	-0.447***	-0.447***	-0.449***	-0.464***	-0.465***	-0.903***
	(0.006)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.006)
Years EL	0.220	0.056	1.088***	1.118***	1.101***	1.096***	1.174***	1.173***	
	(0.327)	(0.282)	(0.278)	(0.271)	(0.267)	(0.263)	(0.245)	(0.222)	
Years^2	-0.010	-0.054**	-0.092***	-0.090***	-0.089***	-0.089***	-0.094***	-0.093***	-0.497***
	(0.025)	(0.020)	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.017)	(0.022)
Locale									
Suburban	1.234*	2.313***	1.864***	0.644	0.722	-0.233	1.393	2.739	0.881
	(0.516)	(0.332)	(0.324)	(0.461)	(0.439)	(0.53)	(1.008)	(1.462)	(2.310)
Town	-0.284	0.804**	1.171***	-0.121	0.098	-0.884	1.223	1.467	1.296
	(0.517)	(0.27)	(0.274)	(0.457)	(0.429)	(0.557)	(1.161)	(1.404)	(1.431)
Rural	0.041	0.608	0.884*	-0.893	-0.591	-1.385	-0.295	0.270	1.184
	(0.609)	(0.442)	(0.442)	(0.747)	(0.746)	(0.812)	(1.121)	(1.147)	(1.243)
Title I	-4.440***	-2.278***	-1.720***	-0.553	-0.484	-0.304	-0.013	-0.731	-1.607**
	(0.428)	(0.360)	(0.357)	(0.320)	(0.317)	(0.341)	(0.450)	(0.521)	(0.539)
Charter	1.304	1.318	1.297	0.841	0.970	1.124	1.790	1.786	0.703
	(0.773)	(0.676)	(0.673)	(0.710)	(0.749)	(0.760)	(1.073)	(1.091)	(1.406)
Female			1.468***	1.481***	1.481***	1.487***	1.532***	1.545***	
			(0.077)	(0.076)	(0.076)	(0.076)	(0.078)	(0.078)	
Ever-IEP			-9.054***	-9.161***	-9.172***	-9.203***	-9.644***	-9.652***	
			(0.201)	(0.196)	(0.195)	(0.196)	(0.188)	(0.186)	
Grade Repeated			-4.429***	-4.346***	-4.237***	-4.306***	-3.670***	-4.145***	-2.427**
			(0.579)	(0.557)	(0.553)	(0.556)	(0.523)	(0.506)	(0.801)
FRL Eligibility			-2.272***	-1.923***	-1.915***	-1.912***	-1.858***	-1.903***	0.091
			(0.145)	(0.165)	(0.159)	(0.155)	(0.140)	(0.136)	(0.199)
Migrant Student			-0.083	-0.203	-0.152	-0.067	-0.336	-0.296	0.559
			(0.752)	(0.724)	(0.714)	(0.717)	(0.729)	(0.733)	(0.991)
Mid-Year Transfer			-3.311***	-3.261***	-3.243***	-3.237***	-3.047***	-2.976***	-2.410***
			(0.371)	(0.374)	(0.376)	(0.379)	(0.389)	(0.382)	(0.443)
Chronic Absenteeism			-4.303***	-4.199***	-4.171***	-4.082***	-3.768***	-3.767***	-2.496***
			(0.335)	(0.308)	(0.299)	(0.286)	(0.255)	(0.256)	(0.237)

Race							
Native American	-1.371	-1.382	-1.373	-1.327	-1.395	-1.200	
	(1.048)	(1.07)	(1.077)	(1.07)	(1.119)	(1.093)	
Asian	-0.649	-0.594	-0.508	-0.275	-0.271	-0.259	
	(0.472)	(0.470)	(0.428)	(0.409)	(0.319)	(0.309)	
Black	-2.898***	-2.710***	-2.572***	-2.317***	-2.032***	-2.032***	
	(0.458)	(0.415)	(0.428)	(0.431)	(0.439)	(0.451)	
Haw. / Pac. Islander	0.208	-0.306	-0.211	-0.190	0.446	-0.552	
	(1.93)	(1.945)	(1.991)	(2.068)	(2.220)	(2.201)	
Two or More	0.151	0.022	0.057	0.121	0.086	0.119	
	(0.255)	(0.262)	(0.246)	(0.244)	(0.208)	(0.207)	
White	0.547*	0.358	0.357	0.345	0.464	0.492	
	(0.276)	(0.313)	(0.305)	(0.314)	(0.255)	(0.258)	
Home Lang.							
Arabic	0.574	-0.729	-0.819	-1.151	-0.129	-0.398	
	(0.533)	(0.756)	(0.74)	(0.719)	(0.667)	(0.673)	
Chinese	6.267***	4.972***	4.821***	4.181***	5.017***	4.700***	
	(0.536)	(0.848)	(0.791)	(0.766)	(0.700)	(0.704)	
Hmong	1.766***	0.171	0.131	-0.388	0.644	0.202	
	(0.450)	(0.77)	(0.708)	(0.68)	(0.623)	(0.596)	
Somali	-0.211	-1.032	-1.025	-1.440	-0.650	0.162	
	(1.034)	(0.926)	(0.926)	(0.947)	(0.988)	(0.799)	
Other	2.378***	1.281*	1.162	0.574	1.488**	1.078*	
	(0.199)	(0.619)	(0.601)	(0.599)	(0.536)	(0.519)	
% Same Home Language		-1.331	-1.454*	-2.310***	-0.691	-1.163	-1.444
		(0.713)	(0.669)	(0.661)	(0.622)	(0.620)	(1.224)
Home Lang. x % Shared							
Arabic		5.869	6.296	8.031*	0.576	2.059	2.068
		(4.215)	(4.105)	(3.745)	(3.944)	(3.988)	(8.346)
Chinese		1.569	1.863	3.839	-1.934	-0.289	-8.960
		(3.244)	(3.215)	(3.223)	(3.661)	(4.148)	(8.794)
Hmong		2.047	1.949	2.577*	-1.176	-0.009	3.032
		(1.066)	(1.009)	(1.004)	(1.079)	(1.056)	(2.243)
Somali		1.691	1.606	3.299	-0.129	-2.049	2.788
		(5.486)	(5.538)	(5.590)	(5.401)	(3.379)	(5.342)
Other		1.418	1.597	2.790*	1.022	2.028	-0.688
		(1.379)	(1.344)	(1.342)	(1.110)	(1.097)	(2.184)
% EL		-1.081	-2.498	-1.676	-5.978	-0.243	-6.519
		(1.520)	(2.014)	(2.475)	(4.410)	(4.567)	(5.053)

~~% Peers Proficient~~									
% IEP				-6.320	-6.523	-3.796	4.183	5.113	-0.968
				(4.552)	(4.347)	(4.138)	(4.799)	(5.478)	(5.397)
Rel. Diversity - Race				4.361***	4.034***	5.089***	10.434***	16.550***	15.802***
				(0.953)	(0.952)	(1.537)	(2.873)	(3.507)	(3.783)
% FRL Eligible				-2.750**	-2.582**	-1.154	0.284	-4.121	-2.859
				(1.009)	(0.966)	(1.223)	(1.652)	(2.969)	(2.914)
Student Teacher Ratio				-0.313	-0.315	-0.052	2.194	2.483*	2.056
				(0.473)	(0.483)	(0.478)	(1.260)	(1.235)	(1.217)
Logged Enrollment				-0.158	-0.322	-0.309	1.286	0.995	-1.607
				(0.336)	(0.315)	(0.312)	(1.309)	(1.581)	(1.595)
% MA+					1.252	0.160	-1.188	0.093	0.420
					(0.764)	(0.752)	(0.887)	(1.657)	(1.830)
Average Salary					1.205	1.369	5.766	2.051	1.679
					(1.484)	(1.532)	(3.079)	(4.087)	(3.731)
Average Experience					0.045	0.097	-0.057	0.091	0.156
					(0.051)	(0.052)	(0.079)	(0.103)	(0.118)
% BLBC					5.114	5.252	2.999	3.153	0.921
					(2.856)	(2.741)	(2.660)	(2.482)	(3.257)
Per-Pupil Expenditures						-4.633***	-1.414		
						(1.365)	(2.930)		
District % EL						3.035	-8.752		
						(4.281)	(6.165)		
District Average SES						2.086***	3.469***		
						(0.466)	(1.024)		
District Unemployment						69.464***	92.575***		
						(12.557)	(19.036)		
Rel. Diversity - FRL						-7.690*	-13.146**		
						(3.685)	(4.822)		
Grade + Year FE	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Student FE	-	-	-	-	-	-	-	-	Yes
School FE	-	-	-	-	-	-	Yes	Yes	Yes
District-Year FE	-	-	-	-	-	-	-	Yes	Yes
Constant	141.616***	114.620***	127.101***	130.889***	117.849***	153.063***	99.959	127.528**	308.327***
	(1.950)	(3.120)	(3.023)	(4.068)	(16.368)	(20.139)	(51.034)	(44.675)	(40.783)
Observations	325,034	325,034	325,034	325,034	325,034	325,034	324,959	324,713	301,430
R2	0.517	0.591	0.612	0.613	0.613	0.614	0.626	0.635	0.815
Adjusted R2	0.517	0.591	0.612	0.613	0.613	0.614	0.624	0.629	0.747

Robust standard errors, clustered at the school level, are given in parentheses. * p < 0.05; ** p < 0.01; *** p < 0.001

Table 13 Placebo Tests for Prior-Year Retention Rate (Preferred Sample)

Model #	Description	(t-3)	(t-2)	(t-1)	(t)	(t+1)
1	Naïve	3.614*	5.850***	2.258	0.448	1.265
2	Year/Grade FE	2.495*	4.383***	3.227**	1.911	0.719
3	Student Var.	2.134*	3.672**	3.104**	1.662	0.645
4	Peer Var.	1.112	3.060*	2.484*	1.184	-0.137
5	Teacher Var.	0.914	2.640*	2.220	1.062	-0.049
6	District Var.	0.810	2.400*	2.130	1.484	0.346
7	School FE	0.500	2.228	2.147	0.454	-0.567
8	District-Year FE	0.974	0.228	4.282**	0.685	-0.229
9	Student FE	-0.040	-1.447	4.179**	-1.765	-2.253

Robust standard errors, clustered at the school level, are given in parentheses.
* p < 0.05; ** p < 0.01; *** p < 0.001

Table 14 Placebo Tests for Prior-Year Retention Rate (Full Sample)

Model #	Description	(t-3)	(t-2)	(t-1)	(t)	(t+1)
1	Naïve	2.862*	3.076*	2.141	2.014	2.693*
2	Year/Grade FE	2.362*	3.373***	3.370***	3.430***	2.094*
3	Student Var.	2.276*	3.142***	3.008***	3.124***	1.710
4	Peer Var.	1.655	2.497*	2.159*	1.866	0.323
5	Teacher Var.	1.422	2.264*	1.939	1.557	0.133
6	District Var.	1.156	2.161*	1.873	1.778	0.337
7	School FE	0.503	2.127*	2.228	1.896	-0.957
8	District-Year FE	-0.690	-0.296	3.209*	2.556*	-0.404
9	Student FE	-0.199	-0.273	2.803*	0.815	-0.890

Robust standard errors, clustered at the school level, are given in parentheses.
* p < 0.05; ** p < 0.01; *** p < 0.001

Table 15 Placebo Tests for Prior-Year Retention Rate (Alternative Specification)

Model #	Description	(t-3)	(t-2)	(t-1)	(t)	(t+1)
1	Naïve	5.213***	6.032***	3.896**	2.863*	3.338*
2	Year/Grade FE	3.912***	4.967***	4.951***	4.332***	3.356**
3	Student Var.	3.808***	4.774***	4.734***	4.201***	3.189**
4	Peer Var.	3.091**	4.007***	3.895***	2.802**	2.017
5	Teacher Var.	2.602*	3.425***	3.375**	2.133*	1.492
6	District Var.	2.151*	3.326***	3.367**	2.580*	1.847
7	School FE	0.722	2.273**	2.444*	0.387	-0.772
8	District-Year FE	0.477	1.369	4.409**	0.835	-0.417
9	Student FE	0.981	1.096	3.237**	0.013	-0.434

Robust standard errors, clustered at the school level, are given in parentheses.
* p < 0.05; ** p < 0.01; *** p < 0.001