Should I Stay or Should I Go?: Exploring the Predictors of Beginning Teacher Turnover in Secondary Public Schools

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SHOULD I STAY OR SHOULD I GO?

EXPLORING THE PREDICTORS OF BEGINNING TEACHER TURNOVER IN SECONDARY PUBLIC SCHOOLS

Dissertation by

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In recent decades, the plight of early career teacher turnover has had significant financial ramifications for our nation's schools and has posed a serious threat to achieving educational equity, with the most disadvantaged schools experiencing the highest rates of turnover. Using data collected from the Beginning Teacher Longitudinal Survey, this study employed discrete-time competing risks survival analysis to explore the first-year experiences of public middle and high school teachers as predictors of their career decisions to stay in their current school, move to a new school, or leave the profession across the first five years of their career. Four facets were conceived as characterizing teachers' first-year experiences: 1) policies and programs for first-year teachers provided by the administration including mentoring and induction, 2) perceptions of their preparedness to teach, 3) perceptions of school climate and workplace conditions, and 4) satisfaction with teaching.

The research questions are:

1. What are the first-year experiences for teachers in the sample and how do they compare between teachers who are retained in their first school placements and teachers who voluntarily or involuntarily turn over in later years?
2. What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the

first year interact with the three other facets of the first-year experience to predict voluntary and involuntary turnover across the early career window?

Findings suggest there may be differences in the mechanisms that drive the moving and leaving phenomena, suggesting that policymakers treat the two turnover pathways as separate problems requiring separate solutions. Furthermore, findings suggest there may be more policy-amendable variables that can be manipulated in the first year of teaching to prevent leaving than there are to prevent moving, implying that curbing rates of moving to minimize the localized impacts of teacher migration to other schools may be more challenging than reducing rates of leaving the profession.

DEDICATION

To my husband, Derek. I have no words to express my gratitude for your constant encouragement and unwavering support throughout this doctoral journey. I could never have done this without you. Here's to receiving mail addressed to "Dr. Vuilleumier and Mr. Welch".

To my parents, Leslie and Paul. There's something about this family and taking seven years to get things done. Apparently, slow and steady wins the race, and I learned from the best. You laid the foundation for all of this. Thank you.

To my grandmother, Rosemary. She was so proud of me when I started this, and although she did not live to see me finish, I know she would be bragging to all the ladies who play Bridge that there is finally a doctor in the family.

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Researcher Positionality

The decision to investigate early career secondary teacher turnover for this dissertation was born out of my own personal experiences with leaving the profession. 2011-2012 marked my fourth year of teaching math in a public high school in Massachusetts. From September through June of that school year, I struggled to answer one burning question, the title of this dissertation, "Should I Stay or Should I Go?" Should I stay in the classroom? After all, I did have a bachelors in Secondary Education, a masters in Curriculum and Instruction, and tenure. Or should I walk away from teaching altogether and pursue a PhD instead? My decision to leave teaching in 2012 was not easy, but my own internal struggle with making that decision afforded me a unique personal perspective into the experiences of the very teachers I studied in this work.

Throughout this research, I have seen myself in the data as both the teacher who left the profession in June 2012, and the teacher who recently returned to it in September 2018. After six years of graduate school, I realized how much I missed working with high school students and now find myself back in the classroom, a first-year teacher all over again, teaching math at a different public high school in Massachusetts. This makes me both a "Leaver" and a "Returner.". And although the conceptual framework for this research was grounded in the literature, I have to acknowledge, up front, that my personal experiences with being a first-year teacher and wrestling with turnover decisions in my early career influenced the lens with which I have framed this work and its implications.

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CHAPTER 1: INTRODUCTION

Every year in the United States, hundreds of thousands of educators leave the schools in which they teach to work in other schools, other districts, and other occupations, or leave the workforce altogether. Although turnover is an inevitable labor market phenomenon in any profession, studies have shown that the current rates of teacher attrition and mobility are substantially higher than in professions requiring comparable levels of pre-service training, such as nursing, accounting, and social work (Ingersoll, 2001; Borman & Dowling, 2008). The Alliance for Excellent Education recently reported that 13.5 percent of all public school teachers in the U.S. turn over each year, either by moving to another school (6.7% mobility) or leaving the profession altogether (6.8% attrition) (Haynes, Maddock, & Goldrick, 2014). To provide a sense of scope, 3.1 million full-time teachers were employed in U.S. public schools during the 2013-2014 academic year (Glander, 2015); 13.5 percent of this workforce calculates to roughly 400,000 teachers in transition by the summer of 2014. Richard Ingersoll characterizes this level of turnover as the “revolving door” of the teaching profession (2003).

Since Ingersoll’s seminal work was published over a decade ago, educational researchers, policymakers, and even the media have seized on his findings to frame teacher turnover as the new crisis of the U.S. public school system; however, the teacher turnover phenomenon is not new. In fact, teaching has long been regarded as a profession with unusually high attrition rates (Lortie, 1975) and the rates of turnover have been moderately stable for the last one hundred years. In the mid-1920s, annual teacher turnover rates hovered around 16 percent (National Education Association, 2004), rising to 19 percent in the late 1960s (Metz & Fleischman, 1974), and dipping back to 16 percent in the early 2000s (Ingersoll, 2003).

While the current teacher turnover rate of 13.5 percent is not in itself a novel finding, the recent fervor surrounding the phenomenon and rapid growth of research on the topic have brought to light the rising and disturbing costs associated with it. The financial impacts on the nation, its districts, and its schools have become a major cause for concern, as have the oft-imperceptible costs of turnover for at-risk students and schools with the most critical needs. Furthermore, although the overall annual rate of turnover is somewhat stable, the same cannot be said for the attrition and mobility rates of specific subgroups of teachers (Hanushek, Kain, & Rivkin, 2004). For example, turnover rates are actually increasing on a yearly basis for beginning teachers (Ingersoll, Merrill, & Stuckey, 2014). These rates are rising even faster for early career teachers in high-poverty, high-minority, urban, and rural schools (Hanushek, Kain, & Rivkin, 2004).

In response to the turnover "crisis", policymakers, researchers, and educators alike have begun to focus more attention on the mechanisms of teacher turnover and teacher resiliency within the population of beginning teachers. This study contributes to this discussion, exploring how teachers' first-year experiences in the field affect turnover and retention decisions throughout their early career. This work also investigates satisfaction with the first year of teaching as a possible moderator of the relationship between teachers' first-year experiences and subsequent turnover outcomes.

Using longitudinal data from teachers and schools collected as part of the Beginning Teacher Longitudinal Survey or the BTLS (U.S. Department of Education National Center for Education Statistics, 2015), this dissertation research focuses on the first-year experiences of public middle and high school teachers as predictors of teacher retention and turnover across the first five years of their teaching career. Four facets were conceived as characterizing teachers' first-year experiences:

1. Tangible first-year supports and programs provided by the school administration, including participation in an official school-based induction program, a reduced teaching schedule, common planning time with colleagues, seminars for beginning teachers, and extra classroom assistance (e.g., having a co-teacher or classroom aide);
2. Perceptions of their preparedness to teach; specifically, perceptions of their ability to handle classroom management, use of a variety of instructional methods, employment of technology in the classroom, assessment of students, development of curriculum materials, and comprehension of subject matter;
3. Perceptions of the school climate, including the level of teacher autonomy; the amount of emotional, pedagogical, and social support received from one's mentor or master teacher, school administrators, colleagues, and parents; the impacts of student behavior; and the influence of standards and accountability systems; and
4. Satisfaction with teaching both as a career as well as localized in one's school setting.

Prior research supporting the importance of these facets is discussed in Chapter 2, and detailed descriptions of how these facets were operationalized using teacher data is provided in Chapter 3.

Research Questions

The research questions that framed this dissertation are:

1. What are the first-year experiences for teachers in the sample and how do they compare between teachers who are retained in their first school placements (i.e. Stayers) and teachers who voluntarily or involuntarily turn over in later years (i.e. Movers and Leavers)?
2. What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and involuntary turnover across the early career window of years 1 through 4?

To address the first research question, teachers' first-year experiences and turnover rates across the five-year early career window are described. To answer the second research question, the four facets of teachers' first-year experiences are discussed in terms of their power to predict teachers' decisions to stay, move, or leave in later years. Teacher and school demographic characteristics were included in this stage of the analyses as covariates (see Chapter 3).

Methodology

This study addressed the research questions using a national longitudinal dataset to conduct descriptive analyses and discrete-time competing risks hazards regression modeling.

Data Sources and Sample

The study drew upon survey data from the first five waves of the restricted-use Beginning Teacher Longitudinal Survey (BTLS) data set (U.S. Department of Education National Center for Education Statistics, 2015). Developed by the National Center for Education Statistics (NCES) and conducted by the U.S. Census Bureau, the BTLS is a national panel study of beginning public school teachers in the initial stages of their educational careers. The study follows the same group of individuals as they transition in and out of secondary level teaching, surveying individuals on a yearly basis over the course of five years. The BTLS sample comprises full-time and part-time teachers, itinerant teachers, long-term substitute teachers, administrators, support staff, librarians, and other school-based staff who taught at least one regularly scheduled class in the 2007-2008 school year in grades K-12. Early career teachers are of particular interest to NCES due to the curiously high rates of turnover for beginning educators relative to their middle-to-late career peers, a phenomenon that fueled the development of the BTLS.

There were five waves of data collection for the BTLS conducted on an annual basis starting with the 2007-2008 school year and ending with the 2011-2012 school year. The first two waves were conducted in conjunction with the 2007-2008 Schools and Staffing Survey (SASS) and the 2008-2009 Teacher Follow-Up Survey (TFS), while the third through fifth waves were conducted as standalone survey research initiatives, as shown in Table 1.

Table 1. *Data Collection by Wave.*

Survey	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
SASS	X				
TFS		X			
BTLS			X	X	X

This dissertation research focused on the population of beginning public school teachers in the United States with the following characteristics: full-time instructors whose primary teaching assignments require them to work with students at the "secondary" level encompassing the 6th through 12th grades (i.e., middle school and/or high school levels). This focus is due to the alternative labor market opportunities available to secondary teachers as a result of their pre-service content training and subject-matter expertise. Therefore, applying these criteria to the first five waves of the BTLS, the unweighted analytic sample for this study included approximately 1,150 teachers drawn from approximately 1,000 schools across 900 school districts.

Conceptual Model and Variables

The analyses were grounded in a conceptual model of teacher turnover and retention for early career teachers based on theoretical frameworks and labor market perspectives described in greater detail in Chapter 2. The variables used in this dissertation research were selected based upon the author's personal experience with early career teaching and turnover as well as a review of the literature. Researchers who have examined factors associated with teacher satisfaction, turnover, and retention suggest that important influences to consider include (a) demographic and background variables for both teachers and students, (b) variables related to the teaching assignment, (c) administrative practices and policies within their schools, (d) the teachers' own perceptions of effectiveness and self-efficacy, and (e) the support they receive from supervisors, colleagues, and parents (e.g., Weiss, 1999; Billingsley, 1993; Chapman, 1984; Chapman & Lowther, 1982; Shen, 1997).

The conceptual model comprises the four facets of the first-year teaching experience: professional supports provided by the administration, perceptions about one's preparedness to teach, perceptions of school climate, and satisfaction with teaching. Using specific variables collected during the first wave of the BTLS, factor analysis was conducted to explore the creation of measurement scales to capture these four facets of the first-year teaching experience. The conceptual model also includes teacher-specific (e.g., demographics, secondary school level, and teacher education and preparation) and school-specific (e.g., school size, urbanicity, charter status, and student body composition) characteristics measured in the first year of teaching at the first school placement that may be related to the teacher turnover phenomenon as demonstrated in the literature. The inclusion of these characteristics as potential covariates was explored. Chapter 2 presents the conceptual model (see Figure 1) and discusses research findings for each of its components. Chapter 3 discusses the specific measures that were used in this study to represent each construct.

Analysis Plan

The analytic methods used to address each research question are detailed below.

RQ1. What are the first-year experiences for teachers in the sample and how do they compare across teachers who are retained in their first school placements (i.e. Stayers) and teachers who voluntarily or involuntarily turn over (i.e. Movers and Leavers) in later years? The study began with descriptive analyses of the proportion of beginning secondary public school teachers classified as Stayers, Movers, and Leavers (both voluntary and involuntary) with respect to their first school placement, as well as the percentage of Stayers, Movers, and Leavers by BTLS wave (i.e., year). In addition, the percentages of Stayers, Movers, and Leavers were compared across schools, with respect to urbanicity, level, size, charter status, and student body composition, and across teachers, with respect to gender, age, race/ethnicity, education level, and preparation route. Furthermore, Stayers, Movers, and Leavers were compared with respect to their first-year teaching experiences, described previously as the four facets of the first-year experience.

RQ2. What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and involuntary turnover across the early career window of years 1 through 4? The second research question was addressed within the framework of survival analysis. First, for the purpose of data reduction and to minimize the impact of multicollinearity, the creation of scales to represent each facet of the first-year teaching experience were investigated via exploratory factor analysis. Then, a discrete-time, competing risks hazards regression was constructed with blocks of predictors including the factor scores developed in the previous stage of analysis to model the probability of a teacher staying, leaving, or moving after their first, second, third, and fourth years of teaching. Note that the unweighted analytic sample for this study included roughly 1,150 teachers drawn from 1,000 schools across 900 districts. With an average of 1.1 beginning secondary teachers per public school (before weighting), the sampling design for the BTLS, which includes only a small number of teachers within each sampled school, precludes the use of multilevel modeling (Mullens & Kasprzyk, 1996).

Due to the discrete time points in which the data was collected, there are five observations for each individual but only four of those observations yield a value for teacher status (i.e., Stayer, Mover, or Leaver) as all teachers in the sample were teaching during the first year of BTLS data collection. There were three discrete, categorical teaching outcomes to be modeled, which required the use of a multinomial logistic regression. The discrete-time, competing risks hazards regression model accounts for this characteristic of the data. The time-varying trichotomous turnover/retention outcome was modeled using blocks of predictors measured in teachers' first year in the classroom. Of particular interest was the potential for satisfaction with teaching to moderate the strength of the relationships between teachers' career decisions and the three other facets of the first-year teaching experience (i.e., perceptions about their preparedness to teach, perceptions of school climate, and the first-year supports provided by the administration). Therefore, interactions between job satisfaction and the other first-year experience predictors were explored.

The relative efficacy of these stepwise nested models in explaining teacher turnover was compared using two techniques: 1) Akaike Information Criterion (AIC) and deviance statistics; and 2) hit ratios with jackknife estimation as measures of classification efficacy. Significant first-year experiential predictors were retained to build the most parsimonious survival model that explains differences in whether and when teachers stay, move, or leave. The analysis methods are described in detail in Chapter 3.

Note that this research relied on teacher and school covariates as they were measured in the first year of teaching only. Thus, covariates were treated as time-invariant, fixed measures during analysis. While it is unlikely that teacher demographics and characteristics changed drastically over the five-year duration of the BTLS, the likelihood that the school characteristics and student body demographics changed over that time period is much greater. This is an acknowledged limitation of the research.

Significance of the Study

This dissertation aimed to identify manipulable, policy-amenable variables specific to the first year of teaching (i.e., teacher preparation, school climate, and administrative supports) that predict voluntary and involuntary early career teacher turnover and retention outcomes in secondary public school settings. In other words, what first-year factors are related to early career teacher survival? In addition, this study sought to examine the role that first-year teachers' job satisfaction (an indicator of thriving) plays in predicting career decisions and investigate the manner in which such satisfaction moderates relationships between teacher preparation, school climate, and administrative supports and turnover/retention outcomes. Put another way, what first-year factors are related to early career teachers thriving on the job, and what is the impact of thriving on survival in the profession?

Justifications for Scope

Early career teachers were the focus of this study due to the higher rates of turnover for this group of educators relative to their middle-to-late career peers. Moreover, the scope of analysis was focused at the secondary level (i.e., middle and high school) due to the alternative labor market opportunities available to secondary teachers as a result of their pre-service content training and subject-matter expertise, particularly in math and science (Murnane, Singer, Willett, Kemple, & Olsen, 1991; National Academy of Sciences, 2007; National Research Council, 2002; Rumberger, 1987). The findings from this study contribute to the current educational policy debates over best practices to recruit, prepare, retain, and sustain highly qualified and satisfied teachers with longevity in the profession. More broadly, this research adds to the body of literature that aims to answer the following question: how can we transform the vocation of teaching from a "profession that eats its young" (Osborne, 1992) to a profession that fully supports the development of its newcomers?

The vast majority of studies on teacher turnover are cross-sectional or cover a limited timeframe of teachers' careers (Ingersoll & Strong, 2011; Borman & Dowling, 2008; Raue, Gray, & O'Rear, 2015). In recent decades, several quantitative studies have been published using data from the Schools and Staffing Survey (SASS) and its companion Teacher Follow-up Survey (TFS) to examine teacher turnover across a two-year period (e.g., Ingersoll, 2001, 2002; Boe, Cook, & Sunderland, 2008; Boe, Bobbitt, & Cook, 1997; Shen, 1997). In spite of these efforts, there is a current need for research that examines the career path of teachers longitudinally (Raue, Gray, & O'Rear, 2015) and on a national scale. This dissertation research fills that need by examining data collected from a national sample of beginning teachers through their first five years of teaching using the BTLS. The longitudinal nature of the BTLS allows for a stronger methodological design compared to studies that use the SASS and TFS to study early career turnover over a shorter time period. Furthermore, those studies that do use longitudinal data tend to be state- or district-specific, whereas the use of the BTLS allows for broader generalizations to our nation's teachers as a whole.

Justifications for Methodology

This research is also unique in that a competing risks discrete-time survival model was developed to address questions of whether, when, and why beginning teachers choose to turn over. While the use of survival analysis and event history analysis is not unprecedented in the teacher turnover literature (e.g., Adams, 1996; Imazeki, 2005; Clotfelter, Ladd, Vigdor, & Diaz, 2004; Fleener & Dahm, 2007; Kelly, 2004; Scafidi, Sjoquist, & Stinebrickner, 2007), this study is unique in that it will be the first work to employ survival analysis for a longitudinal data set with a national sample of beginning teachers. The use of the BTLS allowed for the construction of a teaching spell variable for each individual in the data – essentially capturing the length of their career and the turnover event they experience (e.g., stay, move, or leave). While logistic regression analysis is quite common in turnover research (e.g., Harris, 2007; Smith & Ingersoll, 2004; Ingersoll & May, 2012; Cannady, 2011; Perda, 2013), it has a major limitation in that it can only address research questions examining whether or not a teacher turns over and why. Survival analysis can answer a deeper question – whether and why a teacher turns over and how that differs based on ***when*** they make the choice to leave or move.

CHAPTER 2: REVIEW OF THE LITERATURE

Growing teacher shortages have made filling vacancies with qualified teachers increasingly difficult, and the impacts of these shortages are felt at both the national and local levels. Curbing teacher turnover by reducing rates of both mobility between schools and attrition from the profession has repeatedly been touted as the key to solving such shortages. Approximately 90% of the annual demand for teachers is driven by educators leaving their current teaching placements for other schools or other careers entirely, with two-thirds of those teachers turning over prior to retirement age in the early- or mid-career stages (Carver-Thomas & Darling-Hammond, 2017) constituting a “revolving door” within the teaching profession (Ingersoll, 2003). The problem continues to worsen as we see a consistent annual trend of increasing turnover rates among novice teachers who have taught for 5 years or less (Ingersoll, Merrill, & Stuckey, 2014). Moreover, annual turnover rates are rising even faster for early career teachers in high-poverty, high-minority, urban, and rural schools (Hanushek, Kain, & Rivkin, 2004).

By addressing the factors that generate high rates of mobility and attrition among novice teachers, school systems and policymakers can do more than just tackle the teacher shortage problem. Retaining more early career teachers in their current school placements can: (1) reduce the huge financial burdens on our schools and the broader education system to fill vacancies year after year (Haynes, Maddock, & Goldrick, 2014); (2) improve the health of schools by increasing both teacher quality and instructional quality while promoting staff cohesion, teacher morale, curriculum coherence, and a positive school climate (Ronfeldt, Loeb, & Wyckoff, 2013); and (3) provide more equitable education for students attending high-poverty, high-minority, urban, and rural schools where the impacts of early career turnover tend to be magnified (Gagnon & Mattingly, 2015). Perhaps most importantly, retaining more early career teachers may increase student achievement not only for students in classrooms where teacher stay, but also for other students in the school (Rivkin, Hanushek, & Kain 2005; Clotfelter, Ladd, & Vigdor, 2006).

The issue of early career teacher retention is strongly tied to the evolution of a teacher's professional identity such that the first-year experiences that shape each teacher's identity-making process are likely to have lasting impacts on his or her career decisions far beyond the first year in the classroom (Lindqvist & Nordanger, 2016). Positive and negative experiences from the first year of teaching can carry over into the second, third, fourth, etc. years and inform an individual's decision to turn over or remain in the field. This is not a new or novel concept in the literature; several researchers have pointed to the importance of the first year of teaching as initial experiences in the profession influence teachers' satisfaction and success (Kilgore & Griffin, 1998; Bullough, 1987; Feiman-Nemser, 1983), and therefore, are likely to directly impact retention in later years.

This dissertation research employed existing data to explore the relationships between early career teacher turnover decisions and their experiences in the first year of teaching. From that exploration, this study identified manipulable, policy-amenable variables specific to the first year of teaching (i.e., teacher preparation, school climate, and administrative supports) that predict voluntary and involuntary early career teacher turnover and retention outcomes in secondary public school settings. In addition, this study examined the role that first-year teachers' job satisfaction plays in predicting career decisions and investigated the manner in which satisfaction in the first year of teaching moderates the relationships between teacher preparation, school climate, and administrative supports and turnover/retention outcomes.

To situate the scope of this dissertation research within the body of literature on turnover, Chapter 2 begins with a discussion of the broader context of teacher attrition and mobility. Subsequently, it provides an overview of the financial impacts of turnover; presents implications for educational equity; discusses the negative effects of turnover on the health of schools; and establishes the problem of early career attrition. Misguided policy responses to beginning teacher turnover, the importance of teacher resilience, and gaps in the literature are also addressed. Then, the chapter outlines three theories of teacher turnover from which the conceptual model for this study is derived and identifies the teacher labor market perspectives through which the turnover and retention outcomes are defined. Next, the lasting impact of teachers' first-year experiences on early career trajectories is demonstrated using relevant literature from the field to highlight the influence of perceptions of preparedness to teach, perceptions of school climate, extent of administrative support, and satisfaction with teaching on decisions to stay, move, or leave over the first five years. The chapter concludes with a presentation and discussion of the conceptual model. This conceptual model was developed in response to the literature review and informed the model-building process described in Chapter 3.

The Big Picture of Teacher Turnover

Financial Impacts Nationally and Locally

At the national level, recent estimates of the annual cost of public school teacher attrition in the U.S. place the figure anywhere from $2.2 billion (Haynes, Maddock, &

Goldrick, 2014) to $7.3 billion (National Commission on Teaching and America's Future, 2007). At the school level, the U.S. Department of Labor estimates the average attrition cost to be about 30 percent of the departing teacher's salary (Alliance for Excellent Education, 2005; Grissom, 2011) while other studies have reported costs at 150 percent of that salary, depending on the variables included in the definition of "cost" (Benner, 2000). According to Wong and Asquith (2002), every teacher who leaves their position within the first 3 years drains an estimated $50,000 from school and district funds in recruitment costs, personnel expenditures, and lost productivity. This means that having to replace even one teacher diverts substantial financial and human resources away from addressing other critical school and district needs.

Schools are facing a "revolving door" of teacher turnover at a time when parents are pushing for smaller class sizes and teacher shortages in particular states and subjects are rising to epidemic levels (Hanushek, Kain, & Rivkin, 2004). These teacher shortages are, in part, fueled by a growing trend in which fewer high school graduates are interested in pursuing education as a career and fewer college students are enrolling in teacher preparation programs (Aragon, 2016). Meanwhile, the nation's student population is rapidly growing. From 2012-2013 through 2024-2025, overall public school enrollment in the U.S. is expected to increase by 6 percent with some states seeing a boom as large as 26 percent (Glander, 2015). Under these pressures, schools with teaching vacancies have no choice but to expend their limited financial resources to recruit, hire, and train new teachers, instead of directing them to academic programs and students in need (Barnes, Crowe, & Schafer, 2007; Darling-Hammond & Sykes, 2003).

Implications for Social Justice and Educational Equity

The current teacher turnover crisis in the U.S. is more than just a financial matter, however – it is a social justice issue that poses a threat to achieving educational equity. This section demonstrates the link between increasing turnover rates in high-needs schools, diminished teacher quality, decreased opportunity to learn, and declining student achievement.

Diminished teacher quality. Studies have shown that teachers are more likely to move or leave teaching when their current placement has them working in schools with lower student test scores, a greater number of students from low socioeconomic backgrounds, and higher proportions of minority students (Scafidi, Sjoquist, & Stinebrickner, 2007; Lankford, Loeb, and Wyckoff, 2002; Hanushek et al., 2004). Moreover, through the turnover phenomenon, teachers distribute and redistribute themselves across schools such that institutions serving high-minority and high-poverty students in urban and rural areas tend to be staffed by teachers with fewer qualifications and less classroom experience (Lankford et al., 2002; Loeb, Kalogrides, & Horng, 2010; Ingersoll & May, 2012). Thus, educator mobility and attrition diminish teacher quality in disadvantaged schools. This finding is highly problematic as most scholars in the field agree that teaching quality is the most influential school-related factor that contributes to student learning (Darling-Hammond & Youngs, 2002; Darling-Hammond, Berry, Haselkorn, & Fideler, 1999; Loeb, Darling-Hammond, & Luczak, 2005; Ferguson, 1998; Goldhaber, 2003; Palardy & Rumberger, 2008; Rivkin, Hanushek, & Kain, 2005; Wright, Horn, & Sanders, 1997; Sanders & Rivers, 1996).

Decreased student achievement. The demonstrated link between teacher mobility and teacher quality in traditionally disadvantaged, hard-to-staff environments also has adverse effects on student achievement. In a recent study, Ronfeldt, Loeb, and Wyckoff (2013) estimated the effects of teacher turnover in New York City public schools on student test scores in English language arts and math; they found that students in grade levels with higher turnover rates scored lower on standardized assessments than their peers attending schools with faculty stability. The negative effects of turnover on achievement were even stronger in those schools with higher proportions of Black students and students with histories of low performance. Low student achievement in such high-needs schools then perpetuates the cycle as low student scores increase the likelihood of teacher mobility which depresses teacher quality and yields additional declines in student learning. Of those teachers who leave low-performing schools, the more effective transfers tend to move to high-achieving schools, while the less effective transfers stay in low-performing schools. This exacerbates differences across students in the opportunities they have to learn (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008).

There is also evidence of higher teacher turnover rates in schools traditionally classified as urban and high-poverty with lower student achievement (Rivkin, Hanushek, & Kain 2005; Clotfelter, Ladd, & Vigdor, 2006). The Alliance for Excellent Education (Haynes, Maddock, & Goldrick, 2014) recently reported that turnover rates in high poverty schools were 50% greater than those rates in more affluent districts. These increased teacher mobility and attrition rates mean that a disadvantaged school is more likely to continually employ a disproportionately high number of early career teachers who have been shown to be significantly less effective than their more experienced peers (Grissom, 2011; Ronfeldt, Loeb, & Wyckoff, 2013).

Turnover as a threat to educational policies for equity. In the current age of educational reform, we strive to provide every child access to skilled teaching so that all students may achieve at high levels, but the present rates of attrition and mobility directly conflict with the goal of staffing all classrooms with effective teachers. With the 2001 reauthorization of the Elementary and Secondary Education Act of 1965 (ESEA), No Child Left Behind (NCLB) required that teachers of core academic areas be highly qualified in the subjects they teach by the end of the 2005–06 school year. The Race to the Top (RTTT) program of 2009 provided grant funding to states in order to increase teacher efficacy and achieve equity in the distribution of teachers across schools. Now with the 2016 reauthorization of ESEA, the Every Student Succeeds Act (ESSA) seeks to ensure that students in high needs schools are being taught by effective teachers who are led by effective principals. However, the consistent concentration of teacher turnover in disadvantaged schools has and will continue to seriously compromise our capacity to ensure that the goals of policies like NCLB, RTTT, and ESSA are met on a national scale.

Consequences for the Health of Schools

Employee turnover across all professions, not just teaching, has been extensively studied by economic researchers and is considered to be an important mechanism of the labor market due to its perceived negative impact on organizational effectiveness (Price, 1977; Perda 2013). Excessive employee turnover in any organization may lead to decreases in productivity, slumping morale, problems with quality control, and increased operating costs (Gaudet, 1960; Abbasi & Hollman, 2000; Mowday, Porter, & Steers, 2013). A departing employee typically must be replaced, which requires recruiting, selective hiring, and training. Then, once a replacement has been found, the new employee often experiences a learning curve as they discover and master the short-term and long-term responsibilities of their job while building an understanding of the organization's culture. In spite of these challenges, from an organizational perspective, a certain level of employee turnover is considered normal and healthy as new employees usher in fresh experiences and perspectives that can kick start innovation among other employees (Perda, 2013).

As with any industry, a limited degree of attrition can be beneficial for the public school system, assuming the teachers who turn over are less effective and the teachers who stay and fill vacancies are more effective. However, Borman and Dowling's review of the literature reveals that teacher turnover is not necessarily "healthy" turnover, and the teachers who do leave the profession are not necessarily the ones who are ineffective (2008). After conducting a meta-analysis of 34 quantitative studies on teacher attrition and retention, they found that there is more evidence suggesting that teachers who are better trained, more experienced, and more highly skilled tend to be lost to turnover more often as compared to their less talented and less qualified peers. While this trend is concerning in and of itself, it is compounded by the fact that the turnover rate for teaching is 4% higher than the turnover rates of other comparable professions (Carroll & Fulton, 2004). Taken together, these findings are detrimental given what we know about the strong links between turnover, instructional quality, and student achievement.

From an organizational perspective, the success of a school and the teaching that occurs within it depends heavily on developing commitment and cohesion among members (Ingersoll, 2001; Lortie, 1975), and naturally it takes time to build this sense of community and grow a body of collective knowledge. As a result, schools are incredibly vulnerable to the disruptions caused by consistent turnover (Ingersoll, 2004; Braverman, 1974; Burawoy, 1979; Edwards, 1979). High rates of turnover reduce the coherence and continuity that is necessary for a school to operate efficiently and effectively (Ingersoll, 2001). The current levels of teacher turnover have been shown to have negative compositional effects that depress teacher quality and instructional quality (Ronfeldt, Loeb, & Wyckoff, 2013; Clotfelter, Ladd, Vigdor, & Wheeler, 2007; Darling-Hammond & Sykes, 2003; Guarino, Santibanez, & Daley, 2006; Harris & Adams, 2007; Ingersoll, 2001). In addition, recent attrition and mobility rates have demonstrated disruptive effects that diminish staff cohesion, teacher morale, the sense of school community, and curriculum coherence (Ronfeldt, Loeb, & Wyckoff, 2013; Bryk, Lee, & Holland, 1993; Bryk & Schneider, 2002). All of this, in turn, impacts student achievement. Thus, attrition and mobility have larger institutional impacts that adversely affect not just the students taught by departing teachers, but also the students taught by those teachers who stayed. This illustrates the negative impact of turnover on broader school culture, regardless of whether incoming teachers are "better" than the teachers they replace.

The Problem with Early Career Attrition

Thus far, this chapter has addressed teacher turnover more broadly by discussing early, middle, and late career teachers in the aggregate. The current annual turnover rate for all teachers, regardless of career length, is 13.5 percent (Haynes, Maddock, &

Goldrick, 2014). However, if these educators are split into three separate groups based on years of experience, the rates of turnover are not consistent across the teaching career timeline. Several studies examining career survival of educators have shown that teacher attrition rates (i.e., “Leavers” who exit the profession altogether) tend to follow a U-shaped curve (Grissmer & Kirby, 1987; Murnane, Singer & Willet, 1988; Ingersoll, 2001; Hanushek, Kain & Rivkin, 2001; Kirby, Berends, & Naftel, 1999; Boe, Bobbitt, Cook, Whitener, & Weber, 1997). Attrition rates are high for beginning teachers in their first five years and late career teachers who are close to retirement or who move on to administrative positions (Henke, Chen, Geis, & Knepper, 2000; Perda, 2013) while middle career attrition rates are comparatively low. While the proportion of “Leavers” follows a U-shape pattern, the proportion of “Movers” does not; the pattern for those that take a position in another school or district is linear and negative such that teacher mobility rates are high in the early career stage and decrease as teachers age (Boe, Bobbitt, Cook, Whitener, & Weber, 1997; Perda, 2013).

As with any profession, the high attrition rates at the ends of careers are expected and unavoidable. However, the waves of beginning teachers leaving the profession are surprising and problematic from a labor market perspective as there is little to no return on investment for both the early career teachers who exit and the schools who employ them. Likewise, there is no return on investment for the schools that employ beginning teachers who then switch schools. As a result, in the past 20 years, researchers and policy makers have begun to focus intently on the early career teacher turnover phenomenon to determine why these individuals make the career choices they do and where they settle professionally once they leave.

While the teacher turnover rate for educators across all career stages has stabilized in recent decades, the same cannot be said when we look specifically at turnover rates for beginning teachers. For example, the annual attrition rate for first-year teachers has increased by more than 40 percent over the past two decades (Ingersoll, Merrill, & Stuckey; 2014). As more beginning teachers phase themselves out of the profession, typically, new beginning teachers replace them. This has implications for the overall professional maturity and collective experience of our nation's teachers. During the 1987-1988 school year, the modal career length for teachers in the U.S. was fifteen years; two decades later, the typical teacher was in his or her first year of teaching (Ingersoll, Merrill, & Stuckey, 2014). Thus, the national teacher workforce is getting "greener" and far less experienced. Other studies of teacher attrition have demonstrated that 9 percent leave before the school year even comes to a close (Fideler & Haselkorn, 1999), somewhere between 10 and 15 percent of teachers leave the profession after completing just one year (Ingersoll, 2003; Gray, Taie, & O'Rear, 2015), 20 percent of early career teachers exit within their first three years (Henke, Chen, Gies, & Knepper, 2000), and between 40 and 50 percent leave within their first five years (Ingersoll, 2003; Boe, Cook, & Sunderland, 2008; Perda, 2013; Raue, Gray, & O'Rear, 2015; Ingersoll, Merrill, & Stuckey; 2014; Carroll & Foster, 2010). The rates of beginning teacher turnover are even higher if we focus on specific subgroups, particularly early career teachers in high-poverty, high-minority, urban, and rural schools (Hanushek, Kain, & Rivkin, 2004).

What is driving beginning teachers away from the profession and hard-to-staff, high-needs schools? Unsurprisingly, the first five years of teaching are when teachers report the highest levels of stress, emotional exhaustion, and feelings of burnout

(Dworkin, 1987; Guglielmi & Tatrow, 1998; Weisberg & Sagie, 1999; Kelly & Northrop, 2015). This is also the time period in which teachers are primarily motivated by nonpecuniary rewards and intrinsic values (Ingersoll & May, 2012). Studies have also shown that teachers typically need three to seven years of experience to become highly skilled and develop the type of strategies and coping mechanisms required to do their job well (Berliner, 2000; Huang & Moon, 2009; Haynes, 2011). Therefore, the inevitable struggles and perceived costs of the first few years of teaching may not outweigh the benefits and rewards, allowing only the most resilient beginning teachers to survive – approximately half of those who started.

Misguided Policy Responses to Beginning Teacher Turnover

The prevalent policy response to recent beginning teacher turnover rates and subsequent teacher shortages has been to increase the supply of incoming educators by focusing on ways to recruit more teachers to the profession (Ingersoll & May, 2012; Darling-Hammond, 2007; Rice, Roellke, Sparks, & Kolbe, 2009; Ingersoll, 2002). This singular focus on recruitment initiatives may be misguided. Ingersoll and Perda (2010) found that since the 1990s, the supply of newly qualified math and science teachers has actually more than kept pace with increases in student enrollment and increases in teacher retirements. But when the researchers include the early departures of teachers before retirement into their model (i.e., early career attrition), the supply of new teachers no longer meets the demand (Ingersoll & Perda, 2010). Therefore, it appears that the gap created by unexpected teacher turnover in the beginning of careers may be driving the teacher shortage problem (Ingersoll & May, 2012), as opposed to unsuccessful recruitment. This finding underscores the need to expand the focus of policy initiatives beyond teacher recruitment and find ways to increase early career teacher retention, particularly after the first year of teaching when the risk of turnover is highest (Ingersoll, 2003; Gray, Taie, & O'Rear, 2015).

Some studies and policy makers suggest that raising teachers' salaries could curb early career turnover rates and improve beginning teacher retention (Ingersoll, 2001; Podgursky, Monroe, & Watson, 2004; Cha, 2008). However, compensating teachers with wages that are on par with those of relatively comparable professions is financially impossible for many school districts. In particular, pay raises of the magnitude necessary to reduce turnover substantially in hard-to-staff environments with high mobility and attrition rates are simply not an option for most school districts of this kind (Grissom, 2011). Furthermore, research has shown that early career teachers are primarily motivated by nonpecuniary rewards and intrinsic values (Ingersoll & May, 2012), so implementing salary increase initiatives to recruit and retain beginning teachers is unlikely to be effective.

Most new teachers come into the profession with a unique sense of enthusiasm and commitment that has largely been ignored by schools and policymakers as an asset in solving the turnover crisis (Weiss, 1999). This underscores the need for policies that respond to the positive attributes of early career educators in a way that continually cultivates their enthusiasm for teaching and commitment to the profession. In other words, policies are needed that allow educators to thrive, not just survive. Thus, tackling the problem of turnover entails more than simply increasing the recruitment of teachers. Comprehensively combatting turnover requires addressing the problem of how to retain and sustain teachers in the profession by identifying those characteristics of teachers and schools that allow educators to thrive professionally and personally (Beltman, Mansfield, & Price 2011). Thus, addressing the teacher turnover problem from a policy perspective is both a matter of retention and a matter of resilience (Schaefer, Long, & Clandinin, 2012).

A resilient teacher is one who is able to overcome challenging situations and recurring setbacks and maintain his or her commitment to teaching while enjoying a high degree of job satisfaction (Brunetti, 2006; Castro, Kelly, & Shih, 2010) - one who both survives *and* thrives. While, there is an abundance of available literature that investigates the risk factors associated with beginning teacher retention and survival (e.g., Smith & Ingersoll, 2004; O'Brien, Goddard, & Keeffe, 2008; Liu, 2007), little attention has been paid to the protective factors related to sustaining beginning teachers in the profession who feel fulfilled and satisfied with their work (Schlichte, Yssel, & Merbler, 2005). Consequently, policymakers have responded to the teacher turnover crisis in a way that largely ignores these positive protective factors and instead focuses on mediating the negative risk factors associated with turnover. This gap in the literature and oversight in policy will be directly addressed with the investigation of job satisfaction, a protective factor, as a potential moderator in the conceptual model for this study.

The Importance of Teachers' First-year Experiences

Some recent studies have begun to conceptualize teacher attrition as part of an identity-making process in which individual and contextual factors are deliberated, negotiated, and assigned personal value (Lindqvist & Nordanger, 2016; Clandinin, Downey, & Huber, 2009; Craig, 2014; Flores & Day, 2006; Rinke, 2013). Flores and Day (2006) define identity as "an ongoing and dynamic process, which entails the making sense and (re)interpretation of one's own values and experiences" (p. 220). For teachers, this process of identity-making requires weighing the pros and cons of continuing to identify oneself as an educator; it begins during pre-service training with the student teaching experience and continues to evolve throughout the first year of full-time teaching and, except in cases of attrition, into subsequent years in the field. As a result, career decisions are a byproduct of teacher identity-making, and decisions to leave the profession begin formulating long before the turnover decision is finalized (Schaefer et al., 2012; Lindqvist & Nordanger, 2016).

Since teacher identity and career decisions continually evolve over time, the first-year experiences that shape each teacher's identity-making process are likely to have lasting impacts that extend beyond the first year. This means that career decisions are made within the opportunity and constraints of history (Lindqvist & Nordanger, 2016) such that positive and negative experiences from the first year of teaching can carry over into subsequent years and inform an individual's decision to turn over or stay in the field. This is not a new or novel concept in the literature; several researchers have pointed to the importance of the first year of teaching, as initial experiences in the profession influence teachers' satisfaction and success (Kilgore & Griffin, 1998; Bullough, 1987; Feiman-Nemser, 1983) and therefore are likely to directly impact retention in later years.

Upon entering the profession, most beginning teachers have a strong sense of vocation and commitment to their work (Gu & Day, 2007; Hansen, 1995; Day, Kington, Stobart, & Sammons, 2006). Thus, in their first year, teachers' work is largely fueled by their intrinsic motivation and emotional commitment to best educating their students (Gu and Day, 2007). Yet, the excitement of the first job, a new classroom, and a new community can quickly diminish as first-year teachers confront the realities of teaching (Schlichte, Yssel, & Merbler, 2005), including long hours, classroom isolation, excessive paperwork, students' behavioral and learning problems, the pressures of statewide standards and accountability systems, and lack of parental support or, conversely, parental over-involvement. As awareness of the negative aspects of teaching grows, negative first-year teaching experiences can feed feelings of ineffectiveness, loneliness, alienation from the profession, and burnout (Schlichte, Yssel, & Merbler, 2005), and ultimately may lead to the decision to move schools or leave teaching altogether. Thus, a paradox develops whereby new teachers are simultaneously more committed and also more likely to leave the field (Sclan, 1993), a conflict that can be very difficult for beginning teachers to negotiate as their identity evolves. This paradox underscores the need to identify protective experiences of first-year teachers that not only retain them in their schools but also sustain their commitment to the profession and reinforce their enthusiasm for education during the first year of teaching and beyond.

So, what is occurring during that first year that consistently drives new teachers away? And what experiences do first-year teachers endure that ultimately impact their decisions to move to new schools or leave the profession altogether within the first five years of teaching? Researchers have identified several positive and negative first-year experiences that have been found to impact first-year teachers' career decisions to return for their second year of teaching in the same school, stay in the profession but move to a new school, or leave teaching altogether.

Supports and programs for first-year teachers. The most widely investigated first-year factor is the role of the mentor, also referred to as a master teacher in some literature. Studies have shown that first-year teachers who work with a mentor who teaches in the same subject or grade level are more likely to return for the second year of teaching (Ingersoll & Smith, 2004; Conderman & Stephens, 2000; Delgado, 1999; Rowley, 1999). The typical mentor-mentee relationship provides two different types of support to the novice teacher: 1) psychological support that address the personal and emotional needs of the mentee (Feiman-Nemser, 2003), and 2) instruction-related support by which the mentor instills the fundamentals of lesson planning, school rules, and classroom management in their mentee (Stansbury & Zimmerman, 2000). Mentoring is also critical to minimizing feelings of isolation that are typical in the first year of teaching (Conderman & Stephens, 2000). Furthermore, mentoring has been identified as a key component of professional identity development in first-year teachers as the mentor pushes the mentee to continually reflect on, refine, and revise his or her practice to become a better teacher (Mutchler, 2000; Feiman-Nemser & Remillard, 1996).

Other tangible first-year supports and programs provided by the school administration have been identified as important first-year factors that impact the decisions to return for the second year, as well. These include school policies such as a reduced workload for new teachers (Yee, 1990), guaranteed common planning time with other teachers in the same subject or grade level (Ingersoll & Smith, 2004), and mandatory participation in a formal induction program that initiates teachers into the culture of the school (Rosenholtz, 1989; Feiman-Nemser, 2003; Weiss, 1999).

Preparedness to teach. Teachers' perceptions of their preparedness have been found to have a significant association with self-reported efficacy and burnout (Pas, Bradshaw, & Hershfeldt, 2012; Schonfeld, 2001; Tatar & Horenczyk, 2003), which both contribute to teacher turnover (Glickman & Tamashiro, 1982; Marvel, Lyter, Peltola, Strizek, & Morton, 2006). For first-year teachers, ending the school year with feelings of self-efficacy has been found to be significantly correlated with feeling prepared for the job of teaching (Tschannen-Moran et al., 1998), and both constructs predict teacher retention for the next school year (Glickman & Tamashiro, 1982; Marvel, Lyter, Peltola, Strizek, & Morton, 2006). While first-year teachers' experiences in their pre-service training program undoubtedly have an impact on feeling prepared to teach (Darling-Hammond, Chung, & Frelow, 2002), professional development experiences provided by the administration and the professional culture of the school have been shown to also contribute to perceptions of preparedness, self-efficacy, and turnover decisions after the first year of teaching (Johnson & The Project on the Next Generation of Teachers, 2004). Unfortunately, many first-year teachers do not find themselves in schools that are organized to support their learning through strong professional development experiences. Hoy and Spero (2005) found that there are significant declines in teachers' self-efficacy and sense of preparedness to teach throughout the first year of teaching. This may have a lasting impact on turnover decisions as beginning teachers consider their career options for the future.

School climate and workplace conditions. School climate is another important first-year factor that affects teachers' career decisions to stay, move, or leave with respect to their potential second year of teaching. Several studies have shown that schools that retain their first-year teachers tend to be positive workplaces with collegial and supportive social and organizational structures in place (Yee, 1990; Choy, Chen, & Ross, 1998; Little, 1982, Little & McLaughlin, 1993; Rosenholtz, 1989; Billingsley & Cross, 1992). Examples of these positive structures include opportunities for collegial interaction (Yee, 1990), regularly scheduled collaboration among teachers for professional development (Ingersoll & Smith, 2004), teacher autonomy and control of the work environment (Weiss, 1999; Stockard & Lehman, 2004), teacher participation in decision-making processes at school (Yee, 1990), administrative and faculty support for student discipline (Yee, 1990; Billingsley & Cross, 1992), and cooperation with parents (Skaalvik & Skaalvik, 2011). However, of all the school climate factors that influence first-year teacher turnover decisions, the literature consistently emphasizes the importance of strong school leadership and the principal's administrative style (Billingsley & Cross, 1992). In particular, an administration that encourages and models socialization and collegiality among faculty has been found to reduce stress, build confidence, and reduce feelings of isolation that can lead to burnout and turnover of first-year teachers (Miller, Brownell, & Smith, 1999; Cooley & Yovanoff, 1996; Kilgore & Griffin, 1998; Rosenberg, O'Shea, & O'Shea, 1998).

Job satisfaction. There is an abundance of literature dating back several decades on the relationship between job satisfaction and employee turnover decisions, not just in the field of teaching but across other professions as well (e.g., Locke, 1976; Mobley, 1977; Bluedorn, 1982; Mueller & Price, 1990; Tett & Meyer, 1993; Weiss, 2002). In the teacher turnover literature, job satisfaction is typically defined in one of two ways: 1) facet-specific job satisfaction that reflects the extent to which teachers positively appraise certain aspects of the job of teaching in their specific school, and 2) overall job satisfaction that reflects the extent to which teachers positively appraise the career of teaching in general (Skaalvik & Skaalvik, 2011; Moe, Pazzaglia, & Ronconi, 2010;

Sargent & Hannum, 2005). This dissertation research conceives of teacher job satisfaction using the latter definition, which is more global in nature.

Across one's teaching career, regardless of years of experience, teachers' job satisfaction has been found to be predictive of both intent to leave the teaching profession (Skaalvik & Skaalvik, 2011) and of actually leaving the field (Cha, 2008). Narrowing the scope to first-year teachers, job satisfaction has been found to be the *most* important influence on turnover and retention decisions (Stockard & Lehman, 2004). As in other occupations, job satisfaction does not develop in a vacuum. Dinham and Scott (1998) classify the sources of teacher job satisfaction into three domains: 1) intrinsic rewards of teaching, 2) factors extrinsic to the school, and 3) school-based factors. Note that the first-year experiences previously discussed in this section fall into the third domain as preparedness through school-provided professional development opportunities, school climate and workplace conditions, and first-year teacher supports and programs provided by the administration are school-based in nature. Therefore, this dissertation research will investigate the role that first-year teacher job satisfaction plays in their career decisions while also examining the interactions between job satisfaction and other first-year experiences as they predict turnover or retention decisions.

This section has outlined important first-year teacher experiences that have been shown to be associated with career decisions at the end of the first year of teaching. These experiences include first-year supports and programs provided by the school administration, school climate and workplace conditions, perceptions of one's preparedness to teach, and perceived satisfaction with the job of teaching. Given that teacher identity and career decisions continually evolve over time (Lindqvist &

Nordanger, 2016), the first-year experiences that initially shape each teacher's identity-making process are likely to have lasting impacts that extend beyond the first year and even beyond the second year in the profession. Yet, the vast majority of studies on teacher turnover are cross-sectional or cover a limited timeframe of teachers' careers, typically the first two years of teaching (Ingersoll & Strong, 2011; Borman & Dowling, 2008; Raue, Gray, & O'Rear, 2015). This dissertation research will address the gap in the literature by investigating the influence of first-year experiences found to have an immediate impact on retention and turnover decisions to see if that impact persists into the second, third, fourth, and fifth year of teaching with respect to career decision-making. The findings can then be used to identify school-based, policy amenable factors that can strengthen the first-year teacher experience and yield greater retention rates of beginning teachers in the first five years.

The Career Decisions of Beginning Secondary School Teachers

An important component of the investigation into early career teacher turnover has been identifying the competing careers to which "Leavers" transition and the characteristics of those careers that beginning teachers find so intriguing (Loeb & Page, 2000; Eide, Goldhaber, & Brewer, 2004). There are enticing alternative labor market opportunities available to those teachers with subject matter expertise, who typically teach at the secondary level in middle and high schools, as a result of their extensive pre-service content training that often yields a post-secondary degree in an academic subject (Stockard & Lehman, 2004). This is particularly true for educators with backgrounds in science, technology, engineering, and mathematics (STEM) fields (Ingersoll & May, 2012). Consequently, this dissertation research will focus on early career teachers at the secondary level as these individuals are at a greater risk of leaving the profession for other fields of work due to their pre-service education and specialization in other domains beyond teaching (Borman & Dowling, 2008). Further justifications for focusing on secondary teachers include the findings that teachers working in middle and high schools are less satisfied than their elementary school counterparts (Rochkind, Ott, Immerwahr, Doble, & Johnson, 2008; Heyns, 1988; Stockard & Lehman, 2004) and that they leave teaching at higher rates (Sutcher, Darling-Hammond, & Carver-Thomas, 2016; Billingsley, 1993; Singer, 1992; Theobald, 1990).

Theoretical Perspectives on Turnover

There are three theories of general employee turnover that are cited in the teacher turnover literature: 1) human capital theory from economics (Becker, 1993; Ehrenberg & Smith, 2003; Kirby & Grissmer, 1993), 2) social learning theory from sociology and psychology (Chapman, 1984; Krumboltz, 1979; Chapman & Green, 1986), and 3) the dual-factor job satisfaction theory of business management developed by Herzberg (1968) that is essentially a blend of the first two theories. The human capital theory posits that teacher career decisions are the end result of a rational decision-making process in which an individual logically and systematically weighs the costs and benefits of staying compared to leaving their current position or profession (Ehrenberg & Smith, 2003). Benefits can take many forms – being either monetary or nonpecuniary in nature or manifesting as gains in professional training and worth – that allow an individual to increase their store of human capital (Kirby & Grissmer, 1993). This theory speaks of teacher turnover decisions in terms of tangible investments and returns (Becker, 1993; Ehrenberg & Smith, 2003).

In contrast to this, social learning theory conceives of teacher career decisions as being influenced by a complex web of socio-psychological factors including the interplay of personal characteristics, previous behaviors, and environmental determinants (Krumboltz, 1979; Chapman, 1984). Under this theory, teacher turnover decisions are made when individuals consider their personally held values, aspirations, and beliefs; acknowledge the emotional impact and affective experiences their current career choices have on their job satisfaction; and assess their degree of personal commitment to the teaching profession (Chapman & Green, 1986).

Herzberg's (1968) dual-factor job satisfaction theory blends the principles of human capital and social learning theories into a unified two-dimensional theory of employee turnover. This theory also bridges the gap between the factors that affect turnover decisions and actual turnover behaviors by defining the black box between cause and effect as job satisfaction. Thus, job satisfaction becomes the intervening mechanism through which internal and external factors influence teacher turnover decisions. Herzberg (1968) posits that there are two dimensions of job satisfaction that influence career decisions – motivation and hygiene. The motivation dimension comprises the intrinsic rewards of recognition, sense of achievement, personal growth, professional advancement, sense of responsibility, and the satisfaction that comes from the work itself (Hirsch, Koppich, & Knapp, 2001). This dimension corresponds to the affective tenets of social learning theory. Conversely, the extrinsic factors relevant to the human capital theory of employee turnover compose the hygiene dimension. This dimension includes external influences such as salary, supervision, administrative policies, working conditions, and interpersonal relationships (Herzberg, 1968).

The conceptual model developed for this dissertation incorporates elements of Herzberg's theory by identifying both intrinsic and extrinsic predictors of teacher career decisions experienced during the first year on the job that may explain the turnover phenomenon. With respect to intrinsic predictors of turnover that tap into Herzberg's "motivation" dimension, this research will examine the role that satisfaction with the first year of teaching plays in beginning teachers' career trajectory decisions. Regarding extrinsic predictors of teacher turnover behavior that encapsulate Herzberg's "hygiene" dimension, this research will investigate the roles of teacher preparation and education, school climate, and school-based support structures as they potentially influence teachers' decisions to stay, move, or leave. Moreover, the structure of the conceptual model includes first-year job satisfaction as a moderating variable that may change the nature of the relationships between other first-year experiential predictors and teachers' final turnover outcomes.

Labor Market Perspectives on Retention, Attrition, and Mobility

The variety of teacher labor market perspectives present in the literature on teacher turnover has led to inconsistent definitions for what constitutes "turnover", "attrition", and "mobility" and likewise who counts as "Stayers", "Movers", and "Leavers" (Cochran-Smith & Zeichner, 2009; Billingsley, 1993). There are two overarching perspectives that offer differing insights into the turnover phenomenon (Cannady, 2011). The first is an organizational perspective, which isolates the impacts of teacher turnover at the school, district, or state level and frames staffing concerns as more localized in scope. The second is a labor force perspective that examines the overall quality of the teacher workforce for the country as a whole and considers the effects of turnover on a national scale.

Ingersoll typically approaches his research on teacher turnover from an organizational perspective, treating individual schools as organizations. He defines "teacher turnover" as the departure of teachers from their current teaching positions in their current schools (Ingersoll, 2001). Such turnover can manifest in one of two ways: 1) teachers leaving the profession altogether (i.e., attrition), and 2) teachers transferring to other schools regardless of district or state (i.e., mobility or migration) (Ingersoll, 2001; Johnson, Berg, & Donaldson, 2005). Within the schools-as-organizations perspective, Movers who transfer to other schools are indistinguishable from those who leave the teaching profession entirely as they represent the same drain on the organization – either way the school is left with the task of filling that position. Thus, Movers and Stayers are inherently different groups of teachers, in spite of the fact that both types of teacher remain in the profession, due to the negative organizational impact of those teachers who transfer. Studies that employ the organizational perspective of turnover tend to compare Stayers to the combination of Movers and Leavers (e.g., Loeb et al., 2005; Strunk & Robinson, 2006; Connelly & Graham, 2009; Carter & Keiler, 2009; Olsen & Anderson, 2007; Swars, Meyers, Mays, & Lack, 2009; Ingle, 2009).

Conversely, studies that employ the labor force perspective of turnover tend to compare Leavers to the combination of Stayers and Movers (e.g., Liu, 2007; Krieg, 2006; Lathman & Hogt, 2007; Gonzalez, Brown, & Slate, 2008; Scheopner, 2009). From this point of view, teachers represent a national labor force and the career decision of interest becomes whether or not a teacher chooses to remain in teaching; where they decide to teach is irrelevant. This dissertation research seeks to honor both organizational and labor force perspectives and explore the turnover phenomenon by treating Stayers, Leavers, and Movers as distinct groups of teachers. Several studies of teacher turnover have previously employed this schema (e.g., Harris, 2007; Swars et al., 2009; Imazeki, 2005; Smith, 2006; Kukla-Acevedo, 2009). Keeping the three groups separate acknowledges that the factors that drive migration may be different from the factors that drive attrition.

The Conceptual Model

Researchers who have examined factors associated with teacher satisfaction, turnover, and retention suggest that important influences to consider include (a) demographic and background variables for both teachers and students, (b) variables related to the teaching assignment, (c) administrative practices and policies within their schools, (d) the teachers' own perceptions of effectiveness and self-efficacy, and (e) the support they receive from supervisors, colleagues, and parents (e.g., Weiss, 1999; Billingsley, 1993; Chapman, 1984; Chapman & Lowther, 1982; Shen, 1997). Based on a review of the literature, this dissertation research is grounded in a conceptual framework hypothesizing that early career teachers' decisions to stay, move, or leave with respect to their first school placement in the first five years are related to the following four facets of the first-year teacher experience:

1. Tangible first-year supports and programs provided by the school administration, including participation in an official school-based induction program, a reduced teaching schedule, common planning time with colleagues, seminars for beginning teachers, and extra classroom assistance (e.g., having a co-teacher or classroom aide);

2. Perceptions of their preparedness to teach; specifically, perceptions of their ability to handle classroom management, use of a variety of instructional methods, employment of technology in the classroom, assessment of students, development of curriculum materials, and comprehension of subject matter;
3. Perceptions of the school climate, including the level of teacher autonomy; the amount of emotional, pedagogical, and social support received from one's mentor or master teacher, school administrators, colleagues, and parents; the impacts of student behavior; and the influence of standards and accountability systems; and
4. Satisfaction with teaching both as a career as well as localized in one's school setting.

Figure 1 summarizes the conceptual model. The four aforementioned facets comprise the first-year teacher experience, and they are grouped together on the left side of the figure. Within the first-year teacher experience, it was hypothesized that facets 1-3 interact with job satisfaction when beginning teachers consider their career trajectories at the end of each academic year; in other words, it was hypothesized that satisfaction with teaching moderates the relationship between the other three facets of the first-year teacher experience and the decision to stay, move, or leave at the end of each school year. For example, teachers who lack supports from the school and administration, feel poorly prepared to teach, and perceive the school climate to be contentious may be more likely to remain in their current positions at their first school placements if they have high degrees of satisfaction with the job of teaching; or, these individuals may be more likely to move to another school as a way to change the context of teaching but continue pursuing their career rather than leave the profession altogether. On the other hand, teachers who are highly supported, feel well-prepared to teach, and perceive their school climate to be positive may be more likely to leave the profession if they are not satisfied with teaching as a career. These potential interactions with job satisfaction are represented in the figure using wavy, bidirectional arrows to capture the two-way nature of the relationship between job satisfaction and teachers' other first-year experiences as they may inform teachers' turnover and retention decisions.

The arrow that leads from first-year teacher experiences to turnover and retention decisions is the key to this dissertation research. This arrows captures the predictive power of first-year teacher experiences as they may or may not relate to teacher retention and voluntary and involuntary turnover at the end of years 1, 2, 3, and 4. There are three turnover and retention decisions outlined in the conceptual model: (1) teachers who **stay** retain their full-time teaching status in their first school placement; (2) teachers who **move** switch schools by accepting a full-time teaching position at another school; and (3) teachers who **leave** resign from full-time classroom teaching altogether and exit the profession.

These three outcomes may be observed after years 1, 2, 3, and 4 of a beginning teachers' career are complete, as shown on the right side of Figure 1. The individual teachers represented in the data for this dissertation research were followed longitudinally for the duration of their first five years of teaching, and therefore, may have as many as four observations in the data to represent their career decisions after their first, second, third, and fourth years of teaching.

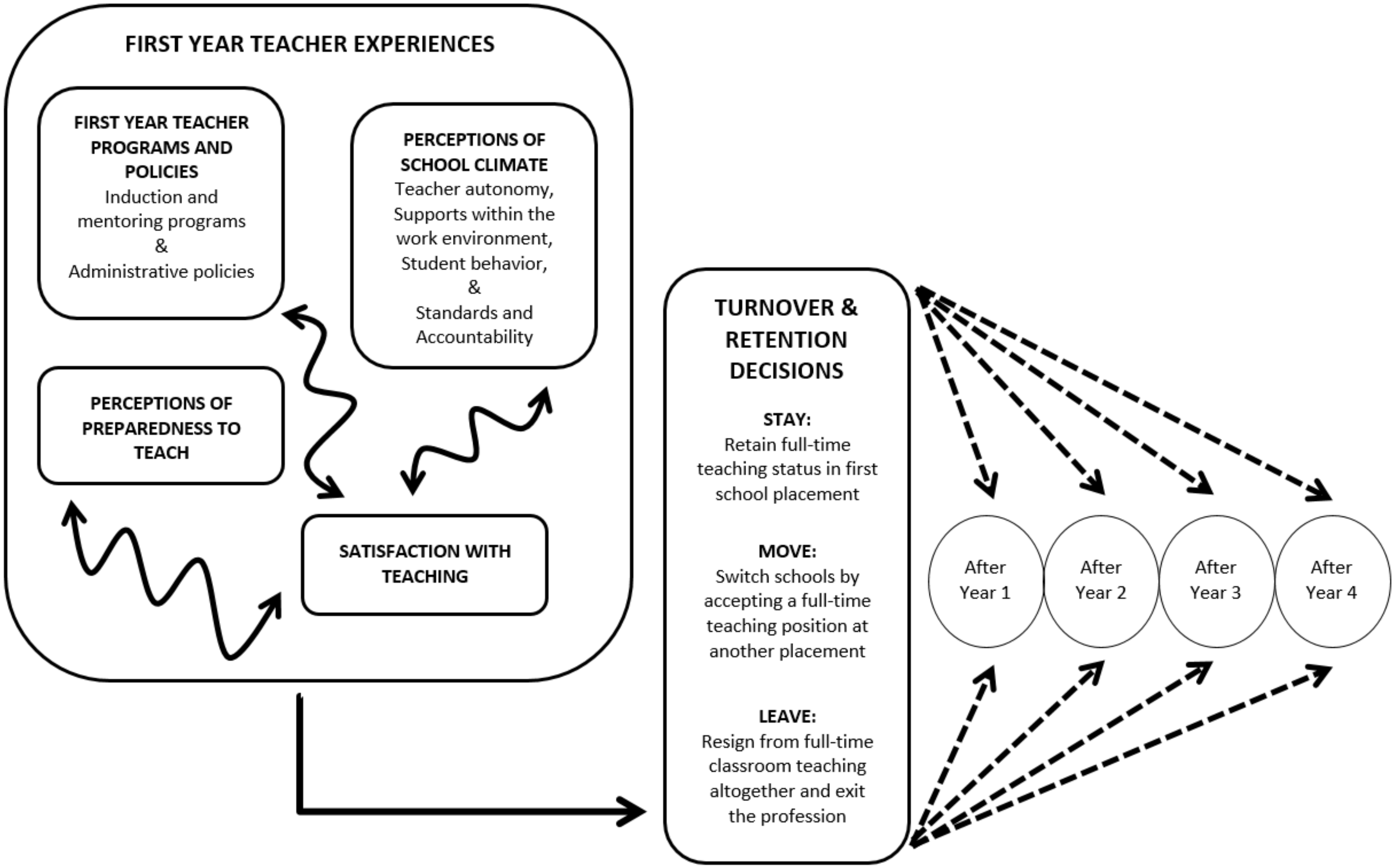

Figure 1. *The Conceptual Model of Early Career Teacher Turnover from the First School Placement.*

Source: Author's creation.

Hypotheses

Building from the conceptual model, this research hypothesized that specific first-year teaching experiences (i.e., programs and policies, perceptions of preparedness, school climate and workplace conditions, and job satisfaction) would be associated with decreases in the rates of moving and leaving after the first year in the classroom and, therefore, increased rates of retention. In addition, this research hypothesized that job satisfaction would moderate the strength of the relationships between teachers' career decisions and the three other facets of the first-year teaching experience (i.e., perceptions about their preparedness to teach, perceptions of school climate, and the first-year supports provided by the administration). This stems from the notion that teachers who are more satisfied with their jobs may be more willing stay in their current school in spite of a poor school climate, lack of programs for first-year teachers, and feeling unprepared to teach.

Furthermore, it was hypothesized that relationships between first-year experiences and decreases in the rates of moving and leaving would persist into later years such that the positive associations of experiences from the first year of one's career would manifest in later decisions to stay in the profession and at one's school. Given the decision to examine moving and leaving as separate phenomena, this research also hypothesized that first-year teacher experiences may relate to moving and leaving outcomes in different ways.

Conclusion

Based on the literature reviewed in this chapter, the issue of early career teacher turnover (i.e., mobility and attrition) has serious consequences for the success of our nation's students and the health of our schools. Moreover, prior research has shown that teachers' first-year experiences may have lasting positive or negative consequences for teacher retention. The conceptual model that emerged from the review of prior research in this area indicated the potential for further exploration of how and why teachers' first-year experiences contribute to early career attrition, mobility, or retention. In the chapter that follows, the methodology for addressing this important topic is discussed.

CHAPTER 3: RESEARCH DESIGN

Using longitudinal data from teachers and schools collected as part of the Beginning Teacher Longitudinal Survey (BTLS; U.S. Department of Education National Center for Education Statistics, 2015), this study investigated the first-year experiences of public middle and high school teachers as predictors of teacher retention and turnover across the first five years of their career in education. The specific research questions that framed this dissertation research are as follows:

1. What are the first-year experiences for teachers in the sample and how do they compare between teachers who are retained in their first school placements (i.e. Stayers) and teachers who voluntarily or involuntarily turn over in later years (i.e. Movers and Leavers)?
2. What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and involuntary turnover across the early career window of years 1 through 4?

Data Sources

The research questions were addressed using data from the Beginning Teacher Longitudinal Study (BTLS). Developed by the National Center for Education Statistics (NCES) and conducted by the U.S. Census Bureau, the BTLS is a national cohort study of beginning public school teachers in the initial stages of their educational careers.

Background and Purpose

The BTLS has two overarching objectives as outlined by NCES and the Census Bureau. First and foremost, the BTLS intends to provide researchers with the means to better understand how school and district characteristics and policies may affect beginning teacher satisfaction and turnover (i.e., mobility and attrition). The second purpose is to document how teachers respond to transitions in their careers. Such transitions include switching schools, changing grade levels or subjects taught, becoming a mentor, accepting an administration position, exiting the teaching profession, and returning to the teaching profession after taking time to pursue other personal or professional endeavors.

The study follows the same group of individuals as they transition in and out of elementary and secondary teaching, surveying individuals on a yearly basis over the course of five years. There were five waves of data collection for the BTLS conducted on an annual basis starting with the 2007-2008 school year and ending with the 2011-2012 school year. The first two waves were conducted in conjunction with the 2007-2008 Schools and Staffing Survey (SASS) and the 2008-2009 Teacher Follow-Up Survey (TFS), while the third through fifth waves were conducted as standalone survey research initiatives, as shown in Table 1. The final BTLS sample comprises full-time and part-time teachers, itinerant teachers, long-term substitute teachers, administrators, support staff, librarians, and other school-based staff who taught at least one regularly scheduled class in the 2007-2008 school year.

Table 1. *Data Collection by Wave*

Survey	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
SASS	X				
TFS		X			
BTLS			X	X	X

The first wave of the BTLS took place as part of the 2007-2008 administration of the Schools and Staffing Survey (SASS). Conducted on a 4-year cycle, SASS is the largest sample survey of educators and schools serving students in kindergarten through 12th grade in the United States. It targets districts, schools, principals, library media centers, and teachers from both public and private institutions with a series of paper-based survey questionnaires. SASS data files provide details about the characteristics, qualifications, and attitudes of educators, hiring practices, professional development, class size, working conditions, and other information about schools nationwide. Using responses from the 2007-2008 SASS, beginning teachers who qualified for participation in the BTLS were identified as individuals who began teaching in 2007 or 2008 in a traditional public school or public charter school setting offering any of grades K-12.

The second wave of the BTLS was conducted in conjunction with the 2008-2009 SASS Teacher Follow-up Survey (TFS). The TFS is administered the year following SASS data collection to determine which teachers stay at the same school, move to a different school, or leave the teaching profession altogether. The 2008-2009 TFS was given to a sample of teachers who completed the SASS in the previous year, including all beginning public school teachers who responded to the 2007-2008 SASS. The 2008-2009 TFS used four questionnaires – two for beginning public school teachers who started teaching in 2007 or 2008 and two for the rest of the TFS sample. The two questionnaires for beginning teachers separately targeted former teachers who had left teaching since the previous SASS and current teachers who were still teaching either in the same school as the SASS year or in a different school. Respondents had the option of completing the paper-based or online version of the relevant questionnaire.

The third, fourth, and fifth waves of BTLS data collection were completely distinct survey administrations and separate from the SASS and TFS. These three waves were carried out using internet-based questionnaires to determine the attrition rate of beginning teachers, determine the rate of reentry into teaching, and investigate the characteristics of teachers who stay in the same school, move to a different school, leave the teaching profession, or return to teaching. The literature refers to these individuals as Stayers, Movers, Leavers, and Returners. Furthermore, the final waves of the BTLS allow researchers to explore the occupations and decision-making processes of those who left teaching and examine the career patterns of those who remain in the teaching profession.

Instrumentation by Wave

The first wave of data collection for the BTLS was conducted using the 2007-2008 SASS Teacher Questionnaire in order to obtain information on teachers' education and training, teaching assignments, certification, workload, attitudes about teaching, and perceptions of teaching and their schools. This questionnaire had nine sections as outlined in Table 2. Later in this chapter, the specific variables that will be used from the first wave of data collection to address the research questions will be presented and discussed in greater detail.

Table 2. *Sections and Content Coverage of the BTLS First-Wave Questionnaire.*

Section #	Section Title	Content Coverage
1	General Information	Teaching status, teaching experience, and other professional experiences
2	Class Organization	Class enrollments, students with Individualized Education Plans (IEPs), students with limited-English proficiency (LEP), class organization, subjects taught, and class size
3	Educational Background	Academic degrees, teacher assessments, and teacher preparation programs
4	Certification and Training	Types of certifications held including grades and content areas covered. New teachers also provided information on attitudes towards preparation for teaching, mentoring experiences, and participation in an induction program.
5	Professional Development	Professional development activities and perceptions of their impact
6	Working Conditions	Hours worked, money spent on classroom supplies without reimbursement, and methods used for communication with parents and/or students outside school hours
7	School Climate and Teacher Attitudes	Teachers' influence on planning and teaching, collaboration among teachers, satisfaction with teaching, student problems, and school safety
8	General Employment and Background Information	Teacher salary, supplemental income, union affiliation, gender, age, and race/ethnicity
9	Contact Information	Respondent's personal contact information and contact information for two additional people

Note. Adapted from Gray, Goldring, & Taie, 2015

The second wave of data collection for the BTLS was carried out to measure the one-year attrition rate of teachers; explore the characteristics of those who stay in teaching, switch schools, change professions, or retire; gather information on the activities or occupations of individuals who left teaching; document teacher's reasons for moving to a new school or leaving the profession; and examine job satisfaction. This wave of the BTLS was conducted in conjunction with the 2008-2009 TFS using the beginning teacher versions of the Questionnaire for Former Teachers and the Questionnaire for Current Teachers.

The third through fifth waves of data collection for the BTLS were conducted as standalone survey research initiatives with the intent to measure the attrition rates of beginning teachers; explore the characteristics of beginning teachers who remained in preK-12 teaching and those who returned to it after leaving; gather information on the activities and occupations of those who left preK-12 teaching; obtain reasons for the decision to move schools, leave preK-12 teaching or return to the profession; and document the development of teachers' educational and professional credentials. These BTLS waves were administered completely online. For waves two through five, the only variable that is of interest in this dissertation research is *teaching status*, which captures whether a teacher stayed at their first school placement, moved to another school, or left the profession completely between two consecutive school years.

BTLS Sampling Frame and Sample Selection

The sample for the BTLS consisted of those traditional public school and public charter school teachers who responded to the 2007-2008 SASS Teacher Questionnaire and indicated that they began teaching in the 2007 or 2008 calendar year. Thus, the sampling procedures for the SASS serve as the initial phases of sample design for the BTLS. This necessitates, first, a discussion of sampling for the SASS and then, second, the sampling procedures for the BTLS.

Establishing the SASS public school sampling frame began with the 2005-2006 Common Core of Data (CCD) Nonfiscal School Universe data file. SASS defines a school as "an institution, or part of an institution, that provides classroom instruction to students; has one or more teachers to provide instruction; serves students in one or more of grades 1-12 or the ungraded equivalent, and is located in one more buildings apart from a private home" (Gray, Goldring, & Taie, 2015, p.8). All public schools listed in the 2005-2006 CCD that met this definition and were located anywhere in the 50 states or the District of Columbia were included in the sampling frame. Some additional school records were added to this sampling frame to include career technical centers or alternative, special education, and juvenile facilities that met the SASS definition of a school but were not represented in the 2009-2010 CCD. The final public school sampling frame for the 2007-2008 SASS consisted of 90,410 traditional public schools and 3,850 public charter schools.

SASS is different from many other educational surveys in that the first stage of sampling requires the selection of schools instead of districts. Once a school is selected for sampling, the district in which that school is located is immediately included in the district sample, and the principal at the selected school is automatically included in the principal sample. Teachers, however, are subsampled within each selected school. In an effort to reduce response burden on a school's faculty, the maximum number of sampled teachers per school is set at 20.

SASS employs a stratified probability proportionate to size (PPS) algorithm to determine the final sample. The sample is selected so that national-, regional-, and state-level elementary and secondary public school estimates and national-level combined public school estimates could be obtained. Schools in the sampling frame are stratified by state, grade range (i.e., elementary, secondary, and combined), and school type (i.e. traditional public, public charter, Bureau of Indian Education-funded, and schools with high American Indian enrollment). Within each stratum, schools are systematically selected using a PPS algorithm. The measure of size for schools is the square root of the number of full-time teachers reported (or imputed) during creation of the sampling frame. Those schools with a measure of size exceeding the sampling interval are automatically selected for the sample.

At the time, there were five states that defined school districts at the county level and had a small number of counties. Consequently, these states had very large school districts, and it was determined by variance analysis that all districts in these five states should be sampled. School probabilities of selection within each of these school districts were analyzed. If the probabilities did not guarantee a sampled school for a district, the school with the highest probability of selection was included in the sample to ensure that all districts in these five states were represented by at least one school in the sample. These procedures produced a national public school sample of 9,810 schools for the 2007-2008 SASS including 8,970 traditional public schools and 370 public charter schools.

SASS defines teachers as "staff members who teach regularly scheduled classes to students in any of grades K-12" (Gray, Goldring, & Taie, 2015, p.9). Teacher Listing Forms were collected from sampled schools ahead of the questionnaire administration period. This was completed primarily by mail and submissions were compiled by the Census Bureau on an ongoing basis during the roster collection period. On these teacher rosters, sampled schools were asked to provide the name of each teacher, their level of teaching experience (categorized as 1-3 years, 4-19 years, and 20 or more years), their status as a full-time or part-time teacher, the primary subject matter taught (special education, general elementary, math, science, English/language arts, social studies, vocational/technical, or other), and whether the responding school official expected the teacher to remain teaching at the same school next year.

Teacher sampling was completed on an ongoing basis as Teacher Listing Forms were submitted. First, schools were assigned a total number of teachers to be selected within each school stratum. Then teachers were stratified into five categories within each sampled school: 1) new teachers (1-3 years) expected to stay at their current school, 2) midcareer (4-19) or highly experienced (20+ years) teachers expected to stay at their current school, 3) new teachers expected to leave their current school, 4) midcareer teachers expected to leave their current school, and 5) highly experienced teachers expected to leave their current school. Teachers expected to leave their current school were intentionally oversampled (i.e., categories 3-5). Within each teacher stratum in each school, teachers were selected systemically with equal probability. Approximately 13% of schools did not submit a Teacher Listing Form, and, therefore, no teachers were selected from these schools for the final teacher sample.

All traditional public school and public charter school teachers who responded to the 2007-2008 SASS Teacher Questionnaire and indicated that they began teaching in the 2007 or 2008 calendar year were included in the initial BTLS sample of 2,100 individuals. However, during subsequent data collection completed after the 2007-2008 SASS, the Census Bureau found that 110 teachers from the initial sample actually did not meet all criteria for inclusion in the BTLS. Consequently, the final sample size for the BTLS is 1,990 beginning teachers.

Data Collection Procedures

Data collection procedures varied across waves due to the embedded nature of the BTLS within the SASS in the first wave and the TFS in the second wave. For the first wave in 2007-2008, SASS/BTLS data were primarily collected by mail with a telephone follow-up and/or an in-person field follow-up, if needed. When possible, the Census Bureau established a survey coordinator at each school to assist in data collection and follow-up with non-respondents. SASS teacher data collection including the BTLS began in August 2007 and ended in June 2008.

For the second wave in 2008-2009, beginning teachers, who indicated they began teaching in the 2007 or 2008 calendar year on the SASS, received the appropriate beginning teacher version of the TFS questionnaire (i.e., former or current teacher) via an online platform. The beginning teacher TFS/BTLS questionnaires contained more items on mentoring, induction, and job preparation than the traditional TFS questionnaires provided to the rest of the teacher sample. Telephone follow-ups were conducted with non-respondents, and when necessary, paper-based questionnaires were mailed to individuals who had not responded to the first two requests. TFS/BTLS data collection began in February 2009 and ended in August 2009.

For the third, fourth, and fifth waves, data collection was completed solely online. Telephone and email follow-ups were carried out to encourage participation from non-respondents. In some cases, a telephone follow-up interview was conducted to collect data. Data collection periods for the third through fifth waves occurred from November 2009 through June 2010, November 2010 through June 2011, and January 2012 through June 2012, respectively. In the last three waves, a letter was mailed to all sample members inviting their continued participation in the BTLS. Monetary incentives were employed during the last three waves in an effort to increase response rates.

Response Rates

Table 3 illustrates the percentages of unweighted and weighted unit response rates for the BTLS by wave. The unweighted response rate is equal to the number of respondents divided by the number of eligible sampled units. The weighted response rate is equal to the base-weight number of respondents divided by the base-weight number of eligible cases; the base weight for each sampled unit is equivalent to the product of the initial base weight (i.e., the inverse of the probability of selection) and the BTLS-SASS weighting adjustment factor. This adjustment factor is necessary because SASS teacher weighting was not completed in time to use the final SASS teacher weights in BTLS sample selection. As a result, the preliminary version of the SASS teacher final weights was used to select the BTLS sample, and this must be accounted for when calculating weighted response rates.

Table 3. *Unweighted and Base-Weighted Teacher-Unit Response Rates by Wave.*

Wave and type of weighting	BTLS Wave	2007-2008 SASS Teacher Listing Form	2007-2008 SASS novice public school teachers	Overall response rate
1st wave (07-08)				
Unweighted	N/A	86.7%	84.6%	73.4%
Weighted	N/A	86.2%	84.3%	72.7%
2nd wave without retrospective cases (08-09)				
Unweighted	84.7	86.7%	84.6%	62.1%
Weighted	84.5	86.2%	84.3%	61.4%
2nd wave with retrospective cases (08-09)				
Unweighted	91.8%	86.7%	84.6%	67.4%
Weighted	91.9%	86.2%	84.3%	66.8%
3rd wave without retrospective cases (09-10)				
Unweighted	86.2%	86.7%	84.6%	63.3%
Weighted	86.1%	86.2%	84.3%	62.5%
3rd wave with retrospective cases (09-10)				
Unweighted	91.2%	86.7%	84.6%	66.9%
Weighted	91.4%	86.2%	84.3%	66.4%
4th wave without retrospective cases (10-11)				
Unweighted	83.7%	86.7%	84.6%	61.4%
Weighted	83.7%	86.2%	84.3%	60.8%
4th wave with retrospective cases (10-11)				
Unweighted	84.8%	86.7%	84.6%	62.2%
Weighted	84.6%	86.2%	84.3%	61.4%
5th wave (11-12)				
Unweighted	77.3%	86.7%	84.6%	56.7%
Weighted	77.7%	86.2%	84.3%	56.5%

Note. 2nd wave retrospective cases are individuals who did not respond during the 2nd wave but responded to 2nd wave survey items during the 3rd wave of data collection. Likewise, 3rd and 4th wave retrospective cases did not respond during the specified wave but instead responded to those items retrospectively in the subsequent wave. Adapted from Gray, Goldring, & Taie, 2015.

Imputation Procedures

Initial imputation for the BTLS first-wave data followed SASS protocols. Beginning with the second wave, all cases in the previous wave were subject to reimputation using “cross-wave imputation.” For cross-wave imputation, data were imputed when possible from the preceding or the subsequent BTLS wave. This was completed for all waves. All restricted-use BTLS files include imputation flags to indicate which items were imputed and how the imputation was conducted. These imputation procedures were carried out by SASS developers, not by me.

Sample Structure

This dissertation research targets the population of beginning public school teachers in the United States with the following characteristics: full-time instructors who were in their first year of teaching in 2007-2008 and whose primary teaching assignments required them to work with students at the “secondary” level encompassing the 6th through 12th grades (i.e., middle school and/or high school levels). Applying these criteria to the first five waves of the BTLS, the analytic sample for this study included approximately 1,150 teachers nested in 1,000 schools and 900 districts. Since the majority of these schools and districts contributed only one teacher to the final sample, multilevel survival models were not explored. When there are relatively few individuals clustered within a level, hierarchical models provide no marked benefit over single-level models as there is little to no difference in the degrees of freedom by level (Cannady, 2011). Mullens and Kasprzyk (1996) argue that the sampling design for SASS (and, therefore, the BTLS) actually prohibits the use appropriate use of multilevel modeling due to the small number of teachers sampled within schools. In the first five waves of the

BTLS, there are on average 1.1 beginning secondary teachers per public school (before weighting). Such sparse data does not warrant the use of hierarchical analyses (Mullens & Kasprzyk, 1996).

Table 4 displays the frequencies of Stayers, Movers, and Leavers across the second through fifth waves (before weighting). The frequencies for missing responses and non-respondents are also included in this table by wave, as well as the frequencies for the small numbers of teachers who returned to teaching with the time period. As the turnover outcome is the dependent variable of interest, these frequencies are an important consideration for analytic power, particularly in light of the analytic framework employed. This study used survival analysis to predict teacher turnover. Survival methods were developed to model time-to-event data in order to investigate the causes or correlates of a particular event occurring at a particular point in time. In survival studies, the event of interest consists of some qualitative change that occurs at a specific point in time and is characterized by a relatively sharp, distinct disjunction between the state that precedes the event and the state that follows (Allison, 2014a). In case of this dissertation research, teacher turnover decisions qualify as an abrupt change in the career history of teachers, and, therefore, survival methods were appropriate to investigate the turnover phenomenon.

The type of survival analysis conducted in this research is simply a derivation of the logistic model, and logistic regression requires relatively large sample sizes due to the use of maximum likelihood estimation (MLE). More specifically, Hosmer and Lemeshow recommend sample sizes greater than 400 when employing logistic regression (Hair, Black, Babin, Anderson, & Tatham, 2010). The unweighted BTLS sample of roughly

1,150 secondary public school teachers exceeds this benchmark. Since subsample sizes by turnover outcome are all greater than 30 for Stayers, Movers, and Leavers (see Table 4), standard errors should be moderate in size, and the analysis appropriately powered (Peat & Barton, 2014).

Table 4. *Raw Frequencies of Stayers, Movers, Leavers, and Returners by Wave.*

Wave (Years)	Outcome	Frequency	Percent
2nd (2008-2009)			
	Leaver	110	9.6
	Stayer	880	76.5
	Mover	160	13.9
3rd (2009-2010)			
	Leaver	140	12.2
	Stayer	820	71.3
	Mover	120	10.4
	Returner	20	1.7
	Non-respondent	40	3.5
4th (2010-2011)			
	Leaver	190	16.5
	Stayer	730	63.5
	Mover	80	7.0
	Returner	20	1.7
	Non-respondent	140	12.2
5th (2011-2012)			
	Leaver	200	17.4
	Stayer	650	56.5
	Mover	60	5.2
	Returner	20	1.7
	Non-respondent	220	19.1

Note. Frequencies have been rounded to the nearest ten to comply with NCES guidelines for publications employing restricted-use data.

Sampling Weights

Recall that the SASS/BTLS sampling design includes stratifying the school sample, oversampling new teachers, and sampling with differential probabilities under the PPS algorithm. Consequently, sampling weights were employed in this dissertation research to correct for the selection of units with unequal probabilities, unit non-response, and non-coverage of the population (Pfeffermann, 1993). If left unweighted, such imperfections in the BTLS sampling design could bias estimates of sample coefficients so that they do not accurately reflect the target population.

Replicate Weights

In addition to sampling weights, NCES also provides a set of balanced replicate weights for each wave in the BTLS data file including BTLS longitudinal probability weights and a set of 88 replicate weights (Kelly & Northrop, 2015). Replication methods involve constructing a number of subsamples from the full sample and computing the statistic of interest for each replicate (Burns, Wang, & Henning, 2011). The mean square error of the replicate estimates around the full sample estimate provides a robust estimate of the variance of the statistic (Burns, Wang, & Henning, 2011). Therefore, replicate weights were employed in the analysis to produce weighted point estimates and corrected standard errors.

Missing Data

The extent and structure of missing data was evaluated to determine whether systematic patterns of missingness might bias sample estimates. The percentage of missing data for each predictor of interest fell below the recommended thresholds

(5-10%) cited in the literature (Little & Rubin, 2002). As a result, analyses were able to proceed without the need for additional imputation for the independent variables beyond those imputation procedures conducted by NCES in the construction of the BTLS data file for restricted-use (described previously).

Table 4 shows that proportions of missing data for the outcome variable fell below the recommended threshold for Waves 2 and 3 of data collection but were greater than 10% in Wave 4 (12.2% missing) and Wave 5 (19.1% missing) due to non-response. Missingness on the outcome attributed to non-response is called random censoring, and this type of censoring is common in large-scale survey research (Allison, 2014a). Survival methods were specifically designed to handle random censoring when individuals prematurely attrite from a study (Allison, 2014a). Consequently, analyses were able to proceed without the need for imputation of the dependent variable.

Variables

This dissertation research modeled the career decisions of public middle and high school teachers across the first five years of teaching using their first-year experiences to predict teacher retention and turnover outcomes. (The survival modeling process is described in detail later in this chapter under Research Question 2.) Four facets characterize teachers' first-year experiences:

1. Tangible first-year supports and programs provided by the school administration, including participation in an official school-based induction program, a reduced teaching schedule, common planning time with colleagues, seminars for beginning teachers, and extra classroom assistance (e.g., having a co-teacher or classroom aide);

2. Perceptions of their preparedness to teach; specifically, perceptions of their ability to handle classroom management, use of a variety of instructional methods, employment of technology in the classroom, assessment of students, development of curriculum materials, and comprehension of subject matter;
3. Perceptions of the school climate, including the level of teacher autonomy; the amount of emotional, pedagogical, and social support received from one's mentor or master teacher, school administrators, colleagues, and parents; the impacts of student behavior; and the influence of standards and accountability systems; and
4. Satisfaction with teaching both as a career as well as localized in one's school setting.

This section provides detailed descriptions of how these four facets and the turnover pathways were operationalized using teacher data from the BTLS. The outcome and predictor variables used to address the research questions are described in the sub-sections that follow, and summarized in Table 5. The individual items under each domain and sub-domain summarized in Table 5 are presented in Appendix A.

Outcomes

The outcome variable examined in this dissertation research is the teaching status of the teacher as measured in Waves, 2, 3, 4, and 5 of the BTLS. These waves correspond to the second, third, fourth, and fifth potential years of teaching for study participants. Due to the longitudinal nature of event history modeling, there are four outcomes that capture the early career decisions of teachers in the sample: a) Teaching status as of Wave 2, b) Teaching status as of Wave 3, c) Teaching status as of Wave 4, and d) Teaching status as of Wave 5. The "teaching status" variable available in the BTLS data file indicates whether a teacher is classified as a Stayer, Leaver, Mover, Returner, or Deceased in each year of data collection starting with Wave 2, the 2008-2009 school year. The teaching status variable also flags missing values and non-respondent values, and status is not imputed for any teacher.

In each wave, the “teaching status” variable was generated using logic statements based on responses to specific items in the survey. In Wave 2 (2008-2009), the teaching status variable was created using three items. The wording of these items and possible responses are as follows:

- W2MOVYN: Are you currently teaching in the same school as you were last year (2007-2008)? (dichotomous; Yes/No)
- W2REGCL: Do you currently teach any regularly scheduled class(es) in any of grades preK-12? (dichotomous; Yes/No)
- W2POSSC: How would you classify your position at your current school, that is, the activity at which you spend most of your time during this school year? [Regular teacher (full-time or part-time), itinerant teacher, long-term substitute, administrator, library media specialist or librarian, other professional staff (e.g., counselor, curriculum coordinator, social worker), support staff (e.g., secretary), short-term substitute, student teacher, and teacher aide]

Respondents who indicated they were still in the same school as last year (i.e., responded “yes” to W2MOVYN) were classified as “Stayers” for the teaching status variable. Respondents who indicated they were not in the same school as last year (i.e., responded “no” to W2MOVYN) and also indicated they were teaching regularly scheduled classes (i.e., responded “yes” to W2REGCL) were classified as “Movers.”

Leavers were defined as individuals who responded that they were no longer teaching any regularly scheduled classes (i.e., responded “no” to W2REGCL). The same process was used in subsequent waves to identify Stayers, Movers, and Leavers.

By the 2009-2010 school year (Wave 3) it was possible to have Returners - individuals who left teaching for at least a year (i.e., Leavers) but decided to return to the profession. Returners were not used as an outcome classification in this study because the research questions focus on career decisions with respect to a teacher’s first school placement. Returners have already made the decision to attrite and leave teaching. Therefore, these individuals maintained their status as “Leavers” in the teaching outcome variable to reflect their status with respect to their initial teaching placement. Some additional recoding was needed for respondents classified as “Movers.” For example, it is possible that in Wave 2 a teacher switches schools and moves out of their first placement to a new school. Then in Wave 3 that person indicates they remained in their current school and becomes classified as a “Stayer.” However, they are not a “Stayer” with respect to their first school placement. Therefore, recoding was necessary to ensure that “teaching status” captured one’s decision to stay, move, or leave with respect to the first school. Put another the way, the recode needed to reflect the following demarcation: once a Mover, always a Mover; once a Leaver, always a Leaver.

There was also a small number of individuals who died during the duration of the study. As such, those individuals become censored in the year that they died. These individuals were treated the same as those flagged as missing or non-respondent in the data file with respect to the teaching status variable in a particular wave.

Predictors

The predictors of teacher turnover were measured in the first year of teaching and were classified into four facets of the first-year teaching experience: 1) first-year teacher policies and programs, 2) perceptions of preparedness to teach, 3) perceptions of school climate, and 4) satisfaction with teaching. The individual measures that were used to capture these facets are discussed in the sections that follow and are outlined in Table 5. The specific wording and responses of items used to measure these facets are provided in Appendix A. Teacher and school covariates (measured in the first year of teaching) are also discussed at the end of this section.

First-year teacher programs and policies. As shown in Table 5, there were two hypothesized subdomains that fell within the larger domain of first-year programs and policies. These subdomains include: 1) participation in induction and mentoring programs (two items), and 2) administrative policies put in place for first-year teachers (four items). The latter subdomain includes such policies as a reduced teaching schedule, common planning time with colleagues, seminars for beginning teachers, and extra classroom assistance in the form of a teacher aide. Since these six programs and policies were of the greatest interest relative to the other predictors of turnover in this study, these six dichotomous variables were included in the analyses as individual predictors rather than creating a scale score to represent them. During the model-building phase, these six indicators were entered as a single block of predictors.

Perceptions of preparedness to teach. As shown in Table 5, six items from the BTLS were considered for the creation of a scale that captures first-year teachers' perceptions of their preparedness to teach. These include perceptions of preparedness for classroom management, disciplining students, varying one's instructional methods, teaching their subject matter, using technology in the classroom, assessing students, and selecting and adapting curriculum and instructional materials. To create this scale, corrected item-total correlations were examined to ensure the items appropriately discriminated among individuals of low and high preparedness to teach; correlations were deemed to be suitable if they fell in the range of 0.2 to 0.8. Cronbach's alpha was calculated to ensure the reliability of scale scores met the acceptable threshold of 0.7; when the threshold was not met, Cronbach's alpha coefficients with each item deleted were considered as a way to identify problematic items for removal that may threaten the internal consistency of the scale scores.

A common factor analysis was conducted to determine the structure of the scale. Factor analysis was chosen over principal components analysis (PCA) because "perceptions of preparedness to teach" is a latent variable that cannot be directly measured with a single variable, thereby deeming factor analysis the more appropriate approach. Further justification for employing factor analysis rather than PCA is summarized below in this excerpt from a 2008 paper by Krishnakumar and Nagar:

> The principal components method is a pure data reduction technique that seeks linear combinations of the observed indicators in such a way as to reproduce the original variance as closely as possible. There is no underlying explanatory model in this method. On the other hand, the factor analysis is an explanatory model in which the observed values are postulated to be (linear) functions of a certain (fewer) number of unobserved latent variables (called factors) (p.482).

Assumptions were checked to determine if exploratory factor analysis (EFA) with principal axis factoring was appropriate for the data at hand. These assumptions checks included ensuring the determinant was not zero; the Kaiser-Meyer-Olkin Test for Sampling Adequacy yielded a value above 0.8, Bartlett's Test of Sphericity was significant, and inter-item correlations were above 0.3. With these assumptions met, Kaiser's rule and examination of the Scree plot was used to determine the number of factors to extract – ideally, this should have been only one factor to represent perceptions of preparedness to teach, which was the case for this construct.

From the final solution, a standardized factor score was generated in SPSS with a mean of zero and standard deviation of 1 to holistically capture the facet of perceptions of preparedness to teach. SPSS creates factor scores by calculating an index variable via an optimally-weighted linear combination of the items where each item's weight is its factor loading (Sweet & Grace-Martin, 2012). As a result, each item's contribution to the factor score depends on how strongly it is related to the factor. Factor scores will be included as predictors when estimating survival models to answer research question 2. When interpreting regression coefficients for survival models that include a factor score as a predictor, the intercept reflects the predicted logit hazards for individuals at the mean for perceptions of preparedness who have a factor score of zero. Furthermore, the betas for preparedness in the "Move" and "Leave" models represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Preparedness subscale fall 1 standard deviation above the mean of zero.

Perceptions of school climate. As shown in Table 5, there were several hypothesized subdomains that fell within the larger domain of perceptions of school climate. These subdomains include teacher autonomy, supports within the work environment, student behavior, and standards and accountability. The creation of a scale for each subdomain was explored in the same manner as described in the previous section by examining indicators of item discrimination, reliability coefficients, and common factor analysis solutions to yield factor scores that were used in the analyses for RQ1 and RQ2. When more than one factor was extracted from the EFA (as was the case with the "Teacher Autonomy" construct only), oblimin rotation was applied to obtain the final solution. Oblimin rotation was deemed appropriate for this data as it was assumed the items used in the creation of the scale were related constructs and correlated both conceptually and empirically. Collinearity diagnostics were examined to ensure that the correlation between factor scores would not be problematic for model estimation.

The teacher autonomy subdomain had six items. These items captured teachers' perceptions of the locus of control over classroom decisions with respect to selecting instructional materials, selecting content and skills to be taught, selecting teaching techniques, evaluating and grading students, disciplining students, and determining the amount of homework to be assigned. It was anticipated that the items would be highly correlated with each other and a single factor solution would be obtained.

The subdomain that captured supports within the work environment had four smaller facets within it: a) support provided by the administration (e.g., principal), b) support provided by colleagues, c) support provided by parents, and d) day-to-day tangible and resource supports within the school. There were six items to reflect support provided by the administration and capture the following concepts: supportive communication, supportive behavior, enforcing school rules on behalf of staff, strong and clear vision and mission for the school, providing praise for good teaching, and supporting teachers of students with special needs. There were three items to reflect support provided by colleagues and capture the following concepts: enforcing school rules consistently across staff, sharing beliefs and values about the school's mission, and cooperation among staff. There were two items that captured support from parents. The first item directly asked about receiving support from parents while the second addressed the lack of parental involvement in school. Finally, there were two items that encapsulated tangible and resource supports within the work environment that addressed availability of materials to do the job of teaching and the problem of routine duties and paperwork interfering with the ability to do the job of teaching. It was hypothesized that, within the larger subdomain of supportive work environment, a four-factor solution would emerge that would correspond to each of the four sources of support from the conceptual model.

The student behavior subdomain included eight items. These items captured the level to which overall student behavior interferes with teaching, tardiness and class cutting, student absenteeism, dropping out, student apathy, and the problem of students coming to school unprepared to learn. It was anticipated that the items would be highly correlated with each other and a single factor solution would be obtained from these eight items.

The standards and accountability subdomain comprises two items. The first captured the level of concern about job security based on student test scores. The second measured the positive influence of content standards on one's satisfaction with teaching. It was anticipated that these two items would be highly correlated with each other and a single factor solution would emerge from the EFA. However, a major limitation to this scale was that the small number of items might not yield reliable scale scores.

Satisfaction with teaching. As shown in Table 5, nine items from the BTLS were considered for the creation of a scale to capture first-year teachers' satisfaction with teaching. Dimensions of satisfaction included satisfaction with teaching salary, satisfaction with teaching at one's specific school, weighing the stress and disappointments of teaching against the value of the job, gauging the satisfaction of teachers at one's school as a group, satisfaction with the way things are run at school, weighing the ability to get a higher paying job over staying in teaching, thinking about transferring to another school, estimating one's enthusiasm for teaching, and feeling fatigued by the job of teaching. The creation of a scale to represent the facet of satisfaction was explored in the same manner as described in previous sections by examining indicators of item discrimination, reliability coefficients, and common factor analysis solutions to yield factor scores that could be used in the analyses for RQ1 and RQ2. It was anticipated that the items would be highly correlated with each other and a single factor solution would be obtained.

Covariates. Both teacher-specific and school-specific covariates were included in the model. Demographic variables for the teachers included gender (dichotomous), race/ethnicity (categorical), and age in their first year of teaching (continuous). A school assignment indicator was entered into the model to reflect the level of the first school placement for the teacher as a middle school, high school, or combined junior and senior high school. Educational and preparatory indicators were incorporated to reflect highest degree earned, duration of practice teaching, completion of coursework in teaching methods, and certification route. With respect to the school, urbanicity, school size, charter school status, and student-teacher ratio were introduced into the model to characterize the school type. Two additional variables were included to capture the makeup of the student body. The first measured the percentage of students in the school who were of a racial/ethnic minority as an indicator of school diversity, and the second measured the percentage of students enrolled in the free/reduced price lunch program at the school as an indicator of poverty.

Table 5. *Summary of Measures.*

	Wave collected	Number of items	Scale/Indicator
Outcomes:			
Teaching status	2, 3, 4, 5	N/A	
Predictors:			
First-year teacher programs and policies			
Induction and mentoring programs	1	2	Indicators
Administrative policies	1	4	Indicators
Perceptions of preparedness to teach	1	6	Scale
Perceptions of school climate			
Teacher autonomy	1	6	Scale
Supports within the work environment			
From administration	1	6	Scale
From colleagues	1	3	Scale
From parents	1	2	Scale
Resource supports	1	2	Scale
Student behavior	1	8	Scale
Standards and accountability	1	2	Scale
Satisfaction with teaching	1	9	Scale
Covariates:			
Teacher specific			
Demographics	1	3	Indicators
School assignment	1	1	Indicators
Education and preparation	1	5	Indicators
School specific			
School type/characteristics	1	4	Indicators
Student body composition	1	2	Indicators

Multicollinearity. Due to the large number of predictors of interest, it was essential to check for multicollinearity of the independent variables. Tolerance and Variance Inflation Factor (VIF) statistics were calculated to check for the presence of multicollinearity. Tolerance had to be greater than 0.20 and VIF had to be less than 5 (Ringle, Wende, & Becker, 2015; Hair et al., 2010) to ensure that any correlations among the predictors were not problematic when modeling the turnover outcome.

Data Analysis and Models

The following analyses and models were used to address each research question.

RQ1. What are the first-year experiences for teachers in the sample and how do they compare between teachers who are retained in their first school placements (i.e. Stayers) and teachers who voluntarily or involuntarily turn over in later years (i.e. Movers and Leavers)?

The first research question was answered using descriptive analysis and effect size comparisons. Descriptive statistics are reported by wave for each variable presented in the conceptual model of teacher turnover (see Figure 1 in Chapter 2). Summary statistics are also reported out by wave and by turnover outcome for teacher-level demographic variables (e.g., gender, race/ethnicity, and age as measured in the first year of teaching) and school-level demographic variables (e.g., urbanicity and total school enrollment). Frequencies, proportions, means, and standard deviations are reported when appropriate and used to support qualitative comparisons among the turnover outcome groups. A qualitative discussion of these descriptives and summary statistics is presented in Chapter 4 to illuminate key differences and similarities between teachers who turn over and teachers who are retained after one, two, three, four, and five years of teaching.

RQ2. What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and involuntary turnover across the early career window of years 1 through 4?

The second research question was addressed using survival analysis, also referred to as event history analysis or hazards modeling (Singer & Willett, 1991). A discrete-time, competing risks hazards models was constructed with blocks of predictors. The relative efficacy of these stepwise nested models in explaining teacher turnover was compared using two techniques: 1) Akaike Information Criterion (AIC), and 2) hit ratios with jackknife estimation as a measure of classification efficacy. Significant predictors were retained at each step of model-building to investigate how first-year teaching experiences combine and interact to explain teacher turnover decisions.

Survival analysis. Survival methods were developed to model time-to-event data in order to investigate the causes or correlates of a particular event occurring at a particular point in time. In survival studies, the event of interest consists of some qualitative change that occurs at a specific point in time and is characterized by a relatively sharp, distinct disjunction between the state that precedes the event and the state that follows (Allison, 2014a). In other words, survival methods are not suited for modeling gradual changes over time, but rather should be used to model abrupt changes in an individual's history. In case of this dissertation research, teacher turnover decisions qualified as an abrupt change in the career history of teachers, and, therefore, survival methods were appropriate to investigate the turnover phenomenon.

The goal of survival analysis is to use independent variables, be they time-invariant or time-varying, to predict two aspects of one outcome – 1) *whether* an individual will experience the event of interest, and, if so, 2) *when* it will occur (Singer & Willett, 1991). To do this, a researcher must collect "event history" data, which, put simply, consists of longitudinal records of when events happen to a sample of individuals or entities as well as possible explanatory or predictor variables (Allison, 2014a). Event history data typically possess two features that complicate and often undermine the use of standard statistical procedures such as linear regression – the presence of censoring and the inclusion of time-varying covariates (Allison, 2014a). While this dissertation study did not include time-varying covariates due to the research focusing on teacher experiences as measured in the first year only, censoring did pose a complication for analyses.

Censoring. There are many types of censoring (e.g., right, random, interval, and left), but generally speaking, censored data arises when the exact "lifetime" for some individuals in the sample is not known (Klein & Moeschberger, 1997). In the context of the BTLS data, a teacher's lifetime was known when the turnover event occurred at some point within the 5-year observation period and the dates of entry into and exit from teaching were both recorded. Therefore, for these uncensored individuals, the length of their teaching "lifetimes" (i.e., duration of teaching) could be calculated. Conversely, a teacher's lifetime could be unknown or "censored" in a variety of ways. Right, random, and interval censoring were all present in the BTLS data. By design, left censoring was not an issue. Left censoring occurs when the turnover event has already transpired for some individuals before the study begins, and these individuals cannot remember when the event happened (Klein & Moeschberger, 1997). This type of censoring was simply not issue in the BTLS data since the first requirement for sample selection was a known date of entry into teaching.

Right censoring occurs when the turnover event does not transpire for some individuals by the end of the 5-year observation period (Klein & Moeschberger, 1997). As a result, all that is known about these individuals is that the turnover event may occur at some point after 5 years of teaching. This is also called *fixed* censoring since the censoring times are fixed by the design of the study (Allison, 2014a). Right censoring was a common occurrence in the BTLS data as a substantial proportion of teachers in the sample maintained "Stayer" status for the duration of the study and never turned over. Random censoring is another a common feature of event history data and was also evident in the BTLS data. This kind of censoring occurs when an individual prematurely attrites from the study (Allison, 2014a). For example, some teachers willingly dropped out from BTLS data collection or were unable to be contacted for the entire 5-year period; a few teachers also died. Whatever their reason for attriting from the study, these individuals became censored at the point at which they left the study, and these censoring times varied across individuals. Survival methods were specifically designed to deal with both right and random censored event history data.

Interval censoring occurs when the exact date and/or time of event occurrence is not known but the event is known as having transpired within a particular interval of time (Klein & Moeschberger, 1997). This type of censoring most commonly occurs in studies, like the BTLS, that engage participants in periodic follow-ups every few weeks, months, or years (Klein & Moeschberger, 1997). While it was more likely for teachers to turn over in the summer between academic years, it was also possible for them to move to another school or leave the profession altogether during the school year. The BTLS does not make the distinction between the two due to the yearly follow-up design. Put simply, the BTLS data is not fine-grained enough to distinguish between a teacher who left in the first week of their second year and a teacher who left after completing their entire second year of teaching. All that is known is that both individuals left at some point after the start of their second year of teaching but before the beginning of their third year of teaching. This is a classic case of interval censoring, and a special method of survival analysis called discrete-time modeling was developed to analyze this kind of data (Allison, 1982). The discrete-time method is appropriate for data that can only occur at regular, discrete points in time or, as is the case with the BTLS, when data can occur at any point in time but are only recorded as having occurred within a particular interval of time (Allison, 1982). Therefore, the discrete-time model provided the appropriate functional form for analyzing the BTLS data due to the interval censoring that resulted from the yearly follow-up design.

Competing risks. There were three discrete, categorical teaching status outcomes to be modeled, which required the use of survival analysis within the framework of multinomial logistic regression. A discrete-time, competing risks hazards regression model could account for these characteristics of the data allowing prediction of the time-varying trichotomous career decision outcome. Competing risks exist when the unit of analysis is at risk of more than one mutually exclusive event and the occurrence of one of these events will prevent any other event from ever happening (Gichangi & Vach, 2005). Therefore, a competing risks model is appropriate when the event of interest has more than two independent plausible outcomes, and in the case of teacher turnover, there were three independent outcomes that could be experienced *with respect to the first school placement*– staying, moving, and leaving.

In competing risks models, the risk of each turnover event is modeled separately (Singer & Willett, 1991), but all cases are included in each analysis with modified definitions of censoring in the person-year data file to account for the competing risks (Singer & Willett, 1991). Then, after modeling the risk profiles for each event separately, a holistic, global profile can be assembled (Singer & Willett, 1991). In this chapter, the discrete-time model for binary event outcomes is presented first for the sake of simplicity and to introduce foundational concepts via discussion of the binary logit model (Guo, 2010). The competing risks addition to the discrete-time method will be discussed later in this chapter detailing procedures for modeling multiple exits by way of the multinomial logit model (Guo, 2010).

Continuous versus discrete time. As mentioned previously, the yearly follow-up design of the BTLS and consequent interval censoring yields discrete-time survival data, and there are two distinct approaches for modeling such data. The simplest approach is to treat time as though it were truly discrete by assuming that turnover events can only occur at distinct time points and estimating model parameters through a discrete-time logistic model (Allison, 1982). This approach originates in the work of Myers, Hankey, and Mantel (1973), Byar and Mantel (1975), Brown (1975), and Mantel and Hankey (1978). The alternative approach is to start with a continuous-time model, usually the

Cox proportional hazards (PH) model, then derive estimators of that model which are appropriate for data grouped into intervals (Allison, 1982). This approach originates from the research of Holford (1976, 1980), Thompson (1977), and Prentice and Gloeckler (1978).

The differences between the discrete and continuous models are slight. In fact, as time intervals become shorter, the discrete-time logistic model actually converges to the continuous-time proportional hazards model (Allison, 1982). However, while both methods lead to very similar estimation procedures, there are conceptual and practical considerations for choosing the more appropriate method with respect to the BTLS data. Although it may be more likely for teachers to turn over around the same time of the year (i.e., during the summer break), the continuous conception of time certainly seems more appropriate since teachers theoretically can turn over at any point during the calendar year. However, the frequency of data collection for the BTLS was not fine-grained enough to make distinctions between teacher turnover events beyond discrete time intervals. When time units are very large (e.g., months, years, or decades) treating discrete time as if it were continuous in analysis becomes problematic for two reasons (Allison, 1982).

The first is the problem of including time-varying covariates in a continuous-time model such as the Cox PH model. While time-dependent explanatory variables can be incorporated into maximum likelihood estimation procedures with Cox models, this strategy often leads to rather cumbersome computational procedures (Allison, 1982). Furthermore, when variables are measured in discrete intervals of time, it may be inappropriate to assume that such variables remain constant for the entirety of continuous time within each discrete interval. Making this assumption would be required for use with a continuous-time model but could introduce bias into the model. Since time-varying covariates were not explored in this dissertation research, this point is moot, however, important to address to understand the complications of choosing an appropriate model.

The second problem, which is very relevant to the BTLS data structure, is the issue of ties. The partial likelihood procedure with the Cox PH model assumes that a large number of events do not occur at the same time, as in, not too many teachers turn over on the same *day* (Adams, 1996). But the BTLS documents time in the much a much larger interval – *years*. When time intervals are large enough that many teachers experience the turnover event in the same time interval (e.g., school year), these time-to-event ties may bias the results of the Cox model (Adams, 1996). In addition, the use of large intervals of time can lead to extremely difficult computational problems. While ties can be handled in theory, the computational requirements for dealing with ties in the Cox model can become so large as to exceed the abilities of currently available software (Allison, 1982). Following from these arguments, the discrete-time approach was deemed to be more appropriate than continuous-time methods for modeling the BTLS data.

Survival and hazard functions. The survival and hazard functions are foundational concepts for the framework of survival analysis. Let X be the time until the teacher turnover event occurs for the BTLS sample such that the distribution of X represents the distribution of teacher lifetimes. In the case of survival analysis, X is assumed to be a nonnegative random variable from a homogeneous population (Klein & Moeschberger, 1997). There are two important functions used to characterize the distribution of X - the survival function and the hazard rate function. The survival function, or survival curve, represents the probability of an individual surviving beyond time x or, more generally, the probability of an individual experiencing the event after time x (Klein & Moeschberger, 1997). Situating this in the context of teacher turnover in which a "survivor" is synonymous with a "Stayer", the population survival function represents the probability that a randomly selected teacher will remain in teaching at their first-year placement school for their 2nd, 3rd, 4th, and 5th years and beyond. Given a representative sample from the target population, the sample survivor function then estimates the population probability that a randomly selected teacher will stay at their first school longer than each time point assessed in follow-up.

All survival curves have the same basic properties - they are monotonic, non-increasing functions equal to 1 when time is zero and equal to 0 as time approaches infinity, but the rate of decline varies according to the risk of experiencing the event at time x (Klein & Moeschberger, 1997). The shape of the survival curve will depend on whether X is a continuous or discrete random variable. As a result, the conceptualization and documentation of time in survival data is an important consideration for the type of survival curve used and subsequently the type of model used. When X is a discrete random variable (e.g., due to grouping event times into intervals), the survival function is a non-increasing step function (Klein & Moeschberger, 1997). Conversely, when X is a continuous random variable (e.g., when exact times of the event are recorded in the data), the survival function is a continuous strictly decreasing function (Klein & Moeschberger, 1997). Since the BTLS data reports the yearly interval when a teacher experienced turnover rather than the exact date of their turnover, the survival curve that is most appropriate to this data is the step function, which conceives of X as a discrete random variable.

The hazard function, also called the risk function, for a discrete random variable X represents the conditional probability that an individual will experience the event at a particular point in time given that person has not yet experienced the event (Singer & Willett, 1991). In the context of the BTLS, the hazard function represents the conditional probability that a beginning teacher will turn over from their first school placement (i.e., leave or move) in a particular time interval (i.e., school year) given that person has not yet left teaching or moved to another school by the beginning of that academic year. Thus, the magnitude of the hazard rate indicates the risk of a teacher leaving in a particular school year interval such that higher hazard rates correspond to greater risk (Singer & Willett, 1991). Mathematically, the hazard rate is equal to the number of teachers who actually turn over in a given time interval divided by the number of teachers still at risk of leaving or moving (Adams, 1996). The denominator of this calculation is important; each interval's hazard function is calculated using data from only those individuals still eligible to experience turnover in that school year, as in, they have not yet left the profession or moved to another school (Adams, 1996).

The hazard function is a useful means to model how the chance of experiencing the turnover event changes with time (Klein & Moeschberger, 1997). Compared to the survival curve, the hazard function is usually more informative about the underlying mechanism of failure (Klein & Moeschberger, 1997). It also has fewer restrictions than survival curves - hazard functions need only be nonnegative (Klein & Moeschberger, 1997). For these reasons, analysis of the hazard function is the more dominant method for summarizing survival data (Klein & Moeschberger, 1997), and the most popular models readily employed in the literature seek to model the hazard profiles of individuals over time rather than modeling survival curves. The hazard function can take on many different shapes based on qualitative understandings of the mechanism of failure (Klein & Moeschberger, 1997). For example, with respect to beginning teacher turnover, a decreasing hazard function is defensible in which there is a very early likelihood of turnover after the first or second year of teaching that diminishes with the passage of time. A hump-shaped hazard function is also plausible in which there would be an initial increase in the hazard rate of turnover after the first year of teaching that peaks in the second or third year and then declines in the fourth or fifth year and beyond.

In the context of the BTLS data for which "Stayers" are synonymous with "survivors", the survival function represents the probability of a teacher surviving in the profession and in their first school placement beyond a specified interval in time (i.e., school year). The turnover lifetime, *X,* follows a simple discrete uniform distribution in the BTLS data. From these conditions then, *X* is best described by the probability mass function, $p(x_j) = \Pr(X = x_j)$, where *j* denotes the discrete time interval and x_j denotes the survival event occurrence in time interval *j.* The survival function, $S(x)$, is given by

$$S(x) = \Pr(X > x) = \sum_{x_j > x} p(x_j)$$

(Klein & Moeschberger, 1997, p.26).

In the context of the BTLS data for which "risk" is synonymous with "turnover", the hazard function represents the conditional probability that the turnover event will occur in a particular time interval (i.e., school year) to a particular teacher, given that the teacher is still at risk at the beginning of that interval, meaning they have not yet experienced the turnover event. The hazard function, $h(x_j)$, is given by

$$h(x_j) = \Pr(X = x_j | X \geq x_j) = \frac{p(x_j)}{S(x_{j-1})}$$

(Klein & Moeschberger, 1997, p.30), where $S(x_o) = 1$. The survival and hazard functions are related such that knowing one allows for the unique derivation of the other. Thus, when X is a discrete random variable, the survival function is related to the hazard function by

$$S(x) = \prod_{x_j \leq X} [1 - h(x_j)]$$

(Klein & Moeschberger, 1997, p.31).

The logit-hazard model. As mentioned previously, the dominant method for modeling survival data appoints the hazard function as the outcome. This adds an additional layer of complexity to survival methods compared to methods like linear regression since the outcome of the typical survival model is a function rather than simply a conditional mean (Singer & Willett, 1991). By modeling the hazard function, hazard profiles can be developed for individuals possessing certain characteristics at a specific point in time, and these profiles can be compared to determine differences in risk. However, the hazard function and the hazard profiles derived from it are bounded probabilities that can only take on values between 0 and 1. Regressing such bounded outcomes is problematic in computation and interpretation (Allison, 2014a). As with logistic regression, a logit transformation is applied to the hazard function yielding the logit-hazard, expressed as $logit(h(x_j))$ or

$$log\left[\frac{h(x_j)}{1-h(x_j)}\right]$$

Modeling the logit-hazard as the regression outcome is preferable because it is unbounded (Singer & Willett, 1991). Thus, survival methods seek to develop a functional representation of the relationship between an individual's logit-hazard profile and a weighted linear combination of predictors (Singer & Willett, 1991). The general form of the logit-hazard model is given by

$$logit(h(t)) = \beta_0(t) + \sum_1^n \beta_n x_n + \sum_1^m \beta_m x_m(t)$$

where *t* represents time, $\beta_0(t)$ is the baseline logit-hazard (synonymous with the intercept), x_n is a time-invariant independent variable, $x_m(t)$ is time-varying covariate, and any number of *n* and *m* predictors may be included in the model. The models for this dissertation research did not include time-varying covariates since all predictors were observed and measured in the first year of teaching only, so the general form of the logit-hazard model applicable in the context of the present research questions is given by

$$logit(h(t)) = \beta_0(t) + \sum_1^n \beta_n x_n$$

where *t* represents time, $\beta_0(t)$ is the baseline logit-hazard (synonymous with the intercept), and x_n is a time-invariant independent variable measured in the first year of teaching.

The baseline logit-hazard. For the sake of simplicity, consider the following logit-hazard model with one time-invariant predictor, x_1, given by

$$logit(h(t)) = \beta_0(t) + \beta_1 x_1$$

The intercept in this model, $\beta_0(t)$, is the baseline logit-hazard. Note that it is written as a function of time *t*, rather than simply β_0, because baseline logit-hazards are conditioned on time and therefore may change depending on the time interval (Singer & Willett, 1991). In terms of interpretation, the baseline logit-hazard profile is the value of the logit-hazard outcome when the predictors in the model equal zero (Singer & Willett, 1991). Consider the graphic representation of the logit-hazard profile with time on the x-axis and estimated logit-hazard on the y-axis. When the predictors take on non-zero values, the conditional logit-hazard profiles become displaced with respect to the baseline logit-hazard profile, and β_n reflects the magnitude of the vertical displacement between logit-hazard profiles for every one-unit change in x_n (Singer & Willett, 1991). If the conditional logit-hazard profile moves up in relation to the baseline, this indicates an increase in the risk of the turnover event. Likewise, if the conditional logit-hazard profile moves down relative to the baseline, this illustrates a decrease in the in the risk. These inferences in the assessment of risk associated with specific predictors are, however, contingent upon the similarity of the shapes of the baseline and conditional logit-hazard profiles. These curves should be roughly parallel and proportional such that the baseline and conditional profiles are "simply magnifications or diminutions of each other" (Singer & Willett, 1991, p.279). This is referred to as the proportional hazards (PH) assumption. The PH assumption is built into the discrete-time hazards model proposed for this dissertation research as the logit link function maintains a constant vertical separation between population hazard functions at different predictor values (Willett & Singer, 2004).

The discrete-time hazards model. The discrete-time hazards model is a variant of the general logit-hazard model presented previously that facilitates the estimation of the baseline hazard function while using standard statistical software packages (Singer & Willett, 1991). In discrete-time models, the baseline-logit hazard, $\beta_0(t)$, is a step function of time and can be expressed as a weighted linear combination of time interval indicators, D_n. For example, in the BTLS data with four recorded time intervals at which a teacher can experience turnover (i.e., waves 2, 3, 4, and 5), the baseline logit-hazard is given by

$$\beta_0(t) = \delta_2 D_2 + \delta_3 D_3 + \delta_4 D_4 + \delta_5 D_5$$

where the delta parameters are weights that the measure deviations of the baseline logit-hazard from an initial value of 0 (Singer & Willett, 1991). Thus, the discrete-time logit-hazards model for the BTLS data with four discrete-time intervals is given by

$$logit(h(t)) = [\delta_2 D_2 + \delta_3 D_3 + \delta_4 D_4 + \delta_5 D_5] + \sum_{1}^{n} \beta_n x_n$$

where *t* represents time, x_n is a time-invariant independent variable, and any number of *n* predictors may be included in the model.

Person-year data format. In order to fit a discrete-time logit-hazards model to the BTLS, the data structure was transformed to a person-time data set (Singer & Willett, 1991). Instead of the standard person data set where each study subject contributes one row to the data file, the BTLS needed to be converted from wide format to long format so that each study subject could contribute multiple lines (up to 4) in the data file based on when they experienced the turnover event or were censored (Guo, 2010). For example, consider the person data for four hypothetical BTLS teachers presented in Table 6. This is the actual format in which NCES provides the BTLS data to licensed users. For the sake of simplicity, this example will first treat the turnover outcome as binary such that Leavers and Movers are grouped into a single category of teachers experiencing any kind of turnover event. For now, we will ignore the possibility of multiple exits that distinguish between Movers and Leavers as well as the possibility of returning to teaching. Multiple exits (i.e., competing risks) will be discussed in the next section.

Table 6. *Person Data for Four Hypothetical BTLS Teachers by Wave.*

ID	Wave 1 Status	Wave 2 Status	Wave 3 Status	Wave 4 Status	Wave 5 Status
1	1	-	-	-	-
2	1	1	0	0	0
3	1	1	1	1	1
4	1	1	1	0	0

Note. "1" = Teaching in first school placement; "0" = No longer teaching in first school placement; "-" = Missing/Unknown

Person 1 responded to the 2007-2008 SASS indicating they were a first-year teacher at the time but were then lost to all follow-ups, hence the missing data. As a result, this individual is considered to be a randomly censored case since the turnover event is never observed within the study window. While the turnover event certainly could have coincided with this individual's disappearance from the study, we cannot assume this is the case. Person 2 taught for two years and then turned over from their first school placement prior to the beginning of their third year by moving to another school to teach in a different placement. Since the turnover event is observed for Person 2, they are not censored. Person 3 taught for the entire duration of BTLS data collection. As a result, this individual is considered to be a right censored case. Person 4 taught for three years and then turned over from their first school placement prior to the beginning of their fourth year by leaving the teaching profession altogether. Since the turnover event is observed for Person 4, they are not censored. Note that Person 2 is technically a "Mover" and Person 4 is technically a "Leaver", but for the sake of simplicity in introducing the model, these two teachers are lumped together into a single outcome of "teachers who turn over from the first school placement" to present the outcome as binary in nature.

Table 7 presents the person-time data conversion for the same cases illustrated in Table 6. Person 1 was only observed in Wave 1. Therefore, this individual is represented by a single row in the data having been observed teaching in their first school placement for a single school year, but then exhibiting random censoring as the turnover event was never observed. Person 2 was observed across the first three waves but moved to another school after two years. Therefore, this individual is represented by three rows in the data – two rows for the two years of teaching and one row for the turnover year. This case was not censored and turnover was observed for this individual at Wave 3. Person 3 was observed across all five waves and never turned over. Therefore, we assign this individual the maximum length of teaching (5 years) but indicate this is a right censored observation since the turnover event was never experienced. Coding the observations for Person 3 in this manner is essential because it is entirely possible that this teacher continued to teach for more than the 5 years observed. Person 4 was observed across the first four waves but left teaching after three years. Therefore, this individual is represented by four rows in the data – three rows for the three years of teaching and one row for the turnover year. This case was not censored and turnover was observed for this individual at Wave 4.

Table 7. *Person-Time Data for Four Hypothetical BTLS Teachers.*

ID	Wave	Length of Teaching	Censored	Turnover Indicator
1	1	1	1	0
2	1	2	0	0
2	2	2	0	0
2	3	2	0	1
3	1	5+	1	0
3	2	5+	1	0
3	3	5+	1	0
3	4	5+	1	0
3	5	5+	1	0
4	1	3	0	0
4	2	3	0	0
4	3	3	0	0
4	4	3	0	1

Note. Length of teaching measured in school years; Censored = 1 if the observation is censored at any point in the record, else 0; Turnover indicator = 1 for the year when the teacher experiences the turnover event (i.e. move or leave) from the first school placement, else 0.

Table 8 represents the person-time data conversion for the same cases illustrated in Tables 6 and 7. This table mimics the form of the analytic data file that will be used in statistical modeling as it includes the time indicators necessary to estimate the baseline logit-hazard (i.e., $D_2, D_3, D_4,$ and D_5) of the turnover outcome coded as a binary variable such that Movers and Leavers are grouped as a single category of teachers experiencing either kind of turnover event from the first school placement.

Table 8. *Coding of Time Indicators for Discrete-Time Logit-Hazard Model for Any Turnover.*

ID	t	D_1	D_2	D_3	D_4	D_5	Turnover (Move or Leave)
1	1	1	0	0	0	0	0
2	1	1	0	0	0	0	0
2	2	0	1	0	0	0	0
2	3	0	0	1	0	0	1
3	1	1	0	0	0	0	0
3	2	0	1	0	0	0	0
3	3	0	0	1	0	0	0
3	4	0	0	0	1	0	0
3	5	0	0	0	0	1	0
4	1	1	0	0	0	0	0
4	2	0	1	0	0	0	0
4	3	0	0	1	0	0	0
4	4	0	0	0	1	0	1

Note. For the "Turnover" outcome 1= Any Turnover and 0=Stayer

Modeling competing risks. Prior to this section, the hazard model and coding of the outcome has been presented under the assumption that teachers experience one of two event states (i.e., turnover occurs or turnover does not occur). When only two outcome states are observed, binary logistic regression is used to model the data. However, it is possible for several mutually exclusive (i.e., independent) and exhaustive states to be modeled via multinomial logistic regression (i.e., stay, move, and leave), and this is known as competing risks survival analysis (Singer & Willett, 1991). In competing risks models, the risk of each event is modeled separately such that the predictors of risk can differ depending on which of the several competing events actually occurs (Singer & Willett, 1991). But rather than modeling separate events on distinct subsamples by outcome experienced, all cases are included in each analysis using modified definitions of censoring to account for competing exits (Singer & Willett, 1991). It is important to note here that the three competing outcome states in this dissertation research (i.e., stay in, move from, or leave the first school placement) meet the assumption of independence due to the way in which turnover has been defined with respect to the first school placement. A teacher cannot experience two of three states simultaneously, and therefore, the outcome comprises three independent competing risks for each individual. These states are also mutually exhaustive in that there are no other turnover or retention trajectories a teacher can experience with respect to the first school placement.

Modeling competing risks requires developing two different outcome variables to be modeled in subsequent analyses. Each outcome is coded using a unique definition of censoring dependent on the turnover outcome being modeled – one outcome for Movers compared to Stayers and one outcome for Leavers compared to Stayers. Table 9 illustrates the coding of the outcome and censoring definitions for the model specific to Movers; likewise, Table 10 illustrates the modeling specific to Leavers. Recall that Person 2 is a “Mover” and Person 4 is a “Leaver”. In Table 9, the turnover-move outcome is flagged for Person 2 by coding the outcome as a 1 in Wave 3 (bolded, italicized, and underlined), but Person 4 appears to be censored in Wave 4 even though we know the turnover-leave outcome occurred for this individual at that time (bolded, italicized, and underlined). This illustrates the modified definition of censoring with respect to the turnover-move outcome that is necessary for modeling competing risks. Similarly, in Table 10, the turnover-leave outcome is flagged for Person 4 by coding the outcome as a 1 in Wave 4 (bolded, italicized, and underlined), but Person 3 appears to be censored in Wave 3 even though we know the turnover-move outcome occurred for this individual at that time (bolded, italicized, and underlined).

Table 9. *Coding of Time Indicators for Discrete-Time Logit-Hazard Model for Movers.*

ID	t	D_1	D_2	D_3	D_4	D_5	Turnover (Move)
1	1	1	0	0	0	0	0
2	1	1	0	0	0	0	0
2	2	0	1	0	0	0	0
2	3	0	0	1	0	0	***1***
3	1	1	0	0	0	0	0
3	2	0	1	0	0	0	0
3	3	0	0	1	0	0	0
3	4	0	0	0	1	0	0
3	5	0	0	0	0	1	0
4	1	1	0	0	0	0	0
4	2	0	1	0	0	0	0
4	3	0	0	1	0	0	0
4	4	0	0	0	1	0	***0***

Note. For the "Turnover" outcome 1= Mover and 0=Not Mover

Table 10. *Coding of Time Indicators for Discrete-Time Logit-Hazard Model for Leavers.*

ID	t	D_1	D_2	D_3	D_4	D_5	Turnover (Leave)
1	1	1	0	0	0	0	0
2	1	1	0	0	0	0	0
2	2	0	1	0	0	0	0
2	3	0	0	1	0	0	***0***
3	1	1	0	0	0	0	0
3	2	0	1	0	0	0	0
3	3	0	0	1	0	0	0
3	4	0	0	0	1	0	0
3	5	0	0	0	0	1	0
4	1	1	0	0	0	0	0
4	2	0	1	0	0	0	0
4	3	0	0	1	0	0	0
4	4	0	0	0	1	0	***1***

Note. For the "Turnover" outcome 1= Leaver and 0=Not Leaver

By redefining censoring between analyses, two hazard models can be estimated such that each event type yields its own type-specific hazard function (Allison, 2014a). This required modeling each competing risk of turnover separately, treating all other observed turnover events as censored. First, I modeled the hazard of moving, treating leaving as censored (Equation 1); then, I modeled the hazard of leaving, treating moving as censored (Equation 2):

$$log\left[\frac{h(MOVE_j)}{1-h(MOVE_j)}\right] = [\delta_2 D_2 + \delta_3 D_3 + \delta_4 D_4 + \delta_5 D_5] + \sum_1^n \beta_n x_n \qquad (1)$$

$$log\left[\frac{h(LEAVE_j)}{1-h(LEAVE_j)}\right] = [\delta_2 D_2 + \delta_3 D_3 + \delta_4 D_4 + \delta_5 D_5] + \sum_1^n \beta_n x_n \qquad (2)$$

To obtain the overall hazard function that reflects the hazard for the occurrence of either turnover event, the sum of the type-specific hazard functions was obtained (Allison, 2014; Jenkins, 1995). Thus, after identifying predictors of hazard for each event separately, the component-risk profiles were recombined via simply summing (adding) the hazards to create the overall risk profile for all the events taken together (Singer & Willett, 1991). In this way, a global profile was assembled, and the final turnover model was obtained (Singer & Willett, 1991). Estimation of such a global profile comes standard with survival analysis software (Singer & Willett, 1991).

Model-building. The final hazards model of teacher turnover was built sequentially in blocks to reflect the conceptual model of first-year teacher experiences as they relate to turnover from the first school placement. Table 11 illustrates the model-building plan. At each phase of the model-building process, significance of predictors and model fit were assessed. Methods for assessing fit are discussed in greater detail in the sections that follow.

Recall, the second research question for this dissertation research: *What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and* *involuntary turnover across the early career window of years 1 through 4?* The conceptual model introduced in Chapter 2 displayed the hypothesized relationships between the four facets of teachers' first-year experience and the turnover outcome. Each of these facets corresponds to a block of predictors in the model-building plan (see Table 11):

- **Block 2: First-year teacher programs and policies.** Tangible first-year supports and programs provided by the school administration, including participation in an official school-based induction program, a reduced teaching schedule, common planning time with colleagues, seminars for beginning teachers, and extra classroom assistance (e.g., co-teacher or classroom aide).
- **Block 3: Perceptions of preparedness to teach.** Perceptions of their preparedness to teach, including perceived abilities to handle classroom management, use a variety of instructional methods, employ technology in the classroom, assess students, develop curriculum materials, and comprehend one's subject matter well enough to teach it.
- **Block 4: Perceptions of school climate.** Perceptions of the school climate, including the level teacher autonomy, the amount of emotional, informational, and social support received from one's mentor/master teacher, school administrators, colleagues, and parents; the impacts of student behavior; and the influence of standards and accountability systems.
- **Block 5: Satisfaction with teaching.** Satisfaction with teaching generally as a career as well as satisfaction with the more localized experience of teaching in one's specific school setting.

Table 11. *Model-Building Plan with Sequential Inclusion of Blocks of Predictors and Interactions.*

	Models							
Blocks	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1a: Teacher covariates	✓	✓	✓	✓	✓	✓	✓	✓
1b: School covariates	✓	✓	✓	✓	✓	✓	✓	✓
2: 1st year teacher programs & policies		✓	✓	✓	✓	✓(Int)	✓(Int)	✓(Int)
3: Perceptions of preparedness to teach			✓	✓	✓	✓	✓(Int)	✓(Int)
4: Perceptions of school climate				✓	✓	✓	✓	✓(Int)
5: Satisfaction with teaching					✓	✓(Int)	✓(Int)	✓(Int)

Note. A "✓" denotes the inclusion of a specific block in the model. "(Int)" indicates the inclusion of interaction terms between predictors retained from previous stages of model-building.

In the first stage of model-building (Model 1), teacher and school covariates (9 and 6 indicators, respectively) were entered into the model to partial out variability in the turnover outcome that can be attributed to teacher and school demographics and characteristics that fall beyond the control of policy. All covariates were included in every model regardless of the significance of predictors in Model 1. Beginning with Model 2, when stepping between consecutive models, any predictors that were significant in the previous model (for $\alpha = .05$) remained in the model regardless of changes to their p-values moving forward into subsequent models. In the second stage of model-building (Models 2 through 5), blocks of scale scores and indicators that capture first-year teacher experiences were included that represent the four facets of teacher turnover from the conceptual model. The order in which these blocks are entered in the model is intentional and theory-based with respect to the timeline of a teacher's first year in the profession and when these facets are likely to emerge along that timeline.

The initial block of first-year teacher experiences included in the model captures first-year teacher programs and policies (Block 2) via a set of 6 indicators. These were added to the model first because these systems are in place in the school before the first-year teacher even arrives. The next block added encapsulates perceptions of preparedness to teach during the first year (Block 3). While these variables are measured at the end of the first year and perceptions of preparedness could change over the course of the first year, teachers' responses to the preparedness items may draw upon perceived efficacy of their teacher preparation program which would be completed prior to beginning the school year. Thus, Blocks 2 and 3 incorporate teacher first-year experiences that may be impacted by other experiences and systems put in place before the first year of teaching actually begins. This was the rationale for including these blocks first.

Next, a block of predictors reflecting perceptions of school climate and workplace conditions (measured in the middle to end of the first year of teaching) was included in the model (Block 4). This block encompasses perceptions of teacher autonomy, supports within the work environment, student behaviors, and the impact of standards and accountability, all of which may change over the course of the school year, but likely are not perceptions that form prior to beginning the first year of teaching. Finally, the very last block of predictors that was included in the model captured satisfaction with teaching (Block 5). This block was included last because it was expected that satisfaction moderates the relationships of the other three facets of the first-year teaching experience with the turnover outcome.

Turnover behavior is a multi-stage process linking attributes of the teacher and the school setting, attitudes towards the job of teaching (including satisfaction), intent to quit, and actual turnover decisions (Price, 2004). Some studies have used job satisfaction as an intervening variable between independent variables (e.g., workplace conditions and administrative support) and teacher turnover outcomes (Clugston, 2000; Lambert, Hogan, & Barton, 2001). However, this dissertation research did not intend to make causal claims about the mediating effects of job satisfaction in the prediction of turnover from teachers' first-year experiences. Rather, this study hypothesizes that there is an interaction that occurs between teaching experiences and satisfaction throughout the first year on the job that relates to teachers' decisions to stay, move, or leave. Put another way, individuals' first-year teaching experiences may influence their levels of job satisfaction which, in turn, may impact the ways in which they perceive their first-year teaching experiences which, again, may sway their feelings of satisfaction with their career; this cyclical, two-way interaction between one's experiences and satisfaction continues throughout the first year. Therefore, it is defensible that the block of job satisfaction predictors was added last to the model so that interactions between job satisfaction and any significant predictors from the previous blocks could be explored in the most parsimonious way moving forward into Models 6, 7, and 8.

Models 6 through 8 included the addition of interaction terms to examine the possibility of a moderating effect of job satisfaction on the relationships between other first-year teacher experiences and the decision to stay, move, or leave. Significant interaction terms were retained moving forward through these stages of model-building. Model 6 examined the interaction of retained predictors from Block 2 (first-year teacher programs and policies) and job satisfaction. Model 7 explored the interaction of any retained predictors from Block 3 (perceptions of preparedness to teach) and job satisfaction. Finally, Model 8 considered the interaction of any retained predictors from Block 4 (perceptions of school climate) and job satisfaction. The final model of teacher turnover was obtained after examining the results from Model 8.

Model fit characteristics. In addition to examining the significance of the predictors to build the best model of beginning teacher turnover, fit characteristics were assessed for all eight models. The relative efficacy of these models in explaining teacher turnover was compared using model fit characteristics, including the Akaike Information Criterion (AIC) and deviance statistics.

The Akaike Information Criterion is a fit index that is useful when comparing nested models to assess the stepwise contribution of variables. In general, models with more parameters tend to fit data better than models with fewer parameters (de Ayala, 2009). To avoid model overparametrization, the AIC is assessed as it accounts for the number of parameters used to achieve a certain level of model-data fit with a statistical penalty (de Ayala, 2009). The AIC is based on the concept of the loss function, where the criterion seeks to estimate the amount of information lost from the theorized model to the final model constructed.

The AIC is calculated as $AIC = -2 \ln L + 2Nparm$, essentially the -2 log likelihood plus 2 times the number of parameters being estimated (Akaike, 1974), and provides an estimate of the information lost when the specified model is used to explain the turnover phenomenon. Therefore, smaller values of the AIC are preferable as it indicates the model is closer to the “true” state of events. However, one drawback of the AIC is that it does not take into account the degrees of freedom of the model and therefore tends to favor more complex models (de Ayala, 2009).

Deviance, or the -2 log-likelihood ($-2LL$) statistic, is another measure of misfit that was used to assess model fit as blocks of predictors are added to the model in a stepwise manner. Like the AIC, smaller values of the deviance statistic are more desirable indicating better model fit. However, unlike the AIC, deviance does not take into account the number of parameter estimates.

Classification efficacy. After examining fit characteristics, each model was then judged on classification efficacy by calculating hit ratios using the "leave-one-out procedure". The "leave-one-out" procedure, also called jackknifing, is a resampling technique that is useful for variance and bias estimation (Hair et al., 2010). The jackknife estimator of a parameter is found by systematically leaving out each observation from a dataset, calculating the parameter estimate, and then finding the mean of these estimates (Tukey, 1958; Efron & Stein, 1981). So, given a sample of size *N*, the jackknife estimate is found by aggregating the $N - 1$ estimates in the sample. Predicted outcomes are compared to observed outcomes to obtain an overall percentage of correct predictions (what Hair et al., 2010 refer to as a "hit ratio") that is used to determine the level of classification accuracy achieved by the model. This percentage should be at least 25% greater than that achieved by chance (Hair et al., 2010). Therefore, given a trichotomous turnover outcome with a 33% chance of randomly predicting the correct turnover group for a teacher, the desired minimum threshold for correct classification by each model in this dissertation research was 58%.

Calculating effect sizes. Making sense of the coefficients from each model required relying on effect sizes to determine which first-year teacher experiences held practical importance in the prediction of teacher turnover. This section outlines the process of using coefficient estimates to calculate hazard ratios, predicted turnover probabilities, and effect sizes following standards and procedures set forth by What Works Clearinghouse (WWC, 2014; Lee-St. John, Walsh, Raczek, Vuilleumier, Foley, Heberle, Sibley, & Dearing, 2018). As an illustrative example, consider the simple survival model that includes the dichotomous mentoring variable as a predictor of staying versus leaving and staying versus moving. This model yielded 15 total estimates – two intercepts (one for the moving model and one for leaving model), two coefficients for the main effect of mentoring (one for the moving model and one for the leaving model), six coefficients for the main effect of discrete time (three for the moving model and three for the leaving model) where Year 2 was the reference group and Years 3, 4, and 5 were the comparison groups, and six coefficients for the interaction of the mentoring variable with discrete time (three for the moving model and three for the leaving model) necessary for meeting the proportional hazards assumption.

First, coefficients were summed for each combination of the outcomes (move or leave), the time points (Year 2, 3, 4, or 5), and the experience of mentoring in the first year (yes or no) yielding 16 values for these summed coefficients. Those values were then exponentiated to obtain the hazard ratio associated with moving or leaving in a specific year given the mentoring experienced or not experienced by a teacher. To obtain the predicted probability of either turnover outcome in a specific year given the presence or lack of mentoring, each hazard ratio was divided by the quantity $(1 + hazard\ ratio)$. The resulting value represents the predicted probability associated with a given combination of turnover outcome, time point, and mentoring experience. To obtain the log odds of moving or leaving in a particular year associated with receiving mentoring, I divided the predicted probability associated with having mentoring by the predicted probability associated with not having mentoring and took the log of the resulting value. From there, a transformation from the log odds to a "Cohen's *d*"-like effect size was achieved by multiplying the log odds by the square root of 3 divided by π (Borenstein, Hedges, Higgins, & Rothstein, 2009).

Conclusion

The methodology described in this chapter outlined the data sources, sample, instruments for data collection, measures used to represent the constructs in the conceptual framework, and the procedures for analyses. The methodology was selected as an appropriate means for answering important questions about the first-year experience correlates for teachers' decisions to stay, leave, or move within the first five years of their teaching career.

CHAPTER 4: RESULTS

This chapter presents the results of the analyses detailed in Chapter 3. It begins with a description of the teachers in the sample with respect to their sociodemographics and background characteristics (e.g., gender, race/ethnicity, age, level of students taught by the teacher, highest degree earned, amount of practice/student teaching completed, number of teaching methods courses completed, and certification route). In addition, the sociodemographics and characteristics of the schools in which they teach are discussed (e.g., urbanicity, charter school status, student enrollment, student-teacher ratio, percentage of students who identify as a racial/ethnic minority, and percentage of students receiving free/reduced lunch). Then, the chapter presents coding schemes and univariate statistics for the various early career turnover trajectories of teachers in the weighted sample. Next, BTLS item descriptives, scale development decisions, and factor score generation are discussed for the scales proposed in Chapter 3.

Then, each research question is addressed in detail. The first research question asks, "What are the first-year experiences for teachers in the sample and how do they compare between teachers who are retained in their first school placements (i.e. Stayers) and teachers who voluntarily or involuntarily turn over in later years (i.e. Movers and Leavers)?" These patterns are described using univariate statistics, including means, standard deviations, and standardized effect size differences to compare the turnover trajectory groups on their first-year teaching experiences. Analyses for research question 1 were conducted in SPSS. The second research question asks, "What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and involuntary turnover across the early career window of years 1 through 4?" This question is addressed using a series of discrete-time, competing risks hazard models estimated in R.

Sample Description

Teacher-specific and school-specific sociodemographics and characteristics were measured in Wave 1 of BTLS data collection. As a result, the Wave 1 final sampling weight was employed when estimating frequencies and descriptives to describe the sample with respect to these covariates. The unweighted sample contained approximately 1,150 teachers; the weighted sample consisted of 67,997 teachers. The sample description provided in this section cites frequencies and descriptives with the Wave 1 final sampling weights applied.

Teacher Characteristics

This section summarizes the frequencies and descriptives for teachers in the sample regarding the following characteristics: gender, race/ethnicity, age, level of students taught by the teacher, highest degree earned, amount of practice/student teaching completed, number of teaching methods courses completed, and certification route.

With respect to gender, roughly two-thirds of the sample identified as female (65.7%) and one-third identified as male (34.3%), as illustrated in Table 12 below.

Table 12. *Distribution of Gender in Wave 1 Weighted Sample.*

	Frequency	Percent
Male	23,296	34.3
Female	44,701	65.7
Total	67,997	100

The BTLS offered several response options for race and ethnicity, however, the vast majority of teachers in the sample identified as White (82.1%), Latino/a (7.9%), or Black (7.6%), as shown in Table 13 below.

Table 13. *Distribution of Race/Ethnicity in Wave 1 Weighted Sample.*

	Frequency	Percent
White	55,827	82.1
Black	5,170	7.6
Latino	5,395	7.9
Other or mixed race	1,605	2.4
Total	67,997	100

The remaining 2.4% of teachers identified as another race or mixed race. Rather than maintain separate categories for each of these additional observed races and ethnicities, these teachers were collapsed into a fourth category for the race/ethnicity variable called "Other/mixed race."

On average, teachers in the sample were roughly 29 years of age at the time of data collection in Wave 1, as depicted below in Table 14.

Table 14. *Descriptives for Age in Wave 1 Weighted Sample.*

	Mean	Std. Dev.	Min.	25th %tile	Median	75th %tile	Max.
Teacher's age	29.48	8.692	20*	23	26	32	70*

Note. Values marked with a "*" have been rounded to the nearest ten to comply with NCES guidelines for publications employing restricted-use data.

Furthermore, the distribution of ages among these teachers is skewed to the right such that the majority of teachers in the sample were in their 20s and early 30s. The 25th percentile for age fell at 23, the median at 26, and the third quartile at 32 years of age. The youngest teacher was approximately 20 and the oldest was approximately 70. The wide range of ages seems to indicate that some individuals may have had another career earlier in life prior to becoming a teacher.

The population of interest for this dissertation research included all beginning secondary teachers. As shown in Table 15, more than half of the teachers in the sample indicated they taught high school students only (53.9%). 38.2% of teachers worked with middle school students only, and the remaining 8.0% taught a combination of middle and high school students.

Table 15. *Distribution of Level of Students Taught by Teacher in Wave 1 Weighted Sample.*

	Frequency	Percent
Middle	25,953	38.2
High	36,620	53.9
Combined	5,425	8.0
Total	67,997	100

With respect to level of education, summarized in Table 16, nearly three-quarters of the sample had received a Bachelor's degree (76.0%) and an additional 20.5% earned a Master's degree, both of which are standard levels of educational attainment for teachers in the U.S.

Table 16. *Distribution of Highest Degree Earned in Wave 1 Weighted Sample.*

	Frequency	Percent
Associate's degree or no college degree	1,257	1.8
Bachelor's degree	51,690	76.0
Master's degree	13,964	20.5
Education Specialist or Certificate of Advanced Graduate Studies	318	0.5
Doctorate or Professional Degree	769	1.1
Total	67,997	100

More notably, 1.8% of teachers indicated they had received an Associate's degree or no college degree, which is interesting given that completion of a Bachelor's degree was a minimum requirement to become a licensed educator in the U.S. at the time the BTLS was administered. It is possible this small group of teachers were granted a provisional license for their first year of teaching such that continued employment beyond the first year was contingent upon completion of a Bachelor's degree prior to the second year of teaching. The remaining teachers (1.6%) had completed advanced coursework beyond a Master's degree resulting in a Certificate of Advanced Graduate Studies, Education Specialist Certification, or a Doctorate or Professional degree.

Teachers were asked to indicate the amount of practice teaching they had completed prior to entering the classroom. As presented in Table 17, nearly half (49.1%) completed extensive student teaching (12 or more weeks) prior to their first year on the job, which is a required component of many teacher preparation programs in the U.S.

Table 17. *Distribution of Amount of Practice/Student Teaching in Wave 1 Weighted Sample.*

	Frequency	Percent
No practice teaching	17,912	26.3
4 weeks or less	1,989	2.9
5-7 weeks	2,729	4.0
8-11 weeks	6,589	9.7
12 weeks or more	33,388	49.1
Missing	5,391	7.9
Total	67,997	100

At the other end of the spectrum, approximately a quarter had no practice teaching whatsoever (26.3%). The remaining teachers fell somewhere in between with 2.9% finishing a month or less, 4.0% gaining 5 to 7 weeks of experience, and 9.7% completing 8 to 11 weeks of practice teaching. 7.9% of teachers did not respond to this question, and their amount of practice teaching could not be deduced from other sources of information. As such, these teachers are missing on this covariate.

In addition to practice teaching, it is common for pre-service teachers to complete coursework in teaching methods prior to entering the classroom. As shown in Table 18, 16.9% of teachers had not taken any courses that covered teaching methods.

Table 18. *Distribution of Teaching Methods Course Completion in Wave 1 Weighted Sample.*

	Frequency	Percent
Yes, I took courses in teaching methods.	56,397	82.9
1 or 2 courses	*8,932*	*13.1*
3 or 4 courses	*15,838*	*23.3*
5 to 9 courses	*20,958*	*30.8*
10 or more courses	*10,188*	*15.0*
Missing	*564*	*0.8*
No, I didn't take any courses.	11,517	16.9
Missing	83	0.1
Total	67,997	100

Of the 82.9% of teachers who had taken coursework on teaching methods, 13.1% took 1 or 2 classes, 23.3% had 3 or 4, 30.8% completed 5 to 9 courses, and 15.0% finished 10 or more.

To complete the picture of pre-service preparation for each teacher in the sample, certification route is also considered to be an important variable in this research (Table 19).

Table 19. *Distribution of Certification Program Route in Wave 1 Weighted Sample.*

	Frequency	Percent
Completed an alternative certification program	23,429	34.5
Completed a traditional certification program	44,568	65.5
Total	67,997	100

Roughly one-third of the sample completed an alternative certification program to become a licensed teacher. Examples of such programs include Teach for America, The

New Teacher Project's Teaching Fellows, and the New York City Teaching Fellows. The remaining 65.5% of teachers in the sample followed more traditional paths to certification and licensure, such as completion of a university-based teacher preparation program resulting in a post-secondary degree in education.

School Characteristics

This section summarizes the frequencies and descriptives that portray the school environments in which this sample of teachers work and the types of students they teach. The following characteristics are discussed: urbanicity, charter school status, student enrollment, student-teacher ratio, percentage of students who identify as a racial/ethnic minority, and percentage of students receiving free/reduced lunch.

The BTLS defines the urbanicity of a school as falling into one of three categories: 1) large or mid-size central city, 2) urban fringe, large town, or rural area inside a Core-Based Statistical Area (CBSA), and 3) small town or rural area outside of a CBSA. Core-Based Statistical Areas (CBSAs) may be either Metropolitan Statistical Areas containing urbanized areas of at least 50,000 persons or Micropolitan Statistical Areas containing urban clusters of 10,000 to 49,999 persons (Hall, Kaufman, & Ricketts, 2006). As illustrated in Table 20, more than half of teachers (51.6%) worked in an urban fringe, large town, or rural area inside a CBSA; 30.3% of teachers indicated they taught in a large or mid-size central city; and 18.1% of teachers' schools were located in a small town or rural area outside a CBSA.

Table 20. *Distribution of School Urbanicity in Wave 1 Weighted Sample.*

	Frequency	Percent
Large or mid-size central city	20,588	30.3
Urban fringe, large town, or rural area inside a CBSA	35,119	51.6
Small town or rural area outside of a CBSA	12,290	18.1
Total	67,997	100

The population of interest for this dissertation research included all beginning secondary public school teachers, and charter schools are one type of public school. Only 4.2% of teachers in this study indicated they taught in a public charter school, implying that the remaining 95.8% of teachers worked in a traditional public school setting, as shown in Table 21 below.

Table 21. *Distribution of Charter School Status in Wave 1 Weighted Sample.*

	Frequency	Percent
Public charter school	2,843	4.2
Traditional public school (not charter)	65,155	95.8
Total	67,997	100

On average, the schools at which these teachers worked enrolled approximately 1,100 students during the academic year with a standard deviation of roughly 700 students, as presented in Table 22. The mean estimated number of students per full-time teacher in these schools was 15 with a standard deviation of approximately 5 students, as shown in Table 22; in other words, the average student-teacher ratio was 15:1 in this sample of schools.

Table 22. *Descriptives for Student Enrollment and Student-Teacher Ratio in Wave 1 Weighted Sample.*

	Mean	Std. Dev.	Min	25th %tile	Med.	75th %tile	Max
Student enrollment	1087	710	<10*	568	935	1485	4500*
Student-teacher ratio	15.19	4.61	<10*	12.87	14.61	17.08	60*

Note. Values marked with a "*" have been rounded to the nearest ten to comply with NCES guidelines for publications employing restricted-use data.

As illustrated in Table 23, the racial diversity of schools in the sample varied widely with some schools indicating 0% of their students identified as belonging to a racial/ethnic minority and other schools responding that 100% of their students identified as such. On average, 51% of students identified as being from a racial/ethnic minority group in the schools at which these teachers worked. Similarly, the socioeconomic diversity of these schools varied widely. Free/reduced lunch status is often used as a proxy for socioeconomic status in the absence of data on family income and will be used in this dissertation research as such. As shown in Table 23, some schools indicated that 0% of their students qualified for free/reduced lunch through the National School Lunch Program (NSLP) and other schools indicated that 100% of their students qualified. On average, 45% of students qualified for free/reduced lunch in the schools at which these teachers worked.

Table 23. *Descriptives for % of Students Identifying as Racial/Ethnic Minority in Wave 1 Weighted Sample.*

	Mean	Std. Dev.	Min	25th %tile	Med.	75th %tile	Max
% minority students	50.75	34.407	0	19.7	47.24	84.04	100
% free/reduced lunch	45.07	27.243	0	21.97	42.02	62.01	100

Outcome: Teacher Turnover Trajectories and Competing Risks

For the purpose of this dissertation research, teachers' employment trajectories were coded as falling into one of twelve categories to capture their overall patterns of turnover across the five waves of the BTLS:

1. M000: Mover in Wave 2
2. L000: Leaver in Wave 2
3. S000: Stayer through Wave 2 and then becomes censored
4. SM00: Mover in Wave 3
5. SL00: Leaver in Wave 3
6. SS00: Stayer through Wave 3 and then becomes censored
7. SSM0: Mover in Wave 4
8. SSL0: Leaver in Wave 4
9. SSS0: Stayer through Wave 4 and then becomes censored
10. SSSM: Mover in Wave 5
11. SSSL: Leaver in Wave 5
12. SSSS: Stayer through Waves 2, 3, 4, and 5

In these four-letter codes, "S" stands for "stay", "M" stands for "move", and "L" stands for "leave." A "0" indicates that the turnover outcome was either a) already observed or b) missing due non-response, the latter of which reflects the notion of censoring. The first position of the four-letter code indicates the outcome in Wave 2, the second position indicates the outcome in Wave 3, and so on for Waves 4 and 5 with the third and fourth positions in the code, respectively. Note that this coding scheme does not capture status in Wave 1 because all teachers were "Stayers" in Wave 1 – this was how they were selected from the SASS and TFS administrations to be included in BTLS data collection. The frequencies for the twelve-category conception of the turnover outcome is presented in Table 24.

Table 24. *Frequencies of Turnover Trajectories in Wave 1 Weighted Sample.*

Wave	Trajectory	Frequency	Percent
2	M000	9,780	14.4%
	L000	5,180	7.6%
	S000	1,798	2.6%
3	SM00	6,053	8.9%
	SL00	2,219	3.3%
	SS00	3,982	5.9%
4	SSM0	3,053	4.5%
	SSL0	2,653	3.9%
	SSS0	3,156	4.6%
5	SSSM	1,756	2.6%
	SSSL	2,562	3.8%
	SSSS	25,807	38.0%
Total		67,997	100.0%

This table shows that 38% of teachers in the sample remained teaching in their first placement schools across all five years of observation, starting with the 2007-2008 school year and ending with the 2011-2012 school year. In other words, these early career teachers "survived" through their first five years on the job. Examining the percentages in the rest of the table, it is difficult to get a sense of how turnover trajectories and outcomes may be changing across waves and over time. To get a better handle on the longitudinal patterns of turnover in the sample, additional definitions and perspective of the turnover outcome are presented and discussed next.

From the twelve turnover trajectories, a new outcome variable was defined to capture the four competing risks a teacher could experience across the five waves of the BTLS (essentially, collapsing all five waves together):

1. Always stay (SSSS). These teachers never experience the turnover outcome in the timeline of the study and survive throughout the first five years of their early career.
2. Ever move (M000, SM00, SSM0, and SSSM). These teachers move to a new school at some point during waves 2, 3, 4, or 5.
3. Ever leave (L000, SL00, SSL0, and SSSL). These teachers leave the profession at some point during waves 2, 3, 4, or 5.
4. Censored stay (S000, SS00, and SSS0). These teachers are observed to be "Stayers" and remain at their first school placement until they are lost to follow-up for whatever reason and become censored in waves 3, 4, or 5.

Table 25 presents the frequencies of each of these four turnover outcomes in the sample.

Table 25. *Frequencies of Turnover/Retention Outcomes in Wave 1 Weighted Sample.*

Outcome	Frequency	Percent
Always stay	25,807	38.0%
Ever move	20,641	30.4%
Ever leave	12,614	18.6%
Censored stay	8,936	13.1%
Total	67,997	100.0%

Again, 38% of teachers in the sample stay at their initial school placement through their first five years on the job. In addition, about 13% of the teachers observed as Stayers eventually became censored and so we will never know if they remained teaching in their first placement school or experienced one of the two turnover outcomes. However, roughly 30% of teachers moved to a new school at some point between years 2 and 5 and about 19% left the teaching profession altogether during that same timespan, for a total of 49% of teachers in the sample experiencing one of the two turnover outcomes within their first five years. This echoes other findings in the literature on teacher turnover discussed in Chapter 2 – somewhere between 40 and 50 percent of teachers experience turnover within their first five years (Ingersoll, 2003; Boe, Cook, & Sunderland, 2008; Perda, 2013; Raue, Gray, & O'Rear, 2015; Ingersoll, Merrill, & Stuckey; 2014; Carroll & Foster, 2010).

Table 26 displays the collapsed counts and percentages for those teachers who experienced either of the two turnover outcomes (Movers and Leavers combined) from the sample both cross-sectionally within each wave (the "Percent" column) and longitudinally across consecutive waves in a cumulative manner (the "Cumulative Percent" column).

Table 26. *Frequencies of Turnover Outcomes Only in Wave 1 Weighted Sample.*

Timing of turnover	Frequency	Percent	Cumulative Percent
Wave 2 move/leave	14,960	22.0%	22.0%
Wave 3 move/leave	8,272	12.2%	34.2%
Wave 4 move/leave	5,706	8.4%	42.6%
Wave 5 move/leave	4,318	6.4%	48.9%
Total	33,256	48.9%	

Note that the frequency of turning over does diminish as time passes. This finding indicates that each additional year a teacher returns to the classroom may decrease the likelihood that she will turn over in the future. Furthermore, this finding seems to suggest that staying in the profession year after year is likely to be associated with increases in teacher resilience. Thus, continually returning to the classroom is indicative not only of surviving for the long term but also *thriving*, a characteristic that protects against future turnover. Interestingly, by the end of the third wave, 34.2% of teachers in the sample moved to a new school or left teaching. This finding is substantially higher than what has been cited in previous literature – that roughly 20 percent of early career teachers turn over within their first three years (Henke, Chen, Gies, & Knepper, 2000). From this descriptive analysis, it seems that early career teachers in this sample are experiencing attrition and mobility at roughly equal rates, if not greater rates, than what is to be expected based on findings from the literature. A reasonable explanation for this difference could be historical context. The BTLS conducted data collection in the U.S. beginning in the 2007-2008 school year and concluding with the 2011-2012 school year. Given this time frame, the first and second waves of survey administration coincided with the Great Recession, which lasted from December 2007 to June 2009, and the economic effects of which were felt long after the summer of 2009. It is possible that trends in early career teacher turnover were different from 2007 through 2012 than they were at the time other seminal research in the field of teacher turnover (e.g., Henke et al., 2000) was being conducted. When reading the sections that follow, it will be important for the reader to remember that this study is situated at a specific point in time.

Research Question 1: First-year Teacher Experiences and Competing Risks of Turnover

The first research question asks, "What are the first-year experiences for teachers in the sample and how do they compare between teachers who are retained in their first school placements (i.e., Stayers) and teachers who voluntarily or involuntarily turn over (i.e., Movers and Leavers) in later years?" To answer this question, this section first presents descriptives for the full weighted sample on the items related to teachers' first-year experiences. Then item descriptive statistics are provided by turnover trajectory using the version of the outcome that collapses turnover status across all waves with four competing risks – 1) Always Stayer, 2) Ever Mover, 3) Ever Leaver, and 4) Censored

Stayer. We conclude with the results of scale development following the factor analysis procedures outlined in Chapter 3 and compare the turnover groups on each resulting factor score that will be included in the models to address research question 2. Note that some items were reverse-coded so that lower scores would reflect more negative experiences and perceptions, and higher scores would correspond to more positive experiences and perceptions. Wave 1 Teacher Final Sampling Weights were used to allow for the inclusion of Censored Stayers who otherwise would have been weighted out of the analyses due to non-response. When interpreting effect sizes in the sections that follow (e.g., Cohen's h for dichotomous predictors and Cohen's d for continuous predictors), the What Works Clearinghouse (WWC, 2014) standards will be applied whereby the minimum effect size to establish practical significance is .25 standard deviation. This cutoff will be utilized to illuminate those first-year teaching experiences that may have meaningful relationships with the turnover phenomenon indicating potential substantive importance.

Descriptives and Comparisons Across Turnover Trajectories

This section first presents descriptives under each of the four categories of teachers' first-year experiences: 1) programs and policies for first-year teachers, 2) perceptions of preparedness to teach, 3) perceptions of school climate and workplace conditions, and 4) job satisfaction for the weighted sample. These are presented in two ways: 1) as the proportion who indicated the experience or perception occurred, not including missing data, and 2) as frequencies including missing data. Then item descriptive statistics are provided for each category of first-year teacher experiences by turnover trajectory using the version of the outcome that collapses turnover status across all waves with four competing risks – 1) Always Stayer, 2) Ever Mover, 3) Ever Leaver, and 4) Censored Stayer. Effect sizes are presented to compare these turnover groups, however, comparisons between Always Stayers and Censored Stayers will not be discussed in detail since the final trajectory status of Censored Stayers is unclear due to non-response. The exact wording of the items is detailed in Appendix A.

First-year teacher programs and policies. Six items from Wave 1 of the BTLS were used to capture experiences with school-based programs and policies that teachers may or may not have received in their first year on the job. These include participation in an induction program, working with a mentor teacher, receiving a reduced teaching load, having common planning time with colleagues, exposure to seminars for novice teachers, and extra assistance in the classroom. Table 27 presents the descriptive statistics for these six items and the distribution of responses to each item. For these dichotomous items, a value of 1 corresponds to "Yes" and a value of 0 reflects "No." Therefore, the mean is equal to the proportion of teachers who actually responded to the item and said "Yes". It appears that the majority of teachers in this sample participated in an induction program, worked with a mentor teacher in their first year, and attended seminars for novice teachers. Conversely, most of these teachers were not given a reduced teaching load or extra assistance in the classroom during their initial year in the classroom. About half of these teachers appeared to have common planning with colleagues in their first year of work.

Table 28 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's h standardized effect size differences for each item capturing first-year teacher programs and policies where Always Stayers are the reference group. Of the six different first-year teacher programs and policies, it appears that mentoring and seminars may have the most substantive importance when it comes to preventing turnover from the profession. The effect size estimates indicate that teachers who remain in their first placement school for the first five years of teaching (Always Stayers) receive substantially more mentoring in the first year relative to those teachers who leave the field at some point in their early career (Ever Leavers). Similarly, teachers who stay for five years attend considerably more seminars for novice practitioners during their first year on the job compared to those who leave within the first five years.

Table 27. *Descriptives and Frequencies for 6 First-year Programs and Policies Items with Wave 1 Weights.*

	Induction		Mentoring		Reduced schedule		Common planning		Seminars		Extra help	
Valid N	66086		66777		66820		66820		66820		66820	
Missing N	1912		1220		1177		1177		1177		1177	
Mean	0.81		0.87		0.16		0.55		0.77		0.27	
Std. Dev.	0.39		0.33		0.36		0.50		0.42		0.44	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No	12765	18.8	8499	12.5	56251	82.7	30240	44.5	15343	22.6	49048	72.1
Yes	53321	78.4	58278	85.7	10569	15.5	36581	53.8	51478	75.7	17772	26.1
Missing	1912	2.8	1220	1.8	1177	1.7	1177	1.7	1177	1.7	1177	1.7
Total	67997	100.0	67997	100.0	67997	100.0	67997	100.0	67997	100.0	67997	100.0

Note. Means are calculated as the proportion of teachers who indicated they did experience the program or policy relative to the larger pool of teachers who responded to the item. These means do not account for missing data.

Table 28. *Descriptives for 6 First-year Programs and Policies Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's h
Induction	Always Stayer	25276	0.82	0.384	0.002	
	Ever Mover	20155	0.82	0.383	0.003	<.01
	Ever Leaver	12155	0.73	0.445	0.004	0.22
	Censored Stayer	8500	0.84	0.365	0.004	-0.06
	Total	66086	0.81	0.395	0.002	
Mentoring	Always Stayer	25423	0.92	0.275	0.002	
	Ever Mover	20345	0.86	0.346	0.002	0.18
	Ever Leaver	12384	0.81	0.395	0.004	0.33*
	Censored Stayer	8626	0.86	0.345	0.004	0.18
	Total	66777	0.87	0.333	0.001	
Reduced schedule	Always Stayer	25423	0.17	0.375	0.002	
	Ever Mover	20388	0.16	0.364	0.003	0.03
	Ever Leaver	12384	0.11	0.315	0.003	0.17
	Censored Stayer	8626	0.20	0.396	0.004	-0.07
	Total	66820	0.16	0.365	0.001	
Common planning	Always Stayer	25423	0.53	0.499	0.003	
	Ever Mover	20388	0.57	0.495	0.003	-0.07
	Ever Leaver	12384	0.49	0.5	0.004	0.09
	Censored Stayer	8626	0.63	0.484	0.005	-0.19
	Total	66820	0.55	0.498	0.002	
Seminars	Always Stayer	25423	0.82	0.383	0.002	
	Ever Mover	20388	0.75	0.431	0.003	0.17
	Ever Leaver	12384	0.66	0.473	0.004	0.37*
	Censored Stayer	8626	0.82	0.386	0.004	0.01
	Total	66820	0.77	0.421	0.002	
Extra help	Always Stayer	25423	0.26	0.437	0.003	
	Ever Mover	20388	0.32	0.467	0.003	-0.14
	Ever Leaver	12384	0.19	0.392	0.004	0.16
	Censored Stayer	8626	0.27	0.443	0.005	-0.02
	Total	66820	0.27	0.442	0.002	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Perceptions of preparedness to teach. Six items from Wave 1 of the BTLS were considered for the creation of a scale to encapsulate first-year teachers' perceptions of their preparedness to teach. These include perceptions of preparedness for classroom management and disciplining students, varying one's instructional methods, teaching their subject matter, using technology in the classroom, assessing students, and selecting and adapting curriculum and instructional materials in the initial year of teaching. Table 29 presents the descriptive statistics for these six items and the distribution of responses to each item. For these items, a value of 1 corresponds to "Not at all prepared" and a value of 4 reflects "Very well prepared." It appears that this sample of teachers felt most prepared to teach their subject matter in their first year (item with the highest mean of 3.26) but felt least prepared to handle a full range of classroom management or discipline situations (item with the lowest mean of 2.74).

Table 30 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's d standardized effect size differences for each item capturing first-year teachers' perceptions of their preparedness to teach where Always Stayers are the reference group. From the effect size estimates, it appears that feeling prepared initially in the first year to handle classroom management and discipline, use a variety of instructional methods, assess students, and select and adapt curriculum and instructional materials may make a difference for novice teachers' when making career decisions year after year. When it comes to handling classroom management and varying one's instructional methods, teachers who stay in their first placement school for five years (Always Stayers) felt more prepared during their first year than teachers who moved to a new school (Ever Movers) and teachers who left the field (Ever Leavers) within the five-year window. Furthermore, teachers who stay for five years felt more prepared initially in the first year to assess their students and select and adapt instructional materials for their curriculum compared to those who left teaching in the five-year window.

Table 29. *Descriptives and Frequencies for 6 Preparedness to Teach Items with Wave 1 Weights.*

	Class management		Instructional methods		Subject matter		Computers		Assess students		Select materials	
Valid N	66842		66884		66884		66822		66795		66649	
Missing N	1155		1113		1114		1175		1202		1348	
Mean	2.74		2.99		3.26		3.01		2.94		2.85	
Std. Deviation	0.79		0.81		0.76		0.88		0.74		0.79	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Not at all prepared	2252	3.3	1883	2.8	916	1.3	3142	4.6	1446	2.1	2192	3.2
Somewhat prepared	25305	37.2	16407	24.1	10303	15.2	15916	23.4	15881	23.4	19943	29.3
Well prepared	26597	39.1	29120	42.8	26032	38.3	24854	36.6	34599	50.9	29954	44.1
Very well prepared	12688	18.7	19474	28.6	29633	43.6	22911	33.7	14869	21.9	14561	21.4
Missing	1155	1.7	1113	1.6	1114	1.6	1175	1.7	1202	1.8	1348	2
Total	67997	100	67997	100	67997	100	67997	100	67997	100	67997	100

Table 30. *Descriptives for 6 Preparedness to Teach Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's h
Classroom Management	Always Stayer	25430	2.9	0.761	0.005	
	Ever Mover	20334	2.65	0.701	0.005	0.35*
	Ever Leaver	12452	2.5	0.886	0.008	0.49*
	Censored Stayer	8626	2.86	0.865	0.009	0.06
	Total	66842	2.74	0.798	0.003	
Instructional Methods	Always Stayer	25430	3.12	0.747	0.005	
	Ever Mover	20388	2.9	0.827	0.006	0.28*
	Ever Leaver	12440	2.83	0.875	0.008	0.36*
	Censored Stayer	8626	3.05	0.746	0.008	0.09
	Total	66884	2.99	0.806	0.003	
Subject Matter	Always Stayer	25418	3.28	0.797	0.005	
	Ever Mover	20388	3.21	0.799	0.006	0.1
	Ever Leaver	12452	3.31	0.633	0.006	-0.03
	Censored Stayer	8626	3.25	0.744	0.008	0.04
	Total	66884	3.26	0.764	0.003	
Computers & Technology	Always Stayer	25425	3.07	0.866	0.005	
	Ever Mover	20388	3.04	0.814	0.006	0.04
	Ever Leaver	12384	2.91	0.965	0.009	0.18
	Censored Stayer	8626	2.89	0.894	0.01	0.2
	Total	66822	3.01	0.877	0.003	
Assess Students	Always Stayer	25430	3.01	0.674	0.004	
	Ever Mover	20388	2.95	0.714	0.005	0.09
	Ever Leaver	12384	2.74	0.823	0.007	0.36*
	Censored Stayer	8593	3.01	0.786	0.008	<.01
	Total	66795	2.94	0.737	0.003	
Select Materials	Always Stayer	25341	2.94	0.829	0.005	
	Ever Mover	20332	2.84	0.764	0.005	0.13
	Ever Leaver	12384	2.69	0.781	0.007	0.32*
	Censored Stayer	8593	2.86	0.719	0.008	0.11
	Total	66649	2.85	0.792	0.003	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Perceptions of school climate and workplace conditions. Exploration of this particular construct began with seven sub-scales, each of which are discussed below separately.

Teacher autonomy. Six items from Wave 1 of the BTLS were considered for the creation of a scale to reflect first-year teachers' perceptions of their level of professional control and teacher autonomy. These items capture first-year teachers' perceptions of the locus of control over classroom decisions with respect to selecting instructional materials, selecting content and skills to be taught, selecting teaching techniques, evaluating and grading students, disciplining students, and determining the amount of homework to be assigned. Table 31 presents the descriptive statistics for these six items and the distribution of responses to each item. For these items, a value of 1 corresponds to "No control" and a value of 4 reflects "A great deal of control." It appears that this sample of teachers felt that they had the most control over their ability to select teaching techniques to use in their own classrooms during their initial year of teaching (item with the highest mean of 3.70) but felt they had the least control over selecting textbooks and other instructional materials (item with the lowest mean of 2.28).

Table 32 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's d standardized effect size differences for each item capturing first-year teachers' perceptions of their level of teacher autonomy where Always Stayers are the reference group. Controlling how much homework to assign to students and when and how to discipline students seem to be facets of autonomy that matter for first year teachers who eventually move to a new school. Teachers who stay in their first placement school feel that they have more autonomy during their first year in the classroom to make those decisions relative to teachers who move to a new teaching environment.

Table 31. *Descriptives and Frequencies for 6 Teacher Autonomy Items with Wave 1 Weights.*

	Select textbooks		Select content		Select techniques		Grading students		Discipline		Homework	
Valid N	67103		67156		67923		67293		67293		67247	
Missing N	894		842		705		705		705		750	
Mean	2.28		2.73		3.7		3.68		3.37		3.71	
Std. Deviation	1.05		1.04		0.54		0.56		0.67		0.62	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No control	19229	28.3	10355	15.2	477	0.7	452	0.7	516	0.8	1162	1.7
Minor control	20895	30.7	16885	24.8	1444	2.1	1875	2.8	5575	8.2	2601	3.8
Moderate control	15848	23.3	20301	29.9	15887	23.4	16678	24.5	29526	43.4	10643	15.7
Great deal of control	11131	16.4	19614	28.8	49485	72.8	48288	71	31676	46.6	52841	77.7
Missing	894	1.3	842	1.2	705	1	705	1	705	1	750	1.1
Total	67997	100	67997	100	67997	100	67997	100	67997	100	67997	100

Table 32. *Descriptives for 6 Teacher Autonomy Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Grading students	Always Stayer	25241	3.68	0.595	0.004	
	Ever Mover	20573	3.60	0.587	0.004	0.14
	Ever Leaver	12583	3.80	0.464	0.004	-0.22
	Censored Stayer	8896	3.69	0.49	0.005	-0.01
	Total	67293	3.68	0.561	0.002	
Select techniques	Always Stayer	25241	3.70	0.591	0.004	
	Ever Mover	20573	3.62	0.539	0.004	0.14
	Ever Leaver	12583	3.71	0.538	0.005	-0.01
	Censored Stayer	8896	3.88	0.336	0.004	-0.37
	Total	67293	3.70	0.544	0.002	
Homework	Always Stayer	25241	3.78	0.559	0.004	
	Ever Mover	20573	3.58	0.672	0.005	0.33*
	Ever Leaver	12538	3.76	0.567	0.005	0.04
	Censored Stayer	8896	3.77	0.685	0.007	0.02
	Total	67247	3.71	0.621	0.002	
Discipline	Always Stayer	25241	3.48	0.618	0.004	
	Ever Mover	20573	3.18	0.665	0.005	0.48*
	Ever Leaver	12583	3.39	0.727	0.006	0.14
	Censored Stayer	8896	3.48	0.616	0.007	0.01
	Total	67293	3.37	0.667	0.003	
Select textbooks	Always Stayer	25083	2.36	1.059	0.007	
	Ever Mover	20573	2.23	1.052	0.007	0.12
	Ever Leaver	12552	2.24	1.077	0.01	0.12
	Censored Stayer	8896	2.23	0.98	0.01	0.14
	Total	67103	2.28	1.052	0.004	
Select content	Always Stayer	25104	2.74	1.031	0.007	
	Ever Mover	20573	2.72	1.061	0.007	0.02
	Ever Leaver	12583	2.64	1.06	0.009	0.10
	Censored Stayer	8896	2.87	0.998	0.011	-0.12
	Total	67156	2.73	1.043	0.004	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Administrative support. Six items from Wave 1 of the BTLS were considered for the creation of a scale to summarize first-year teachers' perceptions of support provided by the administration. These items capture the following concepts from the first year on the job: supportive behavior from the administration, enforcing school rules on behalf of staff, strong and clear vision and mission for the school, providing praise for good teaching, supporting teachers of students with special needs, and supportive communication. Table 33 presents the descriptive statistics for these six items and the distribution of responses to each item. Note the last item in the table had different response options compared to the other five.

For the first five items, a value of 1 corresponds to "Strongly disagree" (indicative of little support) and a value of 4 reflects "Strongly agree" (indicative of greater support). These were reverse-coded from the original BTLS variable values. It appears that this sample of teachers felt most supported by school administration's behavior toward staff during their first year (item with the highest mean of 3.51) but felt least prepared to teach students with special needs (item with the lowest mean of 2.8). In addition, 86% of teachers responded that they received regular supportive communication with their principal, other administrators, or department chair during their first year of teaching. This item was also recoded from the original BTLS variable values. In this analysis, a value of 0 indicates "No" and a value of 1 means "Yes."

Table 34 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's h or d standardized effect size differences for each item capturing first-year teachers' perceptions of administrative support where Always Stayers are the reference group (Cohen's h for "Supportive communication" since this item is binary and Cohen's d for the remaining 5 items). All six domains of administrative support in the first year yield some substantive difference between turnover trajectories. Having supportive and encouraging administrators, a principal who enforces rules, and a principal who communicates a clear vision appear to matter for both those who move and those who leave. For all three of those administrative supports, teachers who stayed for five years had more support in those areas in their first year of teaching compared to teachers who moved and teachers who left. Receiving regular supportive communication from administrators in the initial year appears to make a difference for those who move to a new school, and receiving support for teaching students with special needs in the first year in the classroom seems to be a bigger issue for those who leave the profession.

Table 33. *Descriptives and Frequencies for 6 Administrative Support Items with Wave 1 Weights.*

	Supportive administration		Principal enforces rules		Principal communicates		Staff recognized		Special needs support	
Valid N	66944		66991		67204		67134		66635	
Missing N	1054		1007		793		864		1362	
Mean	3.51		3.5		3.5		3.22		2.8	
Std. Deviation	0.74		0.72		0.68		0.75		0.88	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Strongly disagree	1870	2.8	1661	2.4	923	1.4	1322	1.9	5849	8.6
Somewhat disagree	4454	6.5	3883	5.7	4451	6.5	9217	13.6	16059	23.6
Somewhat agree	18231	26.8	21003	30.9	21648	31.8	29986	44.1	30204	44.4
Strongly agree	42389	62.3	40443	59.5	40183	59.1	26609	39.1	14524	21.4
Missing	1054	1.5	1007	1.5	793	1.2	864	1.3	1362	2
Total	67997	100	67997	100	67997	100	67997	100	67997	100

	Supportive communication	
Valid N	66777	
Missing N	1220	
Mean	0.88	
Std. Deviation	0.33	
	Freq.	%
No	8256	12.1
Yes	58521	86.1
Missing	1220	1.8
Total	67997	100

Table 34. *Descriptives for 6 Administrative Support Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's h/d
Supportive communication	Always Stayer	25423	0.91	0.279	0.002	
	Ever Mover	20345	0.8	0.399	0.003	0.33*
	Ever Leaver	12384	0.86	0.344	0.003	0.17
	Censored Stayer	8626	0.96	0.199	0.002	-0.18
	Total		0.88	0.329	0.001	
Supportive administration	Always Stayer	25058	3.68	0.566	0.004	
	Ever Mover	20505	3.31	0.861	0.006	0.50*
	Ever Leaver	12565	3.39	0.833	0.007	0.41*
	Censored Stayer	8817	3.67	0.585	0.006	0.02
	Total	66944	3.51	0.742	0.003	
Principal enforces rules	Always Stayer	25151	3.65	0.575	0.004	
	Ever Mover	20447	3.34	0.746	0.005	0.47*
	Ever Leaver	12534	3.41	0.914	0.008	0.31*
	Censored Stayer	8859	3.56	0.59	0.006	0.16
	Total	66991	3.5	0.717	0.003	
Principal communication	Always Stayer	25288	3.63	0.589	0.004	
	Ever Mover	20447	3.35	0.743	0.005	0.42*
	Ever Leaver	12583	3.44	0.76	0.007	0.28*
	Censored Stayer	8886	3.59	0.571	0.006	0.07
	Total	67204	3.5	0.682	0.003	
Staff recognized	Always Stayer	25288	3.32	0.67	0.004	
	Ever Mover	20403	3.04	0.828	0.006	0.37*
	Ever Leaver	12583	3.16	0.79	0.007	0.21
	Censored Stayer	8859	3.42	0.618	0.007	-0.16
	Total	67134	3.22	0.751	0.003	
Special Needs	Always Stayer	25194	2.94	0.849	0.005	
	Ever Mover	20378	2.76	0.886	0.006	0.21
	Ever Leaver	12201	2.53	0.913	0.008	0.46*
	Censored Stayer	8863	2.87	0.792	0.008	0.08
	Total	66635	2.8	0.878	0.003	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Collegial support. Three items from Wave 1 of the BTLS were considered for the creation of a scale to encapsulate first-year teachers' perceptions of support provided by their colleagues. These items capture the following concepts: enforcing school rules consistently across staff, sharing beliefs and values about the school's mission, and cooperation among staff. Table 35 presents the descriptive statistics for these three items and the distribution of responses to each item.

Table 35. *Descriptives and Frequencies for 3 Collegial Support Items with Wave 1 Weights.*

	Teachers enforce rules		Colleagues share beliefs		Cooperation among staff	
Valid N	67177		66832		67214	
Missing N	820		1166		783	
Mean	2.87		3.13		3.24	
Std. Deviation	0.87		0.73		0.74	
	Freq.	%	Freq.	%	Freq.	%
Strongly disagree	3805	5.6	1834	2.7	1319	1.9
Somewhat disagree	18948	27.9	8512	12.5	8245	12.1
Somewhat agree	26900	39.6	35360	52	30828	45.3
Strongly agree	17524	25.8	21125	31.1	26822	39.4
Missing	820	1.2	1166	1.7	783	1.2
Total	67997	100	67997	100	67997	100

For these items, a value of 1 corresponds to "Strongly disagree" (indicative of little support) and a value of 4 reflects "Strongly agree" (indicative of greater support). These were reverse-coded from the original BTLS variable values. It appears that this sample of first-year teachers felt most supported by the cooperation among the staff members (item with the highest mean of 3.24) but felt less supported when it came to all staff enforcing rules school (item with the lowest mean of 2.87).

Table 36 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's d standardized effect size differences for each item capturing first-year teachers' perceptions of collegial support where Always Stayers are the reference group.

Table 36. *Descriptives for 3 Collegial Support Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Teachers enforce rules	Always Stayer	25274	2.98	0.852	0.005	
	Ever Mover	20433	2.83	0.842	0.006	0.17
	Ever Leaver	12583	2.82	0.905	0.008	0.18
	Censored Stayer	8886	2.71	0.87	0.009	0.31*
	Total	67177	2.87	0.867	0.003	
Colleagues share beliefs	Always Stayer	25151	3.22	0.692	0.004	
	Ever Mover	20308	3.05	0.751	0.005	0.24
	Ever Leaver	12583	3.06	0.803	0.007	0.21
	Censored Stayer	8789	3.2	0.651	0.007	0.02
	Total	66832	3.13	0.732	0.003	
Cooperation among staff	Always Stayer	25288	3.29	0.719	0.005	
	Ever Mover	20447	3.17	0.744	0.005	0.16
	Ever Leaver	12583	3.2	0.783	0.007	0.11
	Censored Stayer	8896	3.31	0.688	0.007	-0.03
	Total	67214	3.24	0.738	0.003	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

The small effect size differences for these three collegial supports imply that there are no substantive differences among the three turnover groups of interest (Always Stayer, Ever Mover, and Ever Leaver) on perceptions of support from one's fellow teachers in the first year. It is possible that receiving collegial support during the first year on the job may not be a factor that weighs into the career decisions of novice teachers within the first five years. Rather, experiences of collegial support that develop after the first year may be of more importance.

Parental support. Two items from Wave 1 of the BTLS were considered for the creation of a scale to portray first-year teachers' perceptions of support provided by parents. The first item directly asks about receiving support from parents while the second addressing the lack of parental involvement in school. Table 37 presents the descriptive statistics for these two items and the distribution of responses.

Table 37. *Descriptives and Frequencies for 2 Parental Support Items with Wave 1 Weights.*

	Parent support			Parent involvement	
Valid N	67316			67173	
Missing N	681			825	
Mean	2.54			2.28	
Std. Deviation	0.86			0.97	
	Freq.	%		Freq.	%
Strongly disagree	9283	13.7	Serious problem	16875	24.8
Somewhat disagree	19314	28.4	Moderate problem	22366	32.9
Somewhat agree	31471	46.3	Minor problem	20249	29.8
Strongly agree	7249	10.7	Not a problem	7682	11.3
Missing	681	1	Missing	825	1.2
Total	67997	100	Total	67997	100

For these items, a value of 1 corresponds to "Strongly disagree" (indicative of little support) or "Serious problem" (indicative of a lack of parental involvement) and a value of 4 reflects "Strongly agree" (implying greater support) and "Not a problem at all" (implying that parental involvement is not problematic). These were reverse-coded from the original BTLS variable values. Although the response options were different for these two items, this is not problematic when factor analysis is performed using the correlation matrix, as was the case in this study. Factor analysis on the correlation matrix is appropriate for variables that are not meaningfully comparable (e.g., items from different scales) (Yong & Pearce, 2013).

It appears that, on average, this sample of teachers are neutral on the statement that they receive a great deal of support from parents for the work they do in the first year; furthermore, on average, these teachers perceive lack of parental involvement to be a moderate problem in their schools during their first year on the job.

Table 38 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's d standardized effect size differences for each item capturing first-year teachers' perceptions of parental support where Always Stayers are the reference group.

Table 38. *Descriptives for 2 Parental Support Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Parent support	Always Stayer	25288	2.72	0.826	0.005	
	Ever Mover	20549	2.41	0.844	0.006	0.37*
	Ever Leaver	12583	2.32	0.845	0.008	0.48*
	Censored Stayer	8896	2.68	0.882	0.009	0.05
	Total	67316	2.54	0.86	0.003	
Parent involvement	Always Stayer	25344	2.43	0.982	0.006	
	Ever Mover	20429	2.23	0.983	0.007	0.2
	Ever Leaver	12536	2.2	0.933	0.008	0.24
	Censored Stayer	8863	2.06	0.852	0.009	0.41*
	Total	67173	2.28	0.966	0.004	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Across the turnover groups, there are notable differences in the amount of support received from parents in the first year of teaching. Teachers who remain in their school for five years feel more supported by parents to do their job in their initial year of teaching than those who move and those who leave. In contrast, the differences are negligible across these groups with respect to viewing parent involvement as a problem in their school. This is not a surprising finding given that these are secondary level teachers. While parental involvement may be an important part of elementary schooling, by the time students reach middle and high school, there is less of an emphasis on parents being involved and present at school functions.

Resource support. Two items from Wave 1 of the BTLS were considered for the creation of a scale to depict first-year teachers' perceptions of the resource supports available to them in the workplace. These items address the availability of materials to do the job of teaching and the problem of routine duties and paperwork interfering with the ability to do the job of teaching. Table 39 presents the descriptive statistics for these two items and the distribution of responses. Note that the items have the same response options, but they were coded differently based on the positive or negative wording of the item stem such that lower scores reflect less support and more negative workplace conditions.

Table 39. *Descriptives and Frequencies for 2 Resource Support Items with Wave 1 Weights.*

	Materials available			Paperwork interferes	
Valid N	67214			67048	
Missing N	783			949	
Mean	3.16			2.34	
Std. Deviation	0.86			0.89	
	Freq.	%		Freq.	%
Strongly disagree	3428	5.0	Strongly agree	12197	17.9
Somewhat disagree	10321	15.2	Somewhat agree	26951	39.6
Somewhat agree	25683	37.8	Somewhat disagree	20801	30.6
Strongly agree	27783	40.9	Strongly disagree	7099	10.4
Missing	783	1.2	Missing	949	1.4
Total	67997	100.0	Total	67997	100.0

For the first item (materials available), a value of 1 corresponds to “Strongly disagree” (indicative of few available materials) and a value of 4 reflects “Strongly agree” (implying great availability of materials). This item was reverse-coded from the original BTLS variable values. For the second item (paperwork interferes), a value of 1 corresponds to “Strongly agree” (implying routine duties and paperwork interfere with teaching) and a value of 4 corresponds to “Strongly disagree” (implying such things do not interfere). This item was not recoded. It appears that, on average, this sample of teachers somewhat agree that they have access to the necessary materials such as textbooks, supplies, and copy machines to do their job in the first year; furthermore, on average, these teachers somewhat agree that routine duties likes paperwork interference with the job of teaching in their initial year of work.

Table 40 displays the number of valid responses, means, standard deviation, standard errors, and Cohen’s d standardized effect size differences for each item capturing first-year teachers' perceptions of resource support where Always Stayers are the reference group.

Table 40. *Descriptives for 2 Resource Support Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Materials available	Always Stayer	25288	3.32	0.776	0.005	
	Ever Mover	20447	3.04	0.889	0.006	0.33*
	Ever Leaver	12583	3.00	0.904	0.008	0.37*
	Censored Stayer	8896	3.20	0.902	0.01	0.14
	Total	67214	3.16	0.864	0.003	
Paperwork & routine duties interfere	Always Stayer	25194	2.38	0.894	0.006	
	Ever Mover	20375	2.31	0.839	0.006	0.08
	Ever Leaver	12583	2.23	0.955	0.009	0.17
	Censored Stayer	8896	2.44	0.909	0.01	-0.07
	Total	67048	2.34	0.894	0.003	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

The effect size estimates signal that availability of materials such as textbooks, supplies, and copy machines in the first year may be an important factor in the early career decisions of teachers. Relative to moves and Leavers, teachers who stay in their first placement school for five years agree that these types of tangible resources are more available to them in their initial year on the job. Perceptions of paperwork and routine duties interfering with the job of teaching does not seem to differ across turnover groups, however. These results may indicate that teachers weigh the lack of physical resources in their first year more heavily then lack of time when making their career decisions.

Student behavior. Eight items from Wave 1 of the BTLS were considered for the creation of a scale to reflect first-year teachers' perceptions of student behavior as it effects school climate. These items capture the level to which overall student behavior interferes with teaching, tardiness and class cutting, student absenteeism, dropping out, student apathy, and the problem of students coming to school unprepared to learn. Table 41 presents the descriptive statistics for these eight items and the distribution of responses to each. Note that the first two items have different response options from the other six.

For the first two items, a value of 1 corresponds to “Strongly agree” (indicative of student behaviors interfering with teaching) and a value of 4 reflects “Strongly disagree” (implying student behaviors do not interfere with teaching). For the other six items, a value of 1 corresponds to “Serious problem” (implying that a particular student behavior is problematic) and a value of 4 reflect “Not a problem at all” with respect to student behaviors. It appears that, on average, this sample of teachers are neutral when it comes to their perceptions of how much student misbehavior and tardiness interfere with their teaching in the first year. When it comes to problematic student behaviors in their initial year of work, teachers responded that the most problematic behavior is students coming to school unprepared and not ready to learn (item mean of 1.91), whereas the least problematic behavior is students dropping out (item mean of 3.08).

Table 42 displays the number of valid responses, means, standard deviation, standard errors, and Cohen’s d standardized effect size differences for each item capturing first-year teachers’ perceptions of student behavior where Always Stayers are the reference group.

Table 41. *Descriptives and Frequencies for 8 Student Behavior Items with Wave 1 Weights.*

	Student misbehavior		Student tardiness	
Valid N	67316		67181	
Missing N	681		816	
Mean	2.61		2.55	
Std. Deviation	0.98		1.01	
	Freq.	%	Freq.	%
Strongly agree	9082	13.4	11656	17.1
Somewhat agree	23317	34.3	21297	31.3
Somewhat disagree	19721	29.0	19738	29.0
Strongly disagree	15196	22.3	14490	21.3
Missing	681	1.0	816	1.2
Total	67997	100.0	67997	100.0

	Student tardiness		Students absent		Class cutting		Student drop outs		Student apathy		Unprepared students	
Valid N	67252		66758		67209		67106		66697		67252	
Missing N	745		1239		788		891		1301		745	
Mean	2.42		2.21		2.92		3.08		2.29		1.91	
Std. Deviation	0.9		0.85		0.98		0.91		1.02		0.9	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Serious problem	11481	16.9	14438	21.2	7833	11.5	4383	6.4	19072	28.0	27670	40.7
Moderate problem	23568	34.7	27977	41.1	11714	17.2	12273	18.0	17726	26.1	20966	30.8
Minor problem	24437	35.9	20241	29.8	25365	37.3	24208	35.6	21370	31.4	15544	22.9
Not a problem at all	7767	11.4	4102	6.0	22297	32.8	26242	38.6	8529	12.5	3073	4.5
Missing	745	1.1	1239	1.8	788	1.2	891	1.3	1301	1.9	745	1.1
Total	67997	100.0	67997	100.0	67997	100.0	67997	100.0	67997	100.0	67997	100.0

Table 42. *Descriptives for 8 Student Behavior Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Student misbehavior	Always Stayer	25288	2.78	0.926	0.006	
	Ever Mover	20549	2.52	1.028	0.007	0.26*
	Ever Leaver	12583	2.37	1.027	0.009	0.42*
	Censored Stayer	8896	2.68	0.839	0.009	0.11
	Total	67316	2.61	0.979	0.004	
Tardiness interferes	Always Stayer	25288	2.57	1.043	0.007	
	Ever Mover	20447	2.44	0.998	0.007	0.13
	Ever Leaver	12583	2.6	0.901	0.008	-0.03
	Censored Stayer	8863	2.67	1.082	0.011	-0.1
	Total	67181	2.55	1.013	0.004	
Student tardiness is problem	Always Stayer	25344	2.47	0.888	0.006	
	Ever Mover	20429	2.38	0.919	0.006	0.09
	Ever Leaver	12583	2.35	0.903	0.008	0.13
	Censored Stayer	8896	2.49	0.904	0.01	-0.02
	Total	67252	2.42	0.904	0.003	
Students absent	Always Stayer	25344	2.25	0.841	0.005	
	Ever Mover	19935	2.12	0.795	0.006	0.15
	Ever Leaver	12583	2.19	0.905	0.008	0.07
	Censored Stayer	8896	2.33	0.888	0.009	-0.1
	Total	66758	2.21	0.849	0.003	
Class cutting	Always Stayer	25344	3.01	0.976	0.006	
	Ever Mover	20386	2.78	0.936	0.007	0.23
	Ever Leaver	12583	2.95	1.043	0.009	0.06
	Censored Stayer	8896	2.99	0.986	0.01	0.02
	Total	67209	2.92	0.983	0.004	
Student drop outs	Always Stayer	25242	3.12	0.891	0.006	
	Ever Mover	20422	3.02	0.849	0.006	0.11
	Ever Leaver	12547	3.13	0.985	0.009	-0.02
	Censored Stayer	8896	3.02	0.979	0.01	0.1
	Total	67106	3.08	0.911	0.004	

Table 42 (continued). *Descriptives for 8 Student Behavior Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Student apathy	Always Stayer	25237	2.4	1.016	0.006	
	Ever Mover	20378	2.19	1.041	0.007	0.2
	Ever Leaver	12363	2.17	1.021	0.009	0.23
	Censored Stayer	8718	2.35	0.909	0.01	0.05
	Total	66697	2.29	1.017	0.004	
Unprepared students	Always Stayer	25344	2.04	0.851	0.005	
	Ever Mover	20429	1.79	0.915	0.006	0.29*
	Ever Leaver	12583	1.82	0.971	0.009	0.24
	Censored Stayer	8896	1.96	0.872	0.009	0.09
	Total	67252	1.91	0.904	0.003	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Of all the ways in which student behavior can manifest in a school setting, student misbehavior and the preparedness of students in the first year of teaching appear to hold the most weight for teachers when deciding whether to stay, move, or leave in the first five years. Across turnover outcomes, the frequency with which student misbehavior (e.g. noise, horseplay or fighting in the halls, cafeteria or student lounge) interferes with teaching in the initial year on the job seems to be substantially different. Teachers who remain at their first school indicate that general student misbehavior affects their first year of teaching less than both teachers who move and those who leave. The problem of students coming to school unprepared to learn yields a noteworthy difference only between those who stay and those who move with those who stay feeling that this issue is less of a problem compared to teachers who end up switching schools.

Standards and accountability. Two items from Wave 1 of the BTLS were considered for the creation of a scale to capture school climate as it relates to standards and accountability. The first item captures the level of concern about one's job security based on student test scores in the first year. The second measures the positive influence of content standards on one's satisfaction with teaching in the initial year of work. Table 43 presents the descriptive statistics for these two items and the distribution of responses to each. Note that the two items have the same responses options but were coded differently based on the positive or negative working of the item stem such that lower scores reflect worse conditions with respect to standards and accountability.

Table 43. *Descriptives and Frequencies for 2 Standards and Accountability Items with Wave 1 Weights.*

	Job security			Content standards	
Valid N	67181			66782	
Missing N	816			1215	
Mean	2.76			2.49	
Std. Deviation	0.93			0.79	
	Freq.	%		Freq.	%
Strongly agree	6586	9.7	Strongly disagree	8078	11.9
Somewhat agree	19043	28.0	Somewhat disagree	21716	31.9
Somewhat disagree	25233	37.1	Somewhat agree	32846	48.3
Strongly disagree	16319	24.0	Strongly agree	4142	6.1
Missing	816	1.2	Missing	1215	1.8
Total	67997	100.0	Total	67997	100.0

For the first item (job security), a value of 1 corresponds to "Strongly agree" (indicative of job insecurity tied to student test scores) and a value of 4 reflects "Strongly disagree" (implying teachers feel their job is secure). For the second item (content standard), a value of 1 corresponds to "Strongly disagree" (implying content standards have negative effects on satisfaction) and a value of 4 corresponds to "Strongly agree" (implying content standards have positive effects on satisfaction). This item was reverse-coded from the original BTLS variable values. It appears that, on average, this sample of teachers somewhat disagree that they worry about the security of their jobs due to the performance of their students on state and/or local tests in the first year. In addition, these teachers are neutral with respect to the effects of content standards on their satisfaction with teaching in the first year on the job.

Table 44 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's d standardized effect size differences for each item capturing first-year teachers' perceptions of standards and accountability where Always Stayers are the reference group.

Table 44. *Descriptives for 2 Standards and Accountability Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Job security	Always Stayer	25288	2.73	0.9	0.006	
	Ever Mover	20447	2.72	0.904	0.006	0.01
	Ever Leaver	12583	2.82	0.992	0.009	-0.09
	Censored Stayer	8863	2.86	0.961	0.01	-0.14
	Total	67181	2.76	0.929	0.004	
Content standards	Always Stayer	25098	2.49	0.803	0.005	
	Ever Mover	20373	2.51	0.711	0.005	-0.04
	Ever Leaver	12424	2.33	0.831	0.007	0.19
	Censored Stayer	8886	2.70	0.775	0.008	-0.27*
	Total	66782	2.49	0.785	0.003	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

The small effect size differences for these two measures for the associations of standards and accountability with turnover implies that there is no substantive difference among the three turnover groups of interest (Always Stayer, Ever Mover, and Ever Leaver) on their perceptions in their first year of teaching. More specifically, concerns about one's job security in the initial year of work being tied to student performance on high stakes assessments does not appear to be related to career decisions. In addition, the turnover groups do not largely differ on their perceptions of the influence of content standards influencing their job satisfaction in their first year. It is possible that nuanced issues of standards and accountability may come more to the forefront as an important factor when making career decisions for novice teachers after the first year of work.

Perceptions of teachers' job satisfaction. Nine items from Wave 1 of the BTLS were considered for the creation of a scale to summarize first-year teachers' perceptions of their satisfaction with teaching in the first year. Dimensions of satisfaction include satisfaction with teaching salary, satisfaction with teaching at one's specific school, weighing the stress and disappointments of teaching against the value of the job, gauging the satisfaction of teachers at one's school as a group, satisfaction with the way things are run at school, weighing the ability to get a higher paying job over staying in teaching, thinking about transferring to another school, estimating one's enthusiasm for teaching, and feeling fatigued by the job of teaching. Table 45 presents the descriptive statistics for these nine items and the distribution of responses to each. Note that the first four items have the same responses options as the last five but were coded differently based on the positive or negative working of the item stem such that lower scores reflect worse conditions with respect to teachers' job satisfaction levels.

For the first four items, a value of 1 corresponds to "Strongly disagree" (indicative of dissatisfaction) and a value of 4 reflects "Strongly agree" (implying satisfaction). These items were reverse-coded from the original BTLS variable values. For the other five items, a value of 1 corresponds to "Strongly agree" (implying dissatisfaction) and a value of 4 reflect "Strongly disagree" (reflecting satisfaction). It appears that, on average, this sample of teachers experienced the lowest levels of satisfaction during their first year in relation to their salaries (item mean of 2.68) but indicated the highest levels of satisfaction when reflecting on their general level of satisfaction with teaching at their specific schools in their initial year on the job (item mean of 3.49).

Table 46 displays the number of valid responses, means, standard deviation, standard errors, and Cohen's d standardized effect size differences for each item capturing first-year teachers' perceptions of their satisfaction where Always Stayers are the reference group. Of the nine different facets of satisfaction, it appears that eight of them yield differences between Stayers and teachers who experience either kind of turnover. The only measure of satisfaction that does not seem to meaningfully differentiate between turnover groups is salary satisfaction, a finding that contradicts what other researchers have indicated is a critical component for increasing both teacher recruitment and retention (Allegretto & Mishel, 2016; Carver-Thomas & Darling-Hammond, 2017).

Dimensions of satisfaction in the first year in the classroom that appear to be associated with both moving and leaving include: 1) general satisfaction with being a teacher at one's specific school, 2) believing teachers at one's school are a satisfied group, 3) liking the way things are run at one's school, 4) feeling that the stress and disappointments of teaching in one's school are not worth it, 5) becoming less enthusiastic for teaching over time, and 6) feeling too tired to go to school. On those six dimensions of satisfaction, the effect sizes indicate a substantial difference between Stayers and Movers as well as Stayers and Leavers, with those teachers who remain teaching in their first school for five years having greater levels of satisfaction and more positive experiences in these domains during their first year relative to Movers and Leavers.

The remaining two facets of teacher satisfaction seem to only bear differences in one turnover group. Individuals who eventually leave the profession indicated that they think about leaving teaching for a higher paying job during their first year of work more often than those practitioners who stay. In addition, individuals who eventually move to another school to teach responded that they think about transferring to another school during their first year on the job more often than those who remain teaching in their first placement school. In both cases, it seems that teachers' perceptions of their satisfaction on these two dimensions and their turnover intentions tend to manifest as one would expect later in their actual career decisions to move or leave.

Table 45. *Descriptives and Frequencies for 9 Teaching Satisfaction Items with Wave 1 Weights.*

	Satisfied with salary		Generally satisfied		Teachers satisfied		School is well run	
Valid N	67249		67181		67133		67133	
Missing N	748		816		865		865	
Mean	2.68		3.49		3.15		3.15	
Std. Deviation	0.961		0.683		0.781		0.828	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Strongly disagree	10992	16.2	1563	2.3	2629	3.9	2647	3.9
Somewhat disagree	12463	18.3	2570	3.8	8317	12.2	10808	15.9
Somewhat agree	31060	45.7	24175	35.6	32564	47.9	27624	40.6
Strongly agree	12734	18.7	38873	57.2	23623	34.7	26054	38.3
Missing	748	1.1	816	1.2	865	1.3	865	1.3
Total	67997	100.0	816	1.2	67997	100.0	67997	100.0

	Teaching not worth it		Leave for better pay		Transfer to another school		Less enthusiasm		Too tired for school	
Valid N	66933		67120		67110		66868		67063	
Missing N	1064		877		887		1129		934	
Mean	3.3		3.29		3.07		3.26		3.46	
Std. Deviation	0.805		0.852		1.01		0.898		0.837	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Strongly agree	2550	3.7	2433	3.6	6180	9.1	2901	4.3	2113	3.1
Somewhat agree	6992	10.3	10103	14.9	13560	19.9	11852	17.4	9111	13.4
Somewhat disagree	25250	37.1	20010	29.4	16842	24.8	17209	25.3	15775	23.2
Strongly disagree	32141	47.3	34573	50.8	30529	44.9	34906	51.3	40065	58.9
Missing	1064	1.6	877	1.3	887	1.3	1129	1.7	934	1.4
Total	67997	100.0	67997	100.0	67997	100.0	67997	100.0	67997	100.0

Table 46. *Descriptives for 9 Teacher Satisfaction Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Satisfied with salary	Always Stayer	25280	2.77	0.944	0.006	
	Ever Mover	20491	2.65	1.028	0.007	0.12
	Ever Leaver	12583	2.57	0.927	0.008	0.21
	Censored Stayer	8896	2.63	0.871	0.009	0.15
	Total	67249	2.68	0.961	0.004	
Generally satisfied	Always Stayer	25288	3.7	0.503	0.003	
	Ever Mover	20447	3.3	0.755	0.005	0.62*
	Ever Leaver	12583	3.31	0.763	0.007	0.60*
	Censored Stayer	8863	3.61	0.628	0.007	0.16
	Total	67181	3.49	0.683	0.003	
Teachers satisfied	Always Stayer	25317	3.27	0.73	0.005	
	Ever Mover	20429	3.01	0.802	0.006	0.34*
	Ever Leaver	12583	3.06	0.862	0.008	0.26*
	Censored Stayer	8803	3.26	0.672	0.007	0.01
	Total	67133	3.15	0.781	0.003	
School is well run	Always Stayer	25317	3.36	0.723	0.005	
	Ever Mover	20429	2.91	0.879	0.006	0.56*
	Ever Leaver	12583	3.05	0.898	0.008	0.38*
	Censored Stayer	8803	3.23	0.703	0.007	0.18
	Total	67133	3.15	0.828	0.003	
Teaching not worth it	Always Stayer	25297	3.51	0.692	0.004	
	Ever Mover	20323	3.1	0.842	0.006	0.53*
	Ever Leaver	12572	3.1	0.899	0.008	0.51*
	Censored Stayer	8741	3.44	0.679	0.007	0.1
	Total	66933	3.3	0.805	0.003	

Table 46 (continued). *Descriptives for 9 Teacher Satisfaction Items by Turnover Outcome with Wave 1 Weights.*

Item	Turnover outcome	N	Mean	Std. Dev.	Std. Error	Cohen's d
Leave for better pay	Always Stayer	25317	3.36	0.782	0.005	
	Ever Mover	20416	3.31	0.892	0.006	0.06
	Ever Leaver	12583	3	0.934	0.008	0.42*
	Censored Stayer	8803	3.47	0.712	0.008	-0.15
	Total	67120	3.29	0.852	0.003	
Transfer to another school	Always Stayer	25295	3.21	0.961	0.006	
	Ever Mover	20429	2.76	1.072	0.007	0.44*
	Ever Leaver	12583	3.07	1.026	0.009	0.14
	Censored Stayer	8803	3.38	0.757	0.008	-0.2
	Total	67110	3.07	1.01	0.004	
Less enthusiasm	Always Stayer	25223	3.4	0.825	0.005	
	Ever Mover	20429	3.16	0.912	0.006	0.28*
	Ever Leaver	12544	3	1.013	0.009	0.43*
	Censored Stayer	8673	3.44	0.762	0.008	-0.05
	Total	66868	3.26	0.898	0.003	
Too tired for school	Always Stayer	25293	3.59	0.695	0.004	
	Ever Mover	20429	3.32	0.84	0.006	0.35*
	Ever Leaver	12538	3.1	0.969	0.009	0.58*
	Censored Stayer	8803	3.46	0.851	0.009	0.17
	Total	67063	3.4	0.837	0.003	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Scale Development and Factor Score Comparisons Across Turnover Trajectories

This section presents the results of scale development following the factor analysis procedures outlined in Chapter 3, and compares turnover trajectory groups on their mean factor scores using effect sizes. Effect sizes are presented to compare these turnover groups, however, comparisons between Always Stayers and Censored Stayers will not be discussed in detail since the final trajectory status of Censored Stayers is unclear due to non-response. More technical details about scale development decisions are provided in Appendix B. The resulting factor scores will be included in the models developed to address research question 2.

First-year teacher programs and policies. Scale development was not explored for the six dichotomous BTLS items reflecting first-year teacher programs and policies. These include participation in an induction program, working with a mentor teacher, receiving a reduced teaching load, having common planning time with colleagues, exposure to seminars for novice teachers, and extra assistance in the classroom. These variables were included separately in the survival models developed for research question 2 to allow for the estimation of the relationships between each individual program or policy and the turnover outcome.

Preparedness to teach scale. The “Preparedness to Teach” scale contained six items yielding a reliability of 0.821. The final single factor solution with loadings and both initial and extraction communalities are presented in Table 47.

Table 47. *Factor Loadings and Communalities for Preparedness to Teach Scale with Wave 1 Weights.*

	Factor loadings	Communalities	
	Preparedness	Initial	Extraction
Instructional methods	0.846	0.588	0.716
Assess students	0.778	0.507	0.605
Select materials	0.769	0.515	0.591
Subject matter	0.610	0.362	0.372
Class management	0.532	0.309	0.284
Computers	0.461	0.183	0.212

Note. Extraction method: Principal Axis Factoring.

"Preparedness to Teach" factor scores were saved for use in survival modeling to address research question 2. Lower factor scores indicate less preparedness to teach and higher factor scores indicate greater preparedness to teach. Table 48 displays the mean factor scores for each turnover trajectory group, standard deviations, number of valid responses, and Cohen's d standardized effect size differences where Always Stayers are the reference group.

Table 48. *Preparedness Factor Score Descriptives by Turnover Trajectories with Wave 1 Weights.*

Turnover outcome	Mean	Std. Dev.	N	Cohen's d
Always Stayer	0.14	0.88	25317	
Ever Mover	-0.06	0.94	20276	0.22
Ever Leaver	-0.23	0.98	12366	0.39*
Censored Stayer	0.06	0.92	8591	0.09
Total	<.001	0.93	66550	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

It appears that perceptions of preparedness to teach in the first year are different between teachers who eventually leave the job and teachers who remain teaching in their first school, with those who stay having more positive perceptions of their own initial preparedness. This indicates that there may be stronger preparation needed for pre-service teacher candidates as well as novice teachers to ensure that they enter the classroom feeling competent, well-equipped, and fully able to do the job of teaching. Doing so may help decrease the rates of leaving.

Perceptions of school climate and workplace conditions: Teacher autonomy subscales. It was hypothesized the items capturing the "Teacher Autonomy" construct would load together on a single factor. Instead, the items split across two factors, one capturing "Pedagogical Autonomy" and one reflecting "Curricular Autonomy," and they were moderately correlated ($r = .474$). When conducting analyses for research question 2, collinearity diagnostics were examined to ensure that the correlation between these predictors was not be problematic for survival model estimation. VIF and Tolerance statistics indicated that the inclusion of the "Curricular Autonomy" and "Pedagogical Autonomy" predictors did not threaten stability of the survival models in spite of their moderate correlation. The final solution with factor loadings and both initial and extraction communalities are presented in Table 49.

Table 49. *Factor Loadings and Communalities for Teacher Autonomy Scale with Wave 1 Weights.*

	Factor loadings		Communalities	
	Pedagogical	Curricular	Initial	Extraction
Grading students	0.754		0.371	0.558
Select techniques	0.621		0.350	0.473
Homework	0.594		0.276	0.369
Discipline	0.590		0.209	0.298
Select content		0.789	0.318	0.620
Select textbooks		0.664	0.271	0.423

Notes. Extraction method: Principal Axis Factoring. Factor loadings <.2 are suppressed.

The manner in which the items loaded on the two factors is reasonable as the first factor with 4 items pertains to pedagogical decisions teachers typically make about their day-to-day instructional practices whereas the second factor with 2 items is related to broader curriculum decisions related to materials and content coverage. In other words, factor 1 captures the “how” and factor 2 capture the “what”. With this in mind, it was decided that two separate factor scores would be generated – one to capture pedagogical teacher autonomy and a second to capture curricular teacher autonomy. Cronbach’s alpha for the 4-item pedagogical teacher autonomy subscale was 0.726 (above the threshold of 0.7) and for the 2-item curricular teacher autonomy subscale was 0.678 (close to the 0.7 criterion).

“Pedagogical Autonomy” and “Curricular Autonomy” factor scores were saved for use in survival modeling to address research question 2. Lower factor scores indicate less control and autonomy and higher factor scores indicate greater control and autonomy. Table 50 displays the mean factor scores for each turnover trajectory group, standard deviations, number of valid responses, and Cohen’s d standardized effect size differences where Always Stayers are the reference group.

Table 50. *Autonomy Factor Score Descriptives by Turnover Trajectories with Wave 1 Weights.*

Turnover outcome	Pedagogical Autonomy				Curricular Autonomy			
	Mean	SD	N	Cohen's d	Mean	SD	N	Cohen's d
Always Stayer	0.06	0.92	25040		0.04	0.85	25040	
Ever Mover	-0.21	0.93	20571	0.29*	-0.05	0.88	20571	0.10
Ever Leaver	0.10	0.78	12501	-0.04	-0.06	0.87	12501	0.11
Censored Stayer	0.16	0.64	8894	-0.12	0.10	0.74	8894	-0.07
Total	<.001	0.87	67006		<.001	0.85	67006	

Note. Cells with an “*” are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

While the effect sizes indicate no meaningful differences between turnover groups on perceptions of curricular autonomy in the first year on the job, there is a substantive difference between teachers who stay for five years and teachers who move on pedagogical autonomy during the initial year in the classroom. This implies that teachers who continue teaching in their first placement school for five years are given more authority in their first year to grade students, select teaching techniques, assign homework, and discipline students compared to teachers who move to a new school. Therefore, placing trust in one's first-year teachers to make sound decisions about their own pedagogy may curb the rates of teachers moving to new schools.

Perceptions of school climate and workplace conditions: Administrative support subscale. The "Administrative Support" scale contained six items yielding a reliability of 0.792. The final solution with factor loadings and both initial and extraction communalities are presented in Table 51.

Table 51. *Factor Loadings and Communalities for Administrative Support Scale with Wave 1 Weights.*

	Factor loadings	Communalities	
	Administrative Support	Initial	Extraction
Supportive administration	0.771	0.493	0.594
Staff recognized	0.742	0.455	0.550
Principal enforces rules	0.715	0.425	0.511
Principal communication	0.682	0.422	0.465
Supportive communication	0.475	0.248	0.226
Special needs	0.449	0.194	0.202

Note. Extraction method: Principal Axis Factoring.

"Administrative Support" factor scores were saved for use in survival modeling to address research question 2. Lower factor scores indicate less administrative support and higher factor scores indicate greater administrative support. Table 52 displays the mean factor scores for each turnover trajectory group, standard deviations, number of valid responses, and Cohen's d standardized effect size differences where Always Stayers are the reference group.

Table 52. *Administrative Support Factor Score Descriptives by Turnover Trajectories with Wave 1 Weights.*

Turnover outcome	Mean	Std. Dev.	N	Cohen's d
Always Stayer	0.21	0.71	24437	
Ever Mover	-0.28	1.04	20079	0.56*
Ever Leaver	-0.12	1.03	11946	0.38*
Censored Stayer	0.23	0.71	8458	-0.03
Total	<.001	0.87	67006	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Perceptions of administrative support in the first year differ between Stayers and Movers as well as Stayer and Leavers. Teachers who stay in their first school for five years tend to have more positive initial perceptions of support from their principals, department chairs, and other administrative staff relative to those who move and those who leave. While this finding was expected given the literature on the importance of administrative support in retaining teachers (Billingsley & Cross, 1992; Miller, Brownell, & Smith, 1999; Cooley & Yovanoff, 1996; Kilgore & Griffin, 1998; Rosenberg, O'Shea, & O'Shea, 1998), it is interesting that the effect size is larger for teachers who move. This implies that while focusing on administrative support for first-year educators may help to mitigate the rates of both types of turnover, increasing administrative support for brand new practitioners may be more critical for addressing the localized effects of turnover that occur when teachers migrate to other schools as opposed to the broader, national impacts of turnover that result from teachers leaving the field.

Perceptions of school climate and workplace conditions: Collegial support subscale. The "Collegial Support" scale contained three items yielding a reliability of 0.730. The final solution with factor loadings and both initial and extraction communalities are presented in Table 53.

Table 53. *Factor Loadings and Communalities for Collegial Support Scale with Wave 1 Weights.*

	Factor loadings	Communalities	
	Collegial Support	Initial	Extraction
Colleagues share beliefs	0.718	0.330	0.516
Cooperation	0.711	0.325	0.505
Teachers enforce rules	0.652	0.286	0.425

Note. Extraction method: Principal Axis Factoring.

"Collegial Support" factor scores were saved for use in survival modeling to address research question 2. Lower factor scores indicate less collegial support and higher factor scores indicate greater collegial support. Table 54 displays the mean factor scores for each turnover trajectory group, standard deviations, number of valid responses, and Cohen's d standardized effect size differences where Always Stayers are the reference group.

Table 54. *Collegial Support Factor Score Descriptives by Turnover Trajectories with Wave 1 Weights.*

Turnover outcome	Mean	Std. Dev.	N	Cohen's d
Always Stayer	0.11	0.82	25130	
Ever Mover	-0.09	0.86	20293	0.24
Ever Leaver	-0.08	0.95	12577	0.21
Censored Stayer	0.02	0.77	8777	0.11
Total	<.001	0.86	66777	

While the effect sizes for collegial support in the first year suggest that there may not be meaningful group differences on this construct, it is notable that teachers who stay in their schools for five years do have the most positive initial perceptions of collegial support (i.e., the highest mean collegial support factor score) of all the turnover trajectory groups. While the benefits of feeling supported by one's co-workers and developing collegial relationships have been demonstrated elsewhere in the literature on turnover (Simon & Johnson, 2015; Certo & Fox, 2002), it does not appear to be associated with in the career decisions of novice teachers here.

Perceptions of school climate and workplace conditions: Parental support subscale. The "Parental Support" scale contained two items yielding a reliability of 0.648. The final solution with factor loadings and both initial and extraction communalities are presented in Table 55.

Table 55. *Factor Loadings and Communalities for Parental Support Scale with Wave 1 Weights.*

	Factor loadings	Communalities	
	Parental Support	Initial	Extraction
Parent support	0.694	0.232	0.481
Parent involvement	0.694	0.232	0.481

Note. Extraction method: Principal Axis Factoring.

"Parental Support" factor scores were saved for use in survival modeling to address research question 2. Lower factor scores indicate less parental support and higher factor scores indicate greater parental support. Table 56 displays the mean factor scores for each turnover trajectory group, standard deviations, number of valid responses, and Cohen's d standardized effect size differences where Always Stayers are the reference group.

Table 56. *Parental Support Factor Score Descriptives by Turnover Trajectories with Wave 1 Weights.*

Turnover outcome	Mean	Std. Dev.	N	Cohen's d
Always Stayer	0.17	0.80	25281	
Ever Mover	-0.10	0.80	20403	0.33*
Ever Leaver	-0.16	0.81	12530	0.42*
Censored Stayer	-0.04	0.73	8861	0.27*
Total	<.001	0.81	67075	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

The effect sizes demonstrate that there are meaningful differences among the turnover trajectory groups on parental support perceptions in the first year. Teachers who stay in their first school for five years tend to feel more support from parents in their initial year of work than teachers who move and teachers who leave. This finding reinforces the idea that supporting learning both at school and at home increases the chances of success for students and teachers, which may be a key component of retention.

Perceptions of school climate and workplace conditions: Resource supports. The creation of a "Resource Support Scale" was explored with two items, one capturing the availability of materials to do the job of teaching and the other capturing the problem of routine duties and paperwork interfering with the ability to do the job of teaching. Together, the two items yielded a Cronbach's alpha of 0.323 and the correlation between the items was only 0.193. This is evidence that there is little internal consistency between these two items and exploring the creation of a scale was not warranted. Therefore, these variables were included separately in the survival models developed for research question 2 to allow for the estimation of the relationships between each individual resource support and the turnover outcome.

Perceptions of school climate and workplace conditions: Student behavior subscale. The "Student Behavior" scale contained eight items yielding a reliability of 0.860. The final solution with factor loadings and both initial and extraction communalities are presented in Table 57.

Table 57. *Factor Loadings and Communalities for Student Behavior Scale with Wave 1 Weights.*

	Factor loadings	Communalities	
	Student behavior	Initial	Extraction
Student tardiness (agree)	0.784	0.464	0.489
Students absent	0.773	0.542	0.597
Class cutting	0.751	0.553	0.564
Student tardiness (problem)	0.699	0.599	0.615
Unprepared students	0.655	0.466	0.429
Student drop outs	0.591	0.372	0.349
Student apathy	0.588	0.361	0.346
Student misbehavior	0.470	0.264	0.221

Note. Extraction method: Principal Axis Factoring.

"Student Behavior" factor scores were saved for use in survival modeling to address research question 2. Lower factor scores indicate more negative effects of student behavior on school climate and higher factor scores indicate more positive effects of student behavior on school climate. Table 58 displays the mean factor scores for each turnover trajectory group, standard deviations, number of valid responses, and Cohen's d standardized effect size differences where Always Stayers are the reference group.

Table 58. *Student Behavior Factor Score Descriptives by Turnover Trajectories with Wave 1 Weights.*

Turnover outcome	Mean	Std. Dev.	N	Cohen's d
Always Stayer	0.10	0.92	25073	
Ever Mover	-0.12	0.92	19808	0.25*
Ever Leaver	-0.07	0.99	12321	0.18
Censored Stayer	0.07	0.93	8717	0.03
Total	<.001	0.94	65919	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

First-year perceptions of student behavior differ between Stayers and Movers only. Teachers who stay in their first school for five years tend to have more positive perceptions of student behavior during the first year in their school relative to those who switch schools. This implies that improving student behavior and/or mitigating the negative effects of student behavior on the broader school climate may be critical for addressing the localized effects of turnover that occur when teachers migrate to other schools. In addition, this finding suggests that student behavior may not drive teachers away from the profession, but it can drive teachers away from schools with student disciplinary issues.

Perceptions of school climate and workplace conditions: Standards and accountability. The creation of a "Standards and Accountability Scale" was explored with two items, one reflecting the level of concern about job security based on student test scores and the other measuring the positive influence of content standards on one's satisfaction with teaching. Together, the two items yielded a Cronbach's alpha of 0.242 and the correlation between the items was only 0.140. This is evidence that there is little internal consistency between these two items and exploring the creation of a scale was not warranted. Therefore, these variables were included separately in the survival models developed for research question 2 to allow for the estimation of the relationships between each individual experience with standards and accountability and the turnover outcome.

Perceptions of teachers' job satisfaction subscales. It was hypothesized the nine items capturing the "Teacher Job Satisfaction" construct would load together on a single factor. This was not the case, and a substantial amount of exploration was conducted to settle on a final four-item scale to capture teachers' job satisfaction as a unidimensional construct with a single factor (see Appendix B for more details). The four items that capture job satisfaction are: 1) I am generally satisfied with being a teacher at this school, 2) I like the way things are run at this school, 3) The stress and disappointments involved in teaching at this school aren't really worth it, and 4) I don't seem to have as much enthusiasm now as I did when I began teaching. The final solution with factor loadings and both initial and extraction communalities are presented in Table 59.

Table 59. *Factor Loadings and Communalities for Job Satisfaction Scale with Wave 1 Weights.*

	Factor loadings	Communalities	
	Student behavior	Initial	Extraction
Generally satisfied	0.854	0.534	0.730
Teaching not worth it	0.786	0.476	0.618
School is well run	0.626	0.385	0.392
Less enthusiasm	0.547	0.298	0.299

Note. Extraction method: Principal Axis Factoring.

"Job Satisfaction" factor scores were saved for use in survival modeling to address research question 2. Lower factor scores indicate less job satisfaction and higher factor scores indicate greater job satisfaction. Table 60 displays the mean factor scores for each turnover trajectory group, standard deviations, number of valid responses, and Cohen's d standardized effect size differences where Always Stayers are the reference group.

Table 60. *Job Satisfaction Factor Score Descriptives by Turnover Trajectories with Wave 1 Weights.*

Turnover outcome	Mean	Std. Dev.	N	Cohen's d
Always Stayer	0.30	0.70	25147	
Ever Mover	-0.28	1.02	20298	0.66*
Ever Leaver	-0.27	1.02	12532	0.65*
Censored Stayer	0.17	0.92	8578	0.16
Total	<.001	0.92	66556	

Note. Cells with an "*" are flagged as meeting the WWC (2014) cutoff of ±.25 for practical significance.

Perceptions of job satisfaction in the first year differ between Stayers and Movers as well as Stayers and Leavers. Teachers who stay in their first school for five years tend to have greater first-year job satisfaction relative to those who switch schools. Similarly, teachers who stay in their first school for five years have higher initial levels of job satisfaction relative to those who leave the teaching profession altogether. These findings suggest that lower levels of job satisfaction during the first year of teaching may be fueling both types of turnover in our nation's schools.

The relationship between job satisfaction and early career turnover does not develop in a vacuum, and it is likely that job satisfaction both influences and is influenced by teachers' first-year experiences. This is the rationale for examining the interaction of job satisfaction with other first-year teacher experiences as these experiences predict turnover in one's early career, a critical line of inquiry explored in Research Question 2.

Research Question 2: Survival Models

The second research question asks, “What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and involuntary turnover across the early career window of years 1 through 4?”

Prior to analysis, it was necessary to convert the format of the data from wide to long and create new variables to capture censoring, competing risks, and teaching spells which are necessary inputs when conducting discrete-time, competing risks survival analysis in R. The person-level BTLS data file was converted to a person-period data file format using the “dataLongCompRisks” function from the “discSurv” package (Wel & Schmid, 2018) in R. To capture discrete time in the long data format, a series of time-varying dummy variables were created indicating each year of teaching (i.e., BTLS Wave) for teacher *i* at time *t*. Year 2 (i.e., BTLS Wave 2) serves as the intercept as this is the first time point during which a teacher can turn over from their first school placement. In this time coding scheme, year/wave dummies equal 1 when time *t* is equal to the associated year/wave dummy. Overall, this *base-time specification* produces a non-parametric time function that yields grade-specific estimates of the log-odds of turnover. The year/wave dummy coefficients describe the magnitude of the “shifts” in the log-odds (i.e., logit hazards) of turnover that occur across sequential years of teaching relative to the log-odds of turnover in Wave 2 (the earliest possible time at which turnover could occur). See Appendix C for annotated R code that was used to convert the data into a format appropriate for discrete-time, competing risks models.

After data conversion, discrete-time, competing risks hazards analysis was used to model teachers' *time-to-turnover* via multinomial logistic regression in R, more specifically, the "multinom" function from the "nnet" package (Venables & Ripley, 2002) with a trichotomous outcome variable capturing three annual career decisions: 1) stay, 2) move, and 3) leave. The model accounts for the BTLS complex survey design with the inclusion of wave-specific sampling weights and replicate weights using the "withReplicates" function from the "survey" package (Lumley, 2017) in R. The use of sampling weights corrects for the selection of units with unequal probabilities, unit non-response, and non-coverage of the population. Furthermore, inclusion of 88 replicate weights for each wave produces corrected point estimates and robust standard errors. A wrapper function called "svymultinom" from a developer-provided package called "svrepmisc" (Ganz, 2018) was employed to estimate these models, which combines the functions from "multinom" and "withReplicates" together. See Appendix C for annotated R code that was used to run these weighted survival models.

To meet the assumption of proportional hazards, logit hazard profiles for the predictors must retain the approximate shape of the baseline profile of turnover obtained from the base-time specification model. Frequently, predictors' hazards shift the baseline vertically while also changing the shape of the hazard profile (Denson & Schumacker, 1996). This signals that the effect of the predictor varies over time, and therefore, an interaction between that predictor and dummy-coded time variables should be included in the model. In this dissertation research, taking the cross-products of the year/wave dummies with each predictor creates a set of interactions with time that is used to maintain the assumption of proportional hazards. Such interaction terms account for the possibility that the log-odds of turnover are not proportional across the non-parametric time function. Put another way, these interactions with time allow for variations in the hazard rates of leaving or moving over the first five years of teaching. This is critical for correct specification of the model and to minimize bias in estimation that may occur if turnover rates are not constant over the first five years.

Prior to survival modeling, it was essential to check for the presence of multicollinearity among the predictors. Tolerance and VIF were calculated in SPSS for each of the teacher and school covariates and first-year experience variables and compared to standard cutoffs in the field – greater than .20 for Tolerance and less than 5 for VIF (Ringle, Wende, & Becker, 2015; Hair et al., 2010). A linear regression was conducted regressing job satisfaction on all other predictors (both covariates and first-year experience variables) to obtain the collinearity diagnostics. Collinearity statistics for all predictors fell appropriately above the Tolerance cutoff and below the VIF cutoff ensuring that the strength of correlations among predictors would not mask relationships with the turnover outcome. See Appendix D for the table of collinearity statistics.

Presentation of the survival models in this section begins with the base-time specification model, which includes only year/wave dummies, to examine turnover hazard rates conditioned on time alone. Then simple survival models are presented that add one predictor of interest to the base-time specification; estimates include the main effect of the predictor, the main effect of time, and the interaction between the predictor and time that tests the non-proportional hazards assumption. These simple models are discussed to address the effects of each first-year teaching experience on turnover trajectories not controlling for any other covariates or first-year experiences. Both statistical and practical significance for each predictor and interaction are discussed. Next the stepwise modeling procedure outlined in Chapter 3 is presented that empirically tests the tenability of the conceptual model for teacher turnover presented in Chapter 2. Fit statistics (i.e., AIC, deviance, hit ratios, and p-values) are presented for these nested models. Finally, this section concludes by addressing the moderating effect of job satisfaction on the relationships between each predictor of interest and each competing risk of turnover.

Base-Time Specification Model

The base-time specification model produces a non-parametric time function that yields grade-specific estimates of the log-odds of turnover conditioned on time alone. The year/wave dummy coefficients describe the magnitude of the "shifts" in the log-odds (i.e., logit hazards) of turnover that occur across sequential years of teaching relative to the log-odds of turnover in Wave 2 (the earliest possible time at which turnover could occur). Table 61 displays the coefficients, corrected standard errors, t-statistics, and p-values for this baseline model estimated with sampling weights and replicate weights. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 61. *Base-time Specification Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.686	1.783	-0.946	0.347
Leave (Intercept)	-2.172	1.844	-1.178	0.242
Move time 3	-0.268	2.838	-0.094	0.925
Leave time 3	-0.823	3.319	-0.248	0.805
Move time 4	-0.718	3.161	-0.227	0.821
Leave time 4	-0.333	4.173	-0.080	0.937
Move time 5	-1.019	4.140	-0.246	0.806
Leave time 5	-0.209	4.451	-0.047	0.963

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Summing the relevant coefficients and exponentiating those sums yields the hazard ratios associated with each turnover outcome at each point in time. For example, summing the "Move intercept" and the coefficient for "Move time 3" yields the predicted logit hazard of moving at time 3 (equivalent to Wave/Year 3). Exponentiating that logit hazard using the natural base (*e*) produces the hazard ratio, essentially an odds ratio. The probability of moving at time 3 (expressed as a percentage) is then computed by taking that hazards ratio ($h_{Move\ at\ t=3}$) and evaluating the following formula:

$$\Pr(Move\ at\ t = 3) = \frac{h_{Move\ at\ t=3}}{1+h_{Move\ at\ t=3}}.$$

To obtain the cumulative probability of moving across all time points (i.e., the first five years of teaching), the yearly probabilities from Years 2, 3, 4, and 5 are used as follows:

$$\begin{aligned}\Pr(Move\ cumulative) \\ &= 1 - ((1 - \Pr(Move\ at\ t = 2)) * (1 - \Pr(Move\ at\ t = 3)) \\ &* (\Pr(Move\ at\ t = 4)) * (\Pr(Move\ at\ t = 5))).\end{aligned}$$

Table 62 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching and Figure 2 displays the yearly probabilities graphically.

Table 62. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving over the First Five Years.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	.1563	.1241	.0828	.0627	.3647
Leavers	.1023	.0477	.0755	.0846	.2766
Movers & Leavers	.2586	.1718	.1584	.1473	.5594

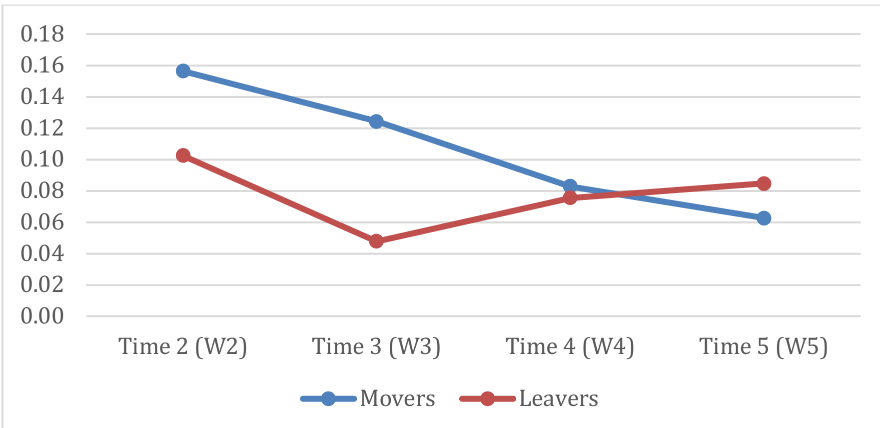

Figure 2. *Yearly Predicted Probabilities of Moving and Leaving over the First Five Years.*

From Figure 2, it appears that the probability of moving decreases consistently across the first five years of teaching; the probability of leaving, however, decreases from Year 2 to Year 3 and then rises through Years 4 and 5. This means that early career teachers are at greater risk of moving than leaving in Years 2 and 3, are at approximately equal risk of both types of turnover in Year 4, and by Year 5 are at a slightly greater risk of leaving than moving. So the risk of moving diminishes the longer a beginning teacher remains in their first placement school, but longer term, the risk of leaving the profession increases.

Interestingly, the yearly rates of moving, leaving, and experiencing either turnover decision shown in Table 62 are much higher for beginning teachers than they are for the overall pool of teachers in any stage of their career - 13.5 percent of all public school teachers in the U.S. turn over each year with 6.7% moving to a new school and 6.8% leaving the profession (Haynes, Maddock, & Goldrick, 2014). In addition, the cumulative predicted probability of experiencing either kind of turnover in the first five years is 55.94%. This reflects a greater risk of early career turnover than findings from other research have suggested citing somewhere between 40 and 50 percent of teachers experiencing turnover within their first five years (Ingersoll, 2003; Boe, Cook, & Sunderland, 2008; Perda, 2013; Raue, Gray, & O'Rear, 2015; Ingersoll, Merrill, & Stuckey; 2014; Carroll & Foster, 2010). These findings seem to suggest that the picture of early career turnover may be bleaker than we originally thought.

In the subsections that follow, individual predictors will be added to this base-time specification model to determine which first-year teacher experiences are associated with a magnification or reduction in early career turnover rates. Models A.1 through A.6 examine the relationships between individual first-year teacher programs and policies and turnover probabilities; then Model A includes all of these predictors together to estimate their collective association with turnover. Model B addresses the link between perceptions of preparedness and turnover decisions. Models C.1 through C.10 estimate the connections between individual workplace conditions and school climate characteristics and turnover rates; then Model C includes all of these predictors together as a block to estimate their collective relationship with moving and leaving. Finally, Model D addresses the link between teachers' job satisfaction and turnover decisions.

Prior to reviewing the findings, it is important to discuss a technical consideration and consequence of using replicate weights in these analyses. Replicate weights were employed in the survival models to produce weighted point estimates and corrected standard errors. In the NCES Handbook of Survey Methods, the authors describe the rationale for and creation of the BTLS replicate weights as follows:

> Replication methods involve constructing a number of subsamples (i.e., replicates) from the full sample and computing the statistic of interest for each replicate. The mean square error of the replicate estimates around the full sample estimate provides an estimate of the variance of the statistic. Since the BTLS sample was a subset of the SASS teacher sample, the SASS teacher replicates were used as the replicate weights for the BTLS sample. The BTLS base weight for each BTLS teacher was multiplied by each of the 88 SASS replicate weights divided by the SASS teacher full sample base weight for that teacher. To calculate 88 replicate weights, which should be used for variance calculations, these BTLS replicate basic weights were processed through the remainder of the BTLS weighting system (Burns, Wang, & Henning, 2011, p.9).

The reader should note that as a consequence of employing replicate weights, none of the coefficients in the models that follow are statistically significant. Instead of relying on statistical significance to discuss the results of these models, henceforth, these sections will highlight the practical significance of predictors using an effect size estimate that roughly equates to Cohen’s d (What Works Clearinghouse, 2014). Transformation from logit hazards to a Cohen's d type effect size can be achieved by multiplying the logit hazards by the ratio of the square root of 3 over pi (Borenstein, Hedges, Higgins, & Rothstein, 2009). The What Works Clearinghouse (WWC, 2014) standard for minimum effect size to establish practical significance is .25 standard deviation, and that cutoff will be utilized to illuminate those first-year teaching experiences that may have sizeable impacts on turnover rates indicating substantive importance.

First-year Teaching Experiences and Competing Turnover Risks

This section presents simple models to predict turnover outcomes conditioned on one first-year teaching experience at a time, not controlling for any other covariates or experiences. From the coefficients estimated in each model, the logit hazards, hazard ratios, and predicted turnover rates are calculated. To summarize the model results, predicted probabilities of turnover in each year, cumulative probabilities across the first five years, and effect sizes associated with both yearly turnover rates and cumulative turnover rates are presented and discussed to address practical significance. When interpreting these effect sizes, negative values of Cohen's *d* imply that teachers who have a particular experience or hold a specific perception in their first year are less likely to experience moving or leaving relative to teachers who do not have that experience or do not hold that perception. In contrast, positive values of Cohen's *d* imply that teachers who have an experience or hold a perception are *more* likely to experience moving or leaving relative to those teachers who do have that experience or perception. Put simply, negative effects sizes mean lower risks of turnover associated with exposure to an experience or perception in the first year of teaching; positive effect sizes mean higher risks of turnover associated with exposure to an experience or perception during one's initial year on the job.

First-year programs and policies and competing turnover risks. In the sections that follow, Models A.1 through A.6 are presented. These simple survival models predict turnover trajectories conditioned just one program or policy, not controlling for any other variables. These programs and policies include induction, mentoring, reduced teaching load, common planning time, seminars for first-year teachers, and extra classroom assistance. This section concludes with a more complex model (Model A) that includes all six program and policy predictors in one survival model.

Model A.1: Induction program participation. The dichotomous indicator capturing participation in an induction program in the first year of teaching was included in the base-time model as well as the interaction between time and induction to ensure the proportionality assumption would be met. Table 63 displays the coefficients, corrected standard errors, t-statistics, and p-values for the induction model estimated with sampling weights and replicate weights. The induction variable was coded with 0 capturing “no induction program” (the reference group) and 1 reflecting “participation in an induction program” (the comparison group).

Table 63. *Induction Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.672	3.715	-0.45	0.654
Leave (Intercept)	-1.555	2.438	-0.638	0.526
Move time 3	-0.14	5.837	-0.024	0.981
Leave time 3	-0.548	8.263	-0.066	0.947
Move time 4	-0.563	8.55	-0.066	0.948
Leave time 4	-1.635	6.646	-0.246	0.806
Move time 5	-2.348	242.937	-0.01	0.992
Leave time 5	-0.493	6.384	-0.077	0.939
Move Induction	0.008	4.601	0.002	0.999
Leave Induction	-0.812	3.455	-0.235	0.815
Move time 3*Induction	-0.192	7.079	-0.027	0.978
Leave time 3*Induction	-0.451	9.177	-0.049	0.961
Move time 4*Induction	-0.184	9.395	-0.02	0.985
Leave time 4*Induction	1.568	7.876	0.199	0.843
Move time 5*Induction	1.417	242.854	0.006	0.995
Leave time 5*Induction	0.406	8.328	0.049	0.961

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 64 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those who did and did not participate in an induction program in the first year; Figure 3 displays the yearly probabilities graphically.

Table 64. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Induction.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	No Induction	15.81%	14.03%	9.66%	1.76%	35.77%
	Induction	15.92%	11.95%	8.24%	6.94%	36.78%
Leavers	No Induction	17.43%	10.88%	3.96%	11.43%	37.40%
	Induction	8.57%	3.34%	8.07%	7.92%	25.19%

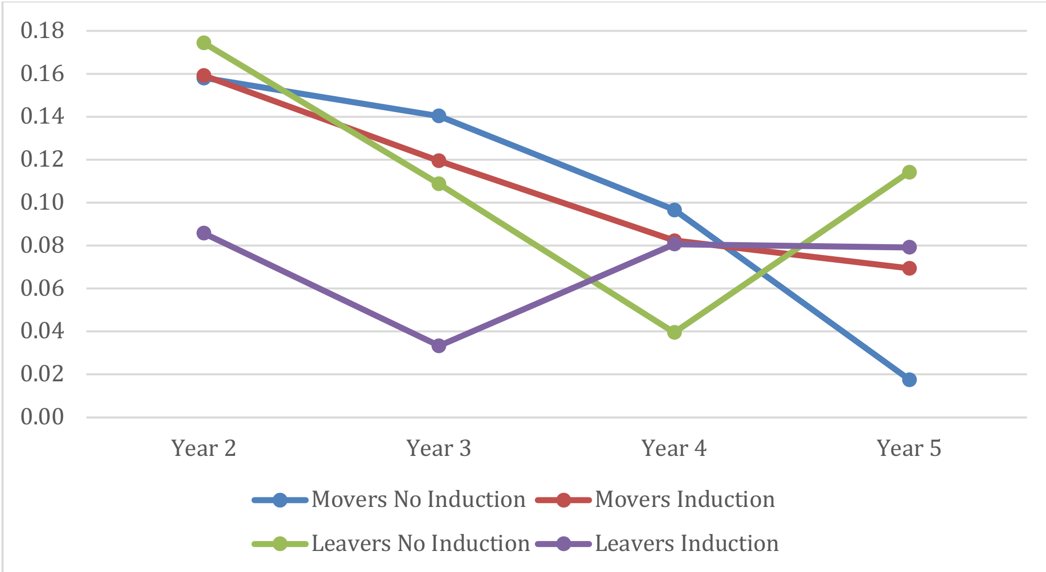

Figure 3. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Induction.*

Table 65 displays the Cohen's d effect sizes associated with participating in a first-year induction program at each subsequent year and cumulatively across the first five years.

Table 65. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Induction.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	0.004	-0.102	-0.097	0.786*	0.024
Leavers	-0.447*	-0.696*	0.417*	-0.224	-0.316*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Compared to teachers who did not experience an induction program in their first year, teachers who received an induction program in their first year were less likely to leave the teaching profession in Years 2 or 3, but more likely to leave in Year 4. Moreover, there was an association between receiving an induction program in the first year of teaching and moving schools in Year 5. Overall, the cumulative predicted probabilities of leaving in any of Years 2 to 5 were lower for teachers who had induction in their first year.

Model A.2: Mentoring. The dichotomous indicator capturing participation in a mentoring program in the first year of teaching was included in the base-time model as well as the interaction between time and mentoring to ensure the proportionality assumption would be met. Table 66 displays the coefficients, corrected standard errors, t-statistics, and p-values for the induction model estimated with sampling weights and replicate weights. The mentoring variable was coded with 0 capturing "no mentoring" (the reference group) and 1 reflecting "participation in mentoring" (the comparison group).

Table 66. *Mentoring Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.389	3.667	-0.379	0.706
Leave (Intercept)	-1.083	3.794	-0.285	0.776
Move time 3	-0.394	5.168	-0.076	0.940
Leave time 3	-1.416	6.562	-0.216	0.830
Move time 4	-0.462	7.859	-0.059	0.953
Leave time 4	-1.851	6.722	-0.275	0.784
Move time 5	-1.039	15.620	-0.067	0.947
Leave time 5	-0.670	51.032	-0.013	0.990
Move Mentoring	-0.331	4.315	-0.077	0.939
Leave Mentoring	-1.359	4.103	-0.331	0.742
Move time 3*Mentoring	0.161	6.453	0.025	0.980
Leave time 3*Mentoring	0.753	7.087	0.106	0.916
Move time 4*Mentoring	-0.295	8.548	-0.035	0.973
Leave time 4*Mentoring	1.844	7.874	0.234	0.816
Move time 5*Mentoring	-0.028	16.857	-0.002	0.999
Leave time 5*Mentoring	0.658	51.292	0.013	0.990

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 67 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those who did and did not participate in a mentoring program in the first year; Figure 4 displays the yearly probabilities graphically.

Table 67. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Mentoring.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	No Mentoring	19.96%	14.40%	13.58%	8.11%	45.59%
	Mentoring	15.19%	12.43%	7.75%	5.81%	35.46%
Leavers	No Mentoring	25.30%	7.60%	5.05%	14.77%	44.14%
	Mentoring	8.01%	4.30%	7.95%	7.91%	25.37%

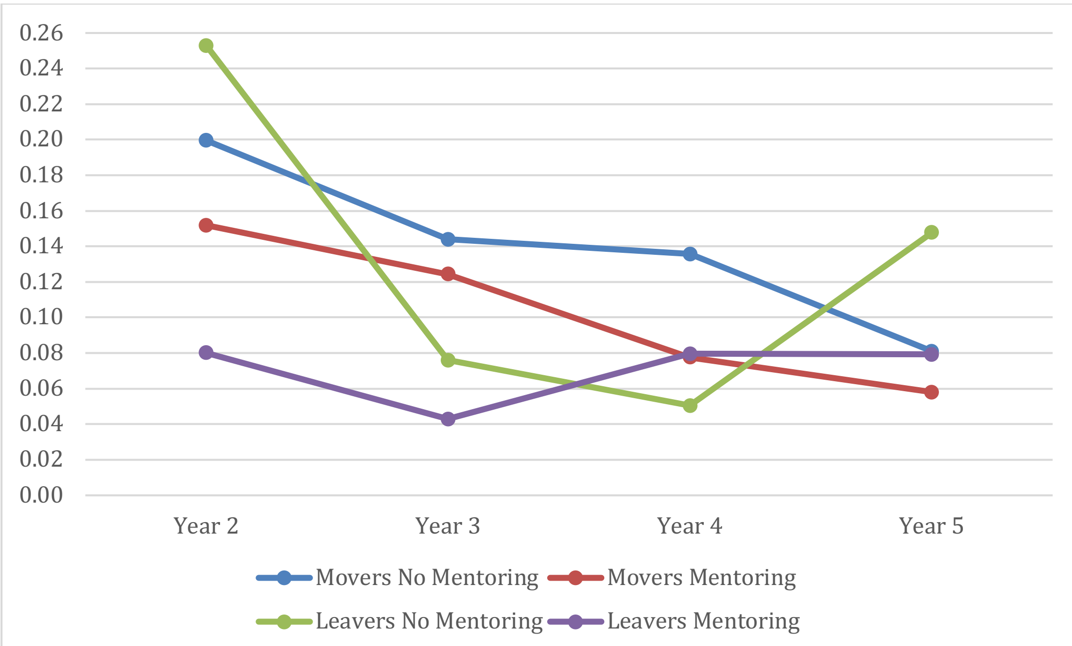

Figure 4. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Mentoring.*

Table 68 displays the Cohen's d effect sizes associated with participating in a first-year mentoring program at each subsequent year and cumulatively across the first five years.

Table 68. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Mentoring.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.182	-0.094	-0.345*	-0.198	-0.232
Leavers	-0.749*	-0.334*	0.267*	-0.387*	-0.465*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Relative to teachers who did not receive mentoring in their first year, teachers who were mentored in their first year were less likely to leave the teaching profession in Years 2, 3, or 5, but more likely to leave in Year 4. In addition, teachers who experienced mentoring were less likely to move in Year 4 than teachers who were not mentored. Overall, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers who had mentoring in their first year.

Model A.3: Teaching a reduced schedule. The dichotomous indicator capturing receiving a reduced teaching schedule in the first year of teaching was included in the base-time model as well as the interaction between time and reduced teaching load to ensure the proportionality assumption would be met. Table 69 displays the coefficients, corrected standard errors, t-statistics, and p-values for the reduced teaching schedule model estimated with sampling weights and replicate weights. The reduced teaching schedule variable was coded with 0 capturing "no reduction" (the reference group) and 1 reflecting "reduced teaching load" (the comparison group).

Table 69. *Reduced Teaching Schedule Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.622	2.008	-0.808	0.422
Leave (Intercept)	-2.094	2.003	-1.046	0.299
Move time 3	-0.398	2.897	-0.138	0.891
Leave time 3	-0.906	3.842	-0.236	0.814
Move time 4	-0.762	3.784	-0.201	0.841
Leave time 4	-0.291	4.349	-0.067	0.947
Move time 5	-1.009	4.869	-0.207	0.837
Leave time 5	-0.252	4.173	-0.060	0.952
Move Reduced	-0.393	3.338	-0.118	0.907
Leave Reduced	-0.610	4.669	-0.131	0.896
Move time 3*Reduced	0.831	6.749	0.123	0.902
Leave time 3*Reduced	0.468	45.648	0.010	0.992
Move time 4*Reduced	0.386	7.771	0.050	0.961
Leave time 4*Reduced	-0.423	251.565	-0.002	0.999
Move time 5*Reduced	-0.616	151.040	-0.004	0.997
Leave time 5*Reduced	0.448	290.380	0.002	0.999

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 70 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those who did and did not receive a reduced teaching schedule in the first year; Figure 5 displays the yearly probabilities graphically.

Table 70. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Reduced Teaching Load.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	No Reduction	16.49%	11.70%	8.44%	6.72%	37.02%
	Reduced Load	11.76%	17.04%	8.39%	2.56%	34.65%
Leavers	No Reduction	10.97%	4.74%	8.43%	8.74%	29.13%
	Reduced Load	6.27%	4.14%	3.17%	7.53%	19.56%

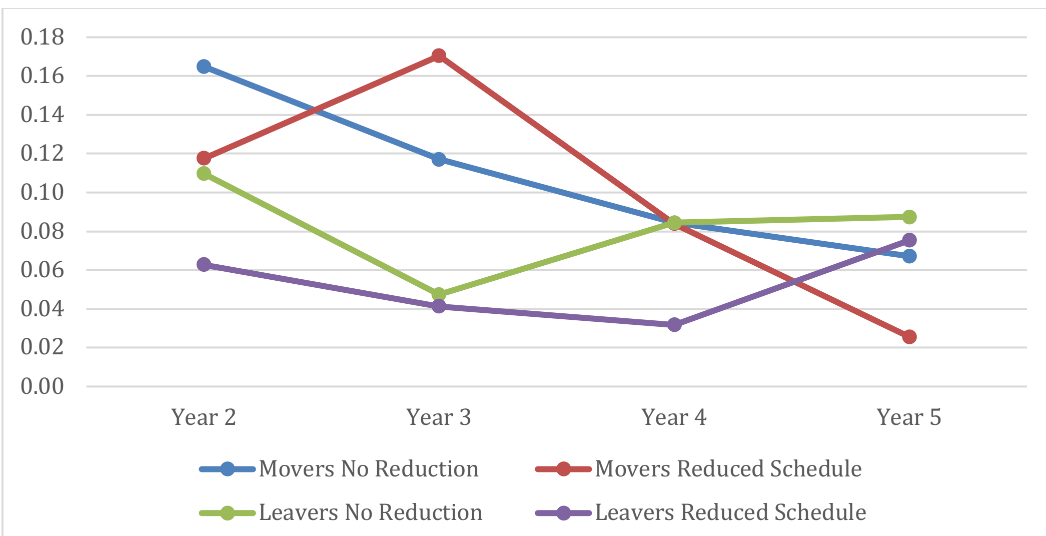

Figure 5. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Reduced Schedule.*

Table 71 displays the Cohen's d effect sizes associated with teaching a reduced schedule as a first-year teacher at each subsequent year and cumulatively across the first five years.

Table 71. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Reduced Teaching Load.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.217	0.241	-0.004	-0.556*	-0.057
Leavers	-0.336*	-0.078	-0.570*	-0.089	-0.289*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

In contrast to teachers who taught a standard load of classes in their first year, teachers who were given a reduced teaching assignment in their first year were less likely to leave the teaching profession in Years 2 and 4 and were less likely to move in Year 5. Overall, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers who were assigned to teach a reduced number of classes or students.

Model A.4: Common planning time. The dichotomous indicator capturing receiving common planning time in the first year of teaching was included in the base-time model as well as the interaction between time and common planning time to ensure the proportionality assumption would be met. Table 72 displays the coefficients, corrected standard errors, t-statistics, and p-values for the common planning time model estimated with sampling weights and replicate weights. The common planning time variable was coded with 0 capturing "no common time" (the reference group) and 1 reflecting "common planning" (the comparison group).

Table 72. *Common Planning Time Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.734	2.308	-0.751	0.455
Leave (Intercept)	-2.256	2.747	-0.821	0.414
Move time 3	-0.183	3.475	-0.053	0.958
Leave time 3	-0.703	3.770	-0.187	0.853
Move time 4	-0.957	5.215	-0.184	0.855
Leave time 4	-0.162	5.058	-0.032	0.975
Move time 5	-0.872	6.004	-0.145	0.885
Leave time 5	0.366	5.588	0.066	0.948
Move Common	0.097	3.741	0.026	0.979
Leave Common	0.144	3.754	0.038	0.970
Move time 3*Common	-0.130	5.767	-0.023	0.982
Leave time 3*Common	-0.263	7.162	-0.037	0.971
Move time 4*Common	0.430	6.394	0.067	0.947
Leave time 4*Common	-0.278	8.502	-0.033	0.974
Move time 5*Common	-0.371	50.369	-0.007	0.994
Leave time 5*Common	-1.283	8.631	-0.149	0.882

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 73 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those who did and did not receive common planning time in the first year; Figure 6 displays the yearly probabilities graphically.

Table 73. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Common Planning Time.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	None	15.01%	12.82%	6.35%	6.88%	35.38%
	Common Time	16.28%	12.45%	10.30%	5.31%	37.75%
Leavers	None	9.48%	4.93%	8.17%	13.12%	31.34%
	Common Time	10.78%	4.40%	7.22%	4.61%	24.51%

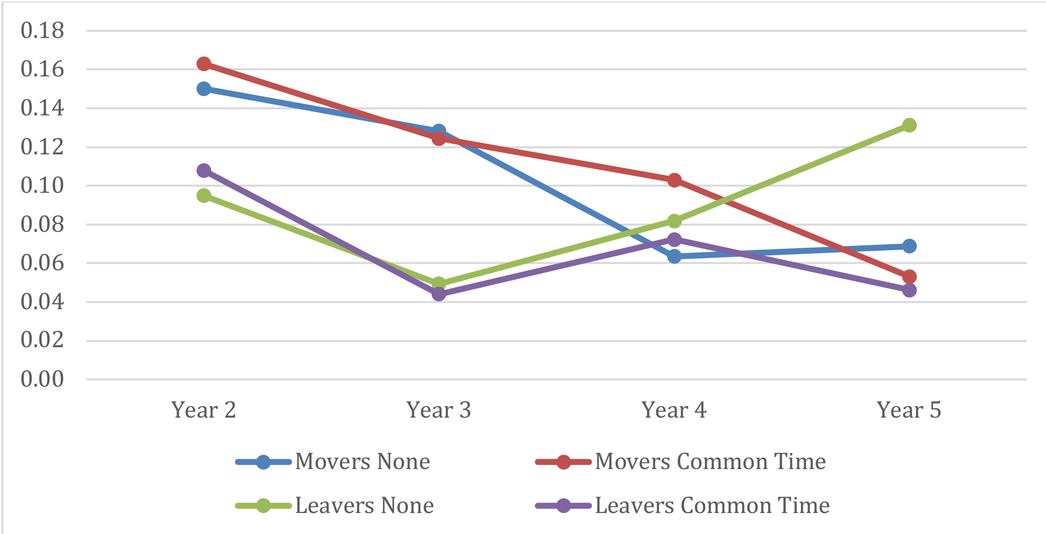

Figure 6. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Common Time.*

Table 74 displays the Cohen's d effect sizes associated with receiving common planning time as a first-year teacher at each subsequent year and cumulatively across the first five years.

Table 74. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Common Planning Time.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	0.053	-0.018	0.291*	-0.151	0.056
Leavers	0.079	-0.066	-0.074	-0.628*	-0.188

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

In comparison with teachers whose schedules did not include common planning time in their first year, teachers who did experience common planning time with colleagues in their first year were less likely to leave the teaching profession in Year 5. However, teachers who were given common planning time were more likely to move in Year 4 than teachers who did not have common planning time built into their school day.

Model A.5: Seminars for novice teachers. The dichotomous indicator capturing participating in seminars for new teachers in the first year of teaching was included in the base-time model as well as the interaction between time and seminars to ensure the proportionality assumption would be met. Table 75 displays the coefficients, corrected standard errors, t-statistics, and p-values for the seminars model estimated with sampling weights and replicate weights. The seminars variable was coded with 0 capturing “no seminars” (the reference group) and 1 reflecting “seminars attended” (the comparison group).

Table 75. *Seminars Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.700	5.085	-0.334	0.739
Leave (Intercept)	-1.563	3.261	-0.479	0.633
Move time 3	-0.051	6.744	-0.008	0.994
Leave time 3	-0.674	7.873	-0.086	0.932
Move time 4	0.177	7.947	0.022	0.982
Leave time 4	-0.637	6.141	-0.104	0.918
Move time 5	-1.428	83.827	-0.017	0.987
Leave time 5	-0.274	7.124	-0.039	0.969
Move Seminars	0.025	5.447	0.005	0.996
Leave Seminars	-0.876	4.182	-0.209	0.835
Move time 3*Seminars	-0.261	7.099	-0.037	0.971
Leave time 3*Seminars	-0.280	9.002	-0.031	0.975
Move time 4*Seminars	-1.222	8.617	-0.142	0.888
Leave time 4*Seminars	0.519	7.894	0.066	0.948
Move time 5*Seminars	0.417	84.479	0.005	0.996
Leave time 5*Seminars	0.180	7.988	0.023	0.982

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 76 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those who did and did not attend new teacher seminars in the first year; Figure 7 displays the yearly probabilities graphically.

Table 76. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Seminars.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	None	15.45%	14.79%	17.90%	4.20%	43.33%
	Seminars	15.78%	12.05%	6.18%	6.38%	34.94%
Leavers	None	17.32%	9.65%	9.98%	13.74%	41.99%
	Seminars	8.02%	3.25%	7.20%	7.36%	23.50%

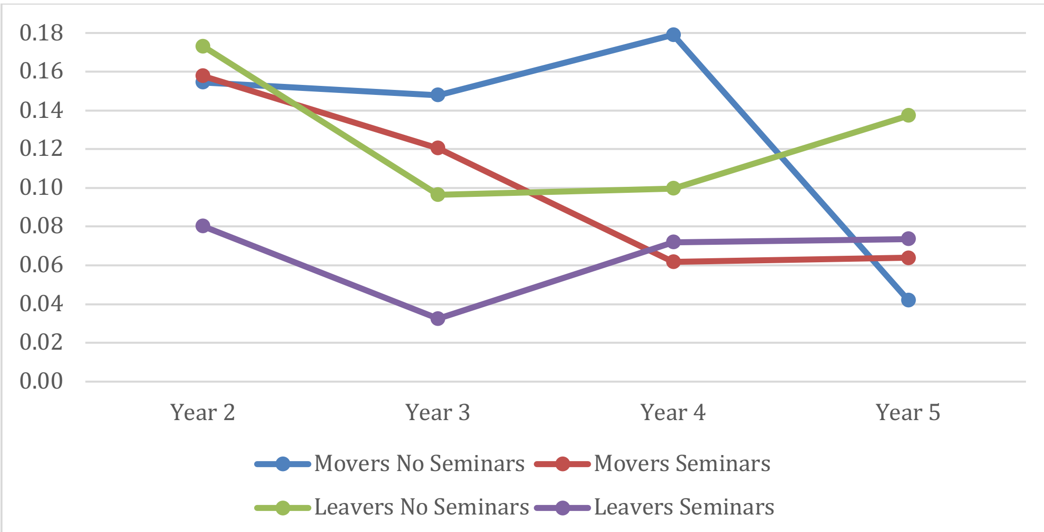

Figure 7. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Seminars.*

Table 77 displays the Cohen's d effect sizes associated with attending new teacher seminars as a first-year teacher at each subsequent year and cumulatively across the first five years.

Table 77. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Seminars.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	0.014	-0.130	-0.660*	0.244	-0.195
Leavers	-0.483*	-0.637*	-0.197	-0.384*	-0.473*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Teachers who attended seminars specifically for first-year educators in their initial year on the job were less likely to leave the teaching profession in Years 2, 3, or 5 relative to those teachers who did not attend such seminars in their first year. In addition, teachers who attended seminars for novices were less likely to move in Year 4 than teachers who did not attend such seminars in their first year. Overall, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers who attended seminars specifically designed for new teachers.

Model A.6: Receiving extra classroom assistance. The dichotomous indicator capturing receiving extra help and assistance in the first year of teaching was included in the base-time model as well as the interaction between time and extra help to ensure the proportionality assumption would be met. Table 78 displays the coefficients, corrected standard errors, t-statistics, and p-values for the extra help model estimated with sampling weights and replicate weights. The seminars variable was coded with 0 capturing "no extra help or assistance" (the reference group) and 1 reflecting "extra help provided" (the comparison group).

Table 78. *Extra Help Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.727	1.947	-0.887	0.378
Leave (Intercept)	-2.068	2.183	-0.948	0.347
Move time 3	-0.287	2.643	-0.108	0.914
Leave time 3	-0.842	4.183	-0.201	0.841
Move time 4	-0.830	3.820	-0.217	0.829
Leave time 4	-0.275	4.867	-0.057	0.955
Move time 5	-1.049	4.700	-0.223	0.824
Leave time 5	-0.247	5.049	-0.049	0.961
Move Extra Help	0.164	5.069	0.032	0.974
Leave Extra Help	-0.478	3.818	-0.125	0.901
Move time 3*Extra Help	0.103	8.225	0.013	0.990
Leave time 3*Extra Help	-0.027	7.073	-0.004	0.997
Move time 4*Extra Help	0.371	7.361	0.050	0.960
Leave time 4*Extra Help	-0.225	7.348	-0.031	0.976
Move time 5*Extra Help	-0.065	126.573	-0.001	1.000
Leave time 5*Extra Help	0.222	170.603	0.001	0.999

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 79 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those who did and did not receive extra help or assistance in the first year; Figure 8 displays the yearly probabilities graphically.

Table 79. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Extra Help.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	None	15.10%	11.78%	7.20%	5.86%	34.56%
	Extra Help	17.33%	14.85%	11.70%	6.44%	41.85%
Leavers	None	11.22%	5.17%	8.76%	8.99%	30.09%
	Extra Help	7.26%	3.18%	4.54%	7.10%	20.37%

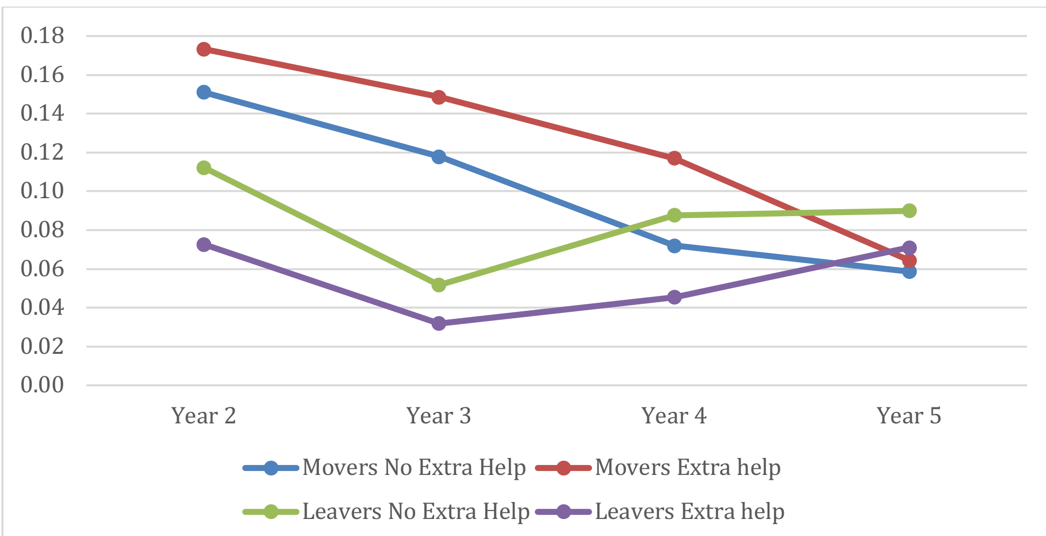

Figure 8. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Extra Help.*

Table 80 displays the Cohen's d effect sizes associated with receiving extra help as a first-year teacher at each subsequent year and cumulatively across the first five years.

Table 80. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Extra Help.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	0.091	0.147	0.295*	0.055	0.170
Leavers	-0.264*	-0.279*	-0.388*	-0.142	-0.287*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Contrasted with teachers who did not receive extra classroom assistance in their first year, teachers who were given extra assistance either in the form of a classroom aide or co-teacher were less likely to leave the teaching profession in Years 2, 3, or 4. However, teachers who did receive additional classroom assistance were more likely to move in Year 4 than teachers who did not receive this extra help. Overall, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers who were given extra classroom assistance in their first year.

Model A: All first-year teacher programs and policies. All dichotomous indicators of first-year teacher programs and policies were included in Model A to determine the relative impact of each predictor after partialling out the variability in turnover attributed to the other first-year teacher programs and policies. Table 81 displays the coefficients, corrected standard errors, t-statistics, and p-values for Model A estimated with sampling weights and replicate weights. Table 82 displays the Cohen's d effect sizes for moving and leaving associated with each type of first-year teacher program and policy at each subsequent year and cumulatively across the first five years.

Controlling for other first-year teacher programs and policies, the effect sizes for Leavers suggest that the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers received mentoring in their first year relative to teachers who were not mentored. Furthermore, the cumulative predicted probabilities of moving in any of Years 2 through 5 were actually higher for teachers received extra classroom assistance compared to teachers who did not receive this additional help in the classroom in their first year. When examining the effect sizes for Leavers, after controlling for other first-year teacher programs and policies, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers received mentoring and attended seminars for novice teachers in their first year relative to teachers who were not mentored or who did not attend such seminars.

Table 81. *First-year Programs and Policies Model Estimates.*

	Moving Coeff.	SE	t	p	Leaving Coeff.	SE	t	p
(Intercept)	-1.511	5.927	-0.255	0.800	-0.730	4.455	-0.164	0.871
time 3	-0.210	9.283	-0.023	0.982	-1.094	8.322	-0.131	0.896
time 4	-0.353	12.031	-0.029	0.977	-2.432	21.075	-0.115	0.909
time 5	-2.120	80.063	-0.027	0.979	-0.448	22.438	-0.020	0.984
Induction	-0.393	4.385	-0.090	0.929	-1.143	4.290	-0.267	0.792
Mentoring	0.098	4.808	0.020	0.984	-0.317	5.185	-0.061	0.952
Reduced Schedule	-0.414	3.597	-0.115	0.909	-0.561	5.483	-0.102	0.919
Common Planning	0.142	3.694	0.038	0.970	0.526	3.563	0.148	0.884
Seminars	0.041	5.969	0.007	0.995	-0.591	5.096	-0.116	0.908
Extra Help	0.212	5.254	0.040	0.968	-0.376	3.656	-0.103	0.919
time 3*Induction	0.261	6.742	0.039	0.969	1.255	9.828	0.128	0.899
time 3*Mentoring	-0.199	6.592	-0.030	0.976	-0.664	9.672	-0.069	0.946
time 3*Reduced Schedule	0.907	6.894	0.132	0.896	0.620	16.059	0.039	0.970
time 3*Common Planning	-0.143	5.603	-0.026	0.980	-0.477	7.975	-0.060	0.953
time 3*Seminars	-0.316	7.406	-0.043	0.966	-0.172	8.829	-0.020	0.985
time 3*Extra Help	0.030	8.402	0.004	0.997	-0.038	7.092	-0.005	0.996
time 4*Induction	-0.179	11.069	-0.016	0.987	1.762	20.295	0.087	0.931
time 4*Mentoring	0.291	10.259	0.028	0.978	1.120	8.029	0.140	0.890
time 4*Reduced Schedule	0.281	9.007	0.031	0.975	-0.787	74.236	-0.011	0.992
time 4*Common Planning	0.652	7.014	0.093	0.927	-0.475	9.146	-0.052	0.959
time 4*Seminars	-1.438	9.751	-0.148	0.884	0.084	8.889	0.010	0.993
time 4*Extra Help	0.478	7.905	0.061	0.952	-0.360	7.976	-0.045	0.964
time 5*Induction	-0.481	41.004	-0.012	0.991	0.907	22.453	0.040	0.968
time 5*Mentoring	1.599	54.687	0.029	0.977	0.052	12.590	0.004	0.997
time 5*Reduced Schedule	-0.631	35.741	-0.018	0.986	0.844	50.768	0.017	0.987
time 5*Common Planning	-0.291	19.432	-0.015	0.988	-1.640	8.337	-0.197	0.845
time 5*Seminars	0.300	27.276	0.011	0.991	0.206	11.301	0.018	0.986
time 5*Extra Help	0.059	48.673	0.001	0.999	0.158	38.860	0.004	0.997

Table 82. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on First-year Programs and Policies.*

Outcome	Experience	Yr 2	Yr 3	Yr 4	Yr 5	Cum.
Moving	Induction	0.05	-0.06	0.21	0.94*	0.21
	Mentoring	-0.22	-0.07	-0.32*	-0.48*	-0.28*
	Reduced Schedule	-0.23	0.27*	-0.07	-0.58*	-0.16
	Common Planning	0.08	0	0.44*	-0.08	0.17
	Seminars	0.02	-0.15	-0.77*	0.19	-0.1
	Extra Help	0.12	0.13	0.38*	0.15	0.26*
Leaving	Induction	-0.18	-0.54*	0.44*	-0.15	-0.2
	Mentoring	-0.63*	0.06	0.34*	-0.13	-0.25*
	Reduced Schedule	-0.31*	0.03	-0.74*	0.16	-0.05
	Common Planning	0.29*	0.03	0.03	-0.61*	-0.19
	Seminars	-0.33*	-0.42*	-0.28*	-0.21	-0.37*
	Extra Help	-0.21	-0.23	-0.41*	-0.12	-0.24

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Preparedness to teach and competing turnover risks. In this section, Model B is presented. This simple survival model predicts turnover trajectories conditioned on the lone factor score capturing preparedness to teach.

Model B: Perceptions of preparedness. The factor score capturing perceptions of preparedness to teach in the first year was included in the base-time model as well as the interaction between time and preparedness to ensure the proportionality assumption would be met. Table 83 displays the coefficients, corrected standard errors, t-statistics, and p-values for the extra help model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of preparedness. Furthermore, the betas for "Move Preparedness" and "Leave Preparedness" represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Preparedness subscale fall 1 standard deviation above the mean.

Table 83. *Preparedness Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.689	1.932	-0.874	0.385
Leave (Intercept)	-2.176	1.936	-1.124	0.265
Move time 3	-0.249	2.857	-0.087	0.931
Leave time 3	-0.915	3.181	-0.288	0.775
Move time 4	-0.791	3.138	-0.252	0.802
Leave time 4	-0.497	3.474	-0.143	0.887
Move time 5	-1.046	4.580	-0.228	0.820
Leave time 5	-0.217	5.184	-0.042	0.967
Move Preparedness	0.072	2.675	0.027	0.979
Leave Preparedness	-0.040	1.809	-0.022	0.982
Move time 3* Preparedness	-0.203	3.378	-0.060	0.952
Leave time 3* Preparedness	-0.406	2.960	-0.137	0.891
Move time 4* Preparedness	-0.731	4.018	-0.182	0.856
Leave time 4* Preparedness	-0.799	4.805	-0.166	0.868
Move time 5* Preparedness	-0.393	3.974	-0.099	0.922
Leave time 5* Preparedness	-0.482	5.094	-0.095	0.925

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 84 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of preparedness (average preparedness) and for individuals with preparedness scores 1 standard deviation above the mean (higher preparedness); Figure 9 displays the yearly probabilities graphically.

Table 84. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Preparedness Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average preparedness	15.59%	12.58%	7.72%	6.10%	36.06%
	Higher preparedness	16.56%	11.21%	4.15%	4.50%	32.18%
Leavers	Average preparedness	10.19%	4.35%	6.46%	8.37%	26.37%
	Higher preparedness	9.83%	2.83%	2.90%	5.14%	19.29%

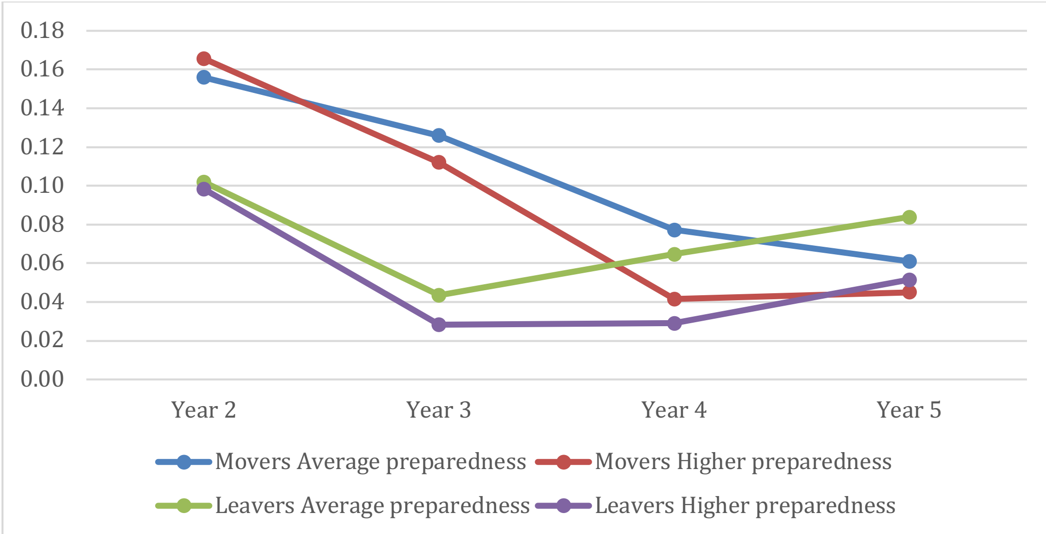

Figure 9. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Preparedness Factor Scores.*

Table 85 displays the Cohen's d effect sizes associated with feeling more prepared as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 85. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Preparedness Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	0.040	-0.072	-0.363*	-0.177	-0.095
Leavers	-0.022	-0.246	-0.463*	-0.288*	-0.223

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Compared to teachers with average perceptions of preparedness, teachers with more positive perceptions of preparation for their first year of teaching (i.e., preparedness scores 1 standard deviation above the mean) were less likely to leave the teaching profession in Years 4 or 5. In addition, teachers with more positive perceptions of preparation for their first year (i.e., preparedness scores 1 standard deviation above the mean) were less likely to move in Year 4 than teachers who perceived their level of preparedness as average.

Perceptions of school climate and workplace conditions. In the sections that follow, Models C.1 through C.10 are presented. These simple survival models predict turnover trajectories conditioned just one measure of school climate and workplace conditions from the initial year of teaching, not controlling for any other variables. These conditions include pedagogical autonomy, curricular autonomy, administrative support, collegial support, parental support, access to materials, paperwork and routine duties interference, student behavior, job security tied to test scores, and content standards impacting satisfaction as measured in the first year of work. This section concludes with a more complex model (Model C) that includes all ten measures of school climate and workplace conditions in one survival model.

Model C.1: Pedagogical autonomy. The factor score capturing perceptions of pedagogical autonomy in the first year was included in the base-time model as well as the interaction between time and pedagogical autonomy to ensure the proportionality assumption would be met. Table 86 displays the coefficients, corrected standard errors, t-statistics, and p-values for the pedagogical autonomy model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of pedagogical autonomy. Furthermore, the betas for "Move Pedagogical Autonomy" and "Leave Pedagogical Autonomy" represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Pedagogical Autonomy subscale fall 1 standard deviation above the mean.

Table 86. *Pedagogical Autonomy Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.729	1.840	-0.940	0.351
Leave (Intercept)	-2.170	1.885	-1.152	0.253
Move time 3	-0.216	3.051	-0.071	0.944
Leave time 3	-0.819	3.400	-0.241	0.810
Move time 4	-0.702	3.201	-0.219	0.827
Leave time 4	-0.389	4.980	-0.078	0.938
Move time 5	-0.957	6.169	-0.155	0.877
Leave time 5	-0.172	4.479	-0.038	0.969
Move Pedagogical Autonomy	-0.459	2.342	-0.196	0.845
Leave Pedagogical Autonomy	0.111	1.769	0.063	0.950
Move time 3* Pedagogical Autonomy	0.415	3.009	0.138	0.891
Leave time 3* Pedagogical Autonomy	-0.171	3.290	-0.052	0.959
Move time 4* Pedagogical Autonomy	-0.001	3.532	0.000	1.000
Leave time 4* Pedagogical Autonomy	0.198	4.088	0.048	0.962
Move time 5* Pedagogical Autonomy	0.613	7.682	0.080	0.937
Leave time 5* Pedagogical Autonomy	-0.111	2.899	-0.038	0.970

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 87 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of pedagogical autonomy (average autonomy) and for individuals with pedagogical autonomy scores 1 standard deviation above the mean (higher autonomy); Figure 10 displays the yearly probabilities graphically.

Table 87. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Pedagogical Autonomy Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average autonomy	15.07%	12.51%	8.08%	6.38%	36.06%
	Higher autonomy	10.08%	12.04%	5.26%	7.37%	30.59%
Leavers	Average autonomy	10.24%	4.79%	7.18%	8.77%	27.63%
	Higher autonomy	11.31%	4.52%	9.53%	8.77%	30.11%

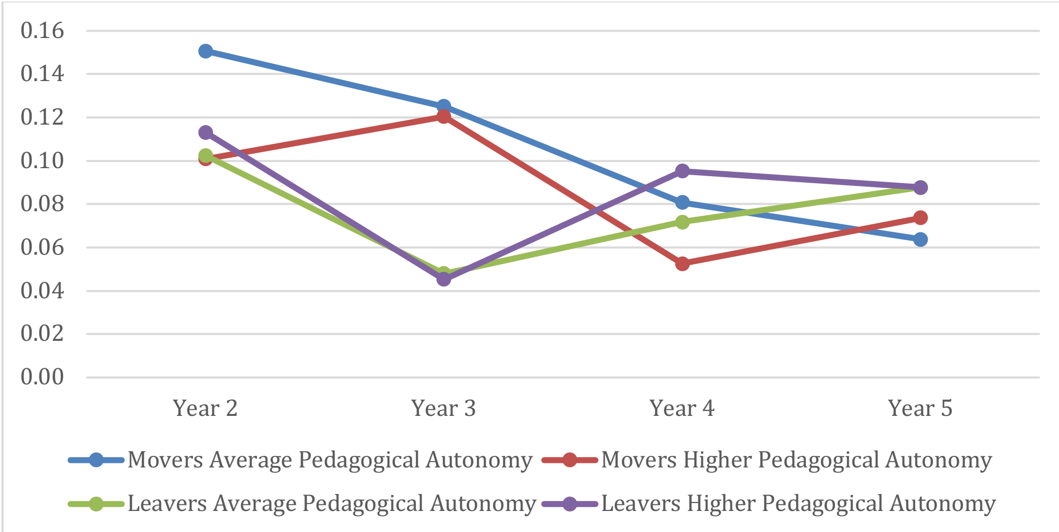

Figure 10. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Pedagogical Autonomy Factor Scores.*

Table 88 displays the Cohen's d effect sizes associated with feeling more pedagogical autonomy as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 88. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Pedagogical Autonomy Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.253*	-0.024	-0.254*	0.085	-0.136
Leavers	0.061	-0.033	0.170	0.000	0.066

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Relative to teachers reporting average levels of pedagogical autonomy, teachers indicating greater levels of pedagogical autonomy during their first year of teaching (i.e., pedagogical autonomy scores 1 standard deviation above the mean) were less likely to move to a new school in Years 2 or 4.

Model C.2: Curricular autonomy. The factor score capturing perceptions of curricular autonomy in the first year was included in the base-time model as well as the interaction between time and curricular autonomy to ensure the proportionality assumption would be met. Table 89 displays the coefficients, corrected standard errors, t-statistics, and p-values for the curricular autonomy model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of curricular autonomy. Furthermore, the betas for "Move Curricular Autonomy" and "Leave Curricular Autonomy" represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Curricular Autonomy subscale fall 1 standard deviation above the mean.

Table 89. *Curricular Autonomy Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.685	1.839	-0.916	0.363
Leave (Intercept)	-2.165	1.790	-1.210	0.230
Move time 3	-0.268	3.037	-0.088	0.930
Leave time 3	-0.841	3.163	-0.266	0.791
Move time 4	-0.714	3.231	-0.221	0.826
Leave time 4	-0.335	4.476	-0.075	0.941
Move time 5	-1.038	5.222	-0.199	0.843
Leave time 5	-0.188	4.498	-0.042	0.967
Move Curricular Autonomy	-0.274	2.884	-0.095	0.925
Leave Curricular Autonomy	-0.187	1.963	-0.095	0.924
Move time 3* Curricular Autonomy	0.383	4.080	0.094	0.926
Leave time 3* Curricular Autonomy	-0.048	4.756	-0.010	0.992
Move time 4* Curricular Autonomy	-0.109	3.279	-0.033	0.974
Leave time 4* Curricular Autonomy	-0.014	4.615	-0.003	0.998
Move time 5* Curricular Autonomy	0.602	6.394	0.094	0.925
Leave time 5* Curricular Autonomy	0.297	3.165	0.094	0.926

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 90 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of curricular autonomy (average autonomy) and for individuals with curricular autonomy scores 1 standard deviation above the mean (higher autonomy); Figure 11 displays the yearly probabilities graphically.

Table 90. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Curricular Autonomy Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average autonomy	15.65%	12.42%	8.33%	6.16%	36.45%
	Higher autonomy	12.36%	13.66%	5.84%	8.36%	34.71%
Leavers	Average autonomy	10.29%	4.72%	7.58%	8.68%	27.86%
	Higher autonomy	8.69%	3.76%	6.29%	9.59%	25.55%

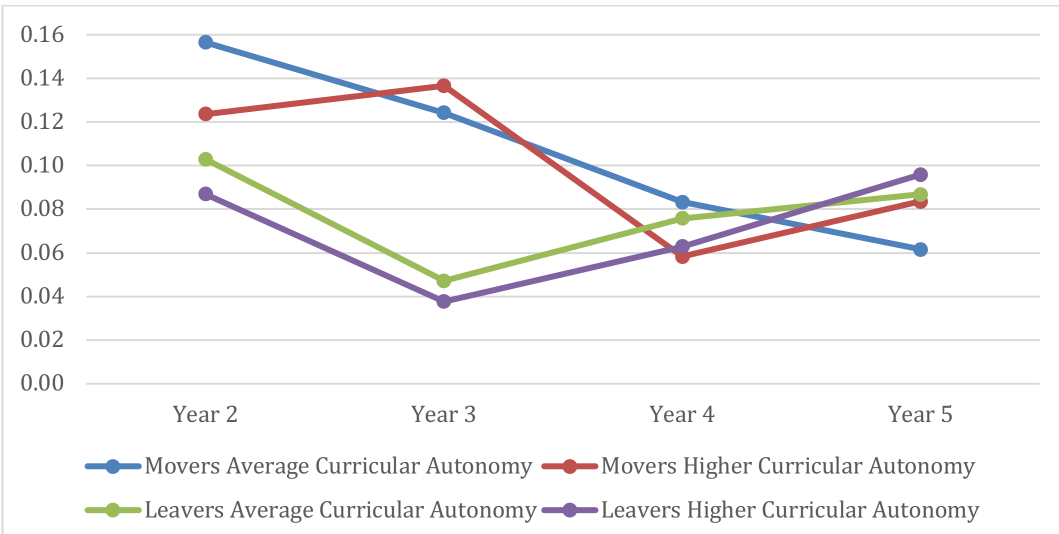

Figure 11. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Curricular Autonomy Factor Scores.*

Table 91 displays the Cohen's d effect sizes associated with feeling more curricular autonomy as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 91. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Curricular Autonomy Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.151	0.060	-0.211	0.181	-0.042
Leavers	-0.103	-0.130	-0.111	0.061	-0.065

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

From these effect size calculations, it appears that perceptions of curricular autonomy in the first year may not be associated with early career teachers' decisions to turn over.

Model C.3: Administrative support. The factor score capturing perceptions of administrative support in the first year was included in the base-time model as well as the interaction between time and administrative support to ensure the proportionality assumption would be met. Table 92 displays the coefficients, corrected standard errors, t-statistics, and p-values for the administrative support model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of administrative support. Furthermore, the betas for "Move Administrative Support" and "Leave Administrative Support" represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Administrative Support subscale fall 1 standard deviation above the mean.

Table 92. *Administrative Support Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.772	1.873	-0.946	0.347
Leave (Intercept)	-2.196	1.971	-1.114	0.269
Move time 3	-0.173	2.780	-0.062	0.951
Leave time 3	-1.059	2.976	-0.356	0.723
Move time 4	-0.757	3.282	-0.231	0.818
Leave time 4	-0.439	3.359	-0.131	0.896
Move time 5	-0.919	5.084	-0.181	0.857
Leave time 5	-0.087	6.041	-0.014	0.989
Move Administrative Support	-0.704	1.417	-0.496	0.621
Leave Administrative Support	-0.580	1.703	-0.340	0.735
Move time 3* Administrative Support	0.829	2.651	0.313	0.755
Leave time 3* Administrative Support	0.128	2.993	0.043	0.966
Move time 4* Administrative Support	-0.266	2.888	-0.092	0.927
Leave time 4* Administrative Support	1.127	5.540	0.203	0.839
Move time 5* Administrative Support	0.005	5.100	0.001	0.999
Leave time 5* Administrative Support	0.089	7.151	0.013	0.990

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 93 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of administrative support (average support) and for individuals with administrative support scores 1 standard deviation above the mean (higher support); Figure 12 displays the yearly probabilities graphically.

Table 93. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Administrative Support Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average support	14.53%	12.51%	7.39%	6.35%	35.15%
	Higher support	7.76%	13.96%	2.94%	3.26%	25.48%
Leavers	Average support	10.01%	3.71%	6.69%	9.26%	26.64%
	Higher support	5.87%	2.40%	11.03%	5.88%	23.06%

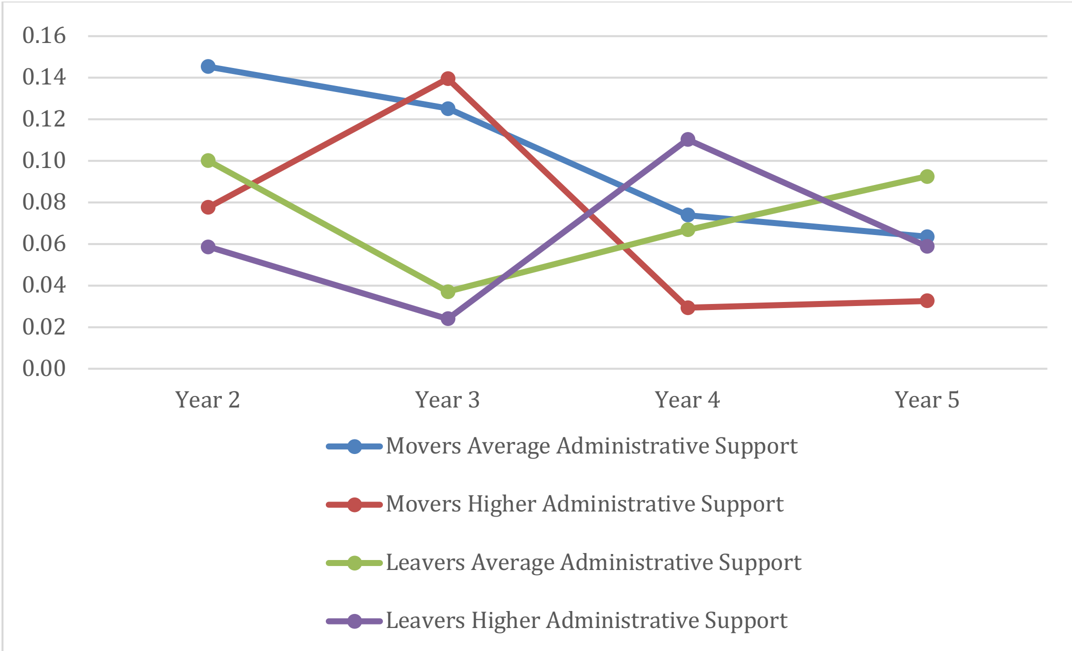

Figure 12. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Administrative Support Factor Scores.*

Table 94 displays the Cohen's d effect sizes associated with feeling more administrative support as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 94. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Administrative Support Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.388*	0.069	-0.534*	-0.385*	-0.254*
Leavers	-0.320*	-0.249	0.302*	-0.271*	-0.106

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Compared to teachers with average perceptions of administrative support, teachers who perceived greater support from their administration throughout their first year of teaching (i.e., administrative support scores 1 standard deviation above the mean) were less likely to leave the teaching profession in Years 2, 4 or 5. In addition, teachers who perceived greater support from their administration in their first year of teaching were less likely to move in Years 2 and 5 but more likely to move in Year 4 than teachers who perceived support provided by administrators as average. Overall, the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers who perceived greater support from administrators relative to those who perceived average support from their school leadership.

Model C.4: Collegial support. The factor score capturing perceptions of collegial support in the first year was included in the base-time model as well as the interaction between time and collegial support to ensure the proportionality assumption would be met. Table 95 displays the coefficients, corrected standard errors, t-statistics, and p-values for the collegial support model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of collegial support. Furthermore, the betas for “Move Collegial Support” and “Leave Collegial Support” represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Collegial Support subscale fall 1 standard deviation above the mean.

Table 95. *Collegial Support Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.710	1.730	-0.988	0.326
Leave (Intercept)	-2.175	1.901	-1.145	0.256
Move time 3	-0.267	2.808	-0.095	0.924
Leave time 3	-0.831	3.305	-0.252	0.802
Move time 4	-0.741	3.112	-0.238	0.813
Leave time 4	-0.505	3.073	-0.164	0.870
Move time 5	-1.009	4.494	-0.225	0.823
Leave time 5	-0.193	4.807	-0.040	0.968
Move Collegial Support	-0.331	2.018	-0.164	0.870
Leave Collegial Support	-0.296	2.138	-0.139	0.890
Move time 3* Collegial Support	0.532	3.339	0.160	0.874
Leave time 3* Collegial Support	-0.067	2.876	-0.023	0.982
Move time 4* Collegial Support	-0.149	2.554	-0.058	0.954
Leave time 4* Collegial Support	1.018	6.032	0.169	0.867
Move time 5* Collegial Support	-0.210	3.704	-0.057	0.955
Leave time 5* Collegial Support	-0.139	5.436	-0.026	0.980

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 96 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of collegial support (average support) and for individuals with collegial support scores 1 standard deviation above the mean (higher support); Figure 13 displays the yearly probabilities graphically.

Table 96. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Collegial Support Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average support	15.32%	12.16%	7.94%	6.19%	35.76%
	Higher support	11.50%	14.49%	5.07%	3.70%	30.82%
Leavers	Average support	10.20%	4.71%	6.41%	8.56%	26.77%
	Higher support	7.78%	3.32%	12.35%	5.71%	26.32%

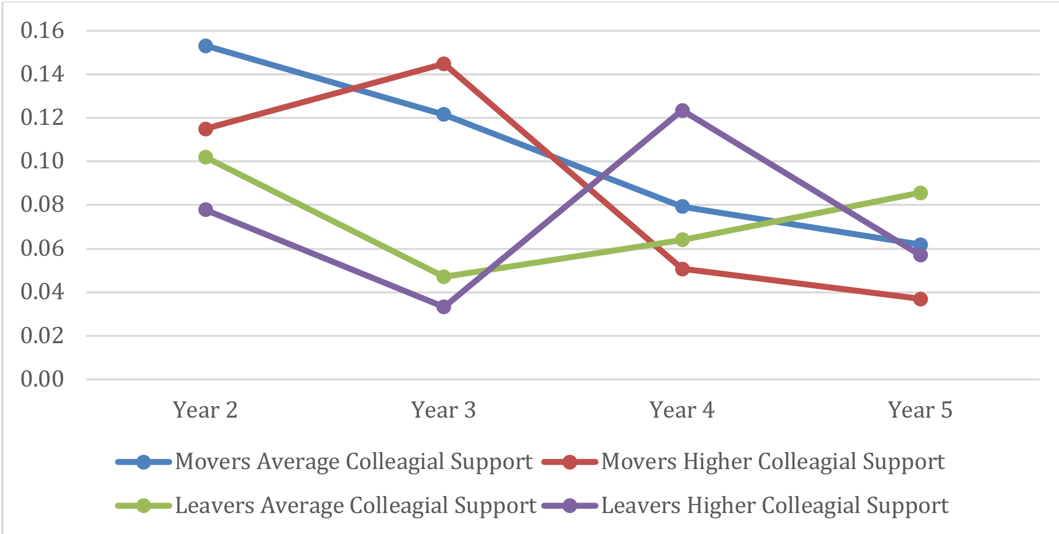

Figure 13. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Collegial Support Factor Scores.*

Table 97 displays the Cohen's d effect sizes associated with feeling more collegial support as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 97. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Collegial Support Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.182	0.111	-0.264*	-0.298*	-0.123
Leavers	-0.163	-0.200	0.398*	-0.240	-0.013

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Teachers who perceived greater support from their colleagues in their first year of teaching (i.e., collegial support scores 1 standard deviation above the mean) were more likely to leave the teaching profession in Year 3 but were less likely to move in Years 4 or 5 in comparison to teachers with average perceptions of collegial support.

Model C.5: Parental support. The factor score capturing perceptions of parental support in the first year was included in the base-time model as well as the interaction between time and parental support to ensure the proportionality assumption would be met. Table 98 displays the coefficients, corrected standard errors, t-statistics, and p-values for the parental support model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of parental support. Furthermore, the betas for "Move Parental Support" and "Leave Parental Support" represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Parental Support subscale fall 1 standard deviation above the mean.

Table 98. *Parental Support Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.716	1.828	-0.939	0.351
Leave (Intercept)	-2.163	1.828	-1.184	0.241
Move time 3	-0.238	2.940	-0.081	0.936
Leave time 3	-0.876	3.242	-0.270	0.788
Move time 4	-0.675	3.285	-0.206	0.838
Leave time 4	-0.366	4.299	-0.085	0.933
Move time 5	-0.976	4.154	-0.235	0.815
Leave time 5	-0.265	4.376	-0.061	0.952
Move Parental Support	-0.367	1.942	-0.189	0.851
Leave Parental Support	-0.018	2.517	-0.007	0.994
Move time 3* Parental Support	0.292	3.691	0.079	0.937
Leave time 3* Parental Support	-0.487	2.978	-0.164	0.870
Move time 4* Parental Support	-0.052	2.820	-0.019	0.985
Leave time 4* Parental Support	-0.508	5.221	-0.097	0.923
Move time 5* Parental Support	0.446	2.940	0.152	0.880
Leave time 5* Parental Support	-0.806	5.113	-0.158	0.875

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 99 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of parental support (average support) and for individuals with parental support scores 1 standard deviation above the mean (higher support); Figure 14 displays the yearly probabilities graphically.

Table 99. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Parental Support Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average support	15.23%	12.41%	8.38%	6.34%	36.29%
	Higher support	11.08%	11.62%	5.68%	6.83%	30.93%
Leavers	Average support	10.31%	4.57%	7.39%	8.10%	27.15%
	Higher support	10.14%	2.81%	4.50%	3.73%	19.70%

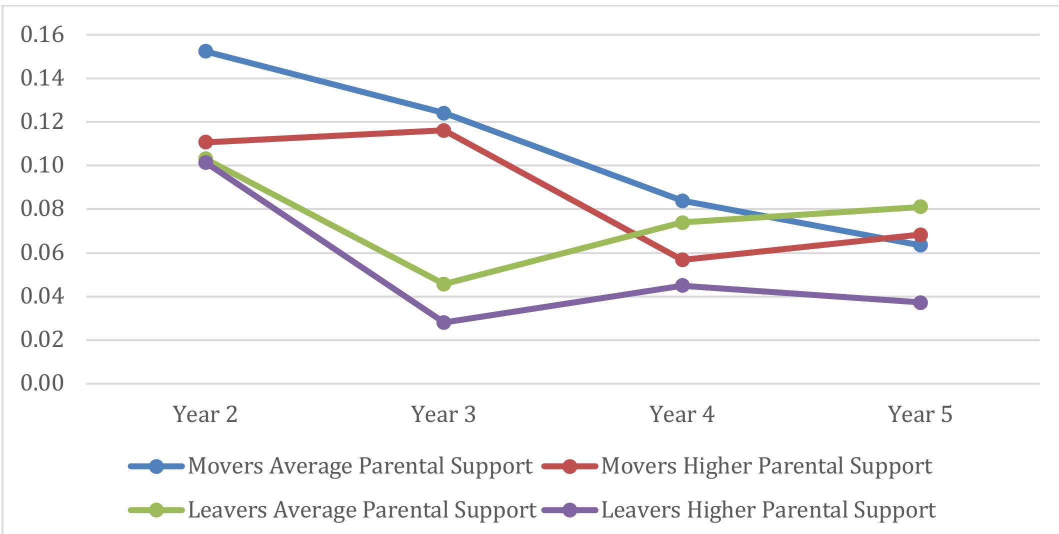

Figure 14. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Parental Support Factor Scores.*

Table 100 displays the Cohen's d effect sizes associated with feeling more parental support as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 100. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Parental Support Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.202	-0.041	-0.231	0.044	-0.133
Leavers	-0.010	-0.279*	-0.290*	-0.454*	-0.230

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Relative to teachers with average perceptions of parental support, teachers who perceived greater support from their students' parents in their first year of teaching (i.e., parental support scores 1 standard deviation above the mean) were less likely to leave the teaching profession in Years 3, 4 or 5.

Model C.6: Access to materials. The variable capturing availability of materials in the first year was included in the base-time model as well as the interaction between time and material availability to ensure the proportionality assumption would be met. Table 101 displays the coefficients, corrected standard errors, t-statistics, and p-values for the material availability model estimated with sampling weights and replicate weights. This variable retains its original scale from the BTLS from 1 to 4 where "1" corresponds to the respondent strongly disagreeing and "4" corresponds to the respondent strongly agreeing with the statement that "Necessary materials such as textbooks, supplies, and copy machines are available as needed by the staff." Therefore, the intercepts for this model reflect the predicted logit hazards for individuals with a "0" on this item, a score that falls outside the range of responses for the variable. Since this variable was not centered, the intercepts are not meaningful in the context of the original scale. However, the betas for "Move Material Availability" and "Leave Material Availability" are meaningful and represent the predicted change in the logit hazards for a 1-unit increase in the response to this item, where such an increase reflects greater availability of materials. Therefore, the betas reflect the change to the log-hazards of moving and leaving when more materials are available in the school.

Table 101. *Material Availability Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-0.494	4.446	-0.111	0.912
Leave (Intercept)	-1.678	8.184	-0.205	0.838
Move time 3	-2.442	8.449	-0.289	0.773
Leave time 3	0.210	12.075	0.017	0.986
Move time 4	0.251	9.575	0.026	0.979
Leave time 4	0.876	11.173	0.078	0.938
Move time 5	-0.326	19.358	-0.017	0.987
Leave time 5	0.234	18.667	0.013	0.990
Move Material Availability	-0.389	1.394	-0.279	0.781
Leave Material Availability	-0.155	2.499	-0.062	0.951
Move time 3* Material Availability	0.686	2.865	0.239	0.812
Leave time 3* Material Availability	-0.351	3.498	-0.100	0.920
Move time 4* Material Availability	-0.314	3.015	-0.104	0.917
Leave time 4* Material Availability	-0.387	3.350	-0.115	0.908
Move time 5* Material Availability	-0.204	5.966	-0.034	0.973
Leave time 5* Material Availability	-0.125	5.151	-0.024	0.981

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 102 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching associated with each level of agreement relative to the material availability item; a “1” implies less availability and a “4” implies greater availability.

Table 102. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Material Availability Responses.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly disagree; little available)	29.26%	6.67%	27.97%	19.59%	61.76%
	2 (Somewhat disagree)	21.90%	8.77%	16.14%	11.88%	47.35%
	3 (Somewhat agree)	15.98%	11.47%	8.71%	6.94%	36.80%
	4 (Strongly agree; more available)	11.42%	14.85%	4.51%	3.96%	30.83%
Leavers	1 (Strongly disagree; little available)	13.80%	12.20%	20.70%	15.14%	49.07%
	2 (Somewhat disagree)	12.06%	7.74%	13.19%	11.89%	37.94%
	3 (Somewhat agree)	10.51%	4.82%	8.12%	9.26%	28.99%
	4 (Strongly agree; more available)	9.15%	2.96%	4.90%	7.16%	22.16%

Table 103 displays the Cohen's d effect sizes associated with each level of material availability as a first-year teacher at each subsequent year and cumulatively across the first five years.

Table 103. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Material Availability.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly disagree; little available)	-0.214	0.164	-0.387*	-0.326*	-0.403*
	2 (Somewhat disagree)	-0.428*	0.328*	-0.774*	-0.653*	-0.726*
	3 (Somewhat agree)	-0.643*	0.492*	-1.161*	-0.979*	-0.966*
	4 (Strongly agree; more available)	-0.857*	0.656*	-1.549*	-1.306*	-1.113*
Leavers	1 (Strongly disagree; little available)	-0.085	-0.279*	-0.298*	-0.154	-0.285*
	2 (Somewhat disagree)	-0.170	-0.557*	-0.597*	-0.308*	-0.535*
	3 (Somewhat agree)	-0.256*	-0.836*	-0.895*	-0.463*	-0.758*
	4 (Strongly agree; more available)	-0.341*	-1.115*	-1.193*	-0.617*	-0.957*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Interpretation of these effect sizes is different from those presented previously. Rather than highlight specific effect sizes from the table, it is more illuminating to discuss this table based on the trends visible within each column for Movers and Leavers. Note that for both turnover outcomes, the effect sizes increase in magnitude and become more and more negative as there are more resources and materials available to first-year teachers (with the exception of Movers in Year 3). This implies that the probabilities of leaving across Years 2 through 5 decrease with greater access to materials and resources for first-year teachers. In addition, the effect sizes associated with the risk of leaving in Years 2 through 5 increase in magnitude as there are greater and greater resources available. This implies that the probability of leaving decreases as teachers gain greater and greater access to the resources they need to do their job. With respect to moving, the probabilities of moving to a new school in Years 2, 4, and 5 decrease with greater resource availability but actually increase in Year 3.

Model C.7: Paperwork and routine duties interference. The variable capturing the amount that paperwork and routine duties interfere with the job of teaching in the first year was included in the base-time model as well as the interaction between time and interference to ensure the proportionality assumption would be met. Table 104 displays the coefficients, corrected standard errors, t-statistics, and p-values for the paperwork interference model estimated with sampling weights and replicate weights. This variable retains its original scale from the BTLS from 1 to 4 where “1” corresponds to the respondent strongly agreeing and “4” corresponds to the respondent strongly disagreeing with the statement that “Routine duties and paperwork interfere with my job of teaching.” Therefore, the intercepts for this model reflect the predicted logit hazards for individuals with a “0” on this item, a score that falls outside the range of responses for the variable. Since this variable was not centered, the intercepts are not meaningful in the context of the original scale. However, the betas for “Move Paperwork Interference” and “Leave Paperwork Interference” are meaningful and represent the predicted change in the logit hazards for a 1-unit increase in the response to this item, where such an increase reflects less interference of routine duties and paperwork. Therefore, the betas reflect the change to the log-hazards of moving and leaving when there is less interference by additional responsibilities.

Table 104. *Paperwork Interference Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.213	5.175	-0.234	0.815
Leave (Intercept)	-2.299	5.560	-0.414	0.681
Move time 3	-1.191	7.546	-0.158	0.875
Leave time 3	0.237	11.265	0.021	0.983
Move time 4	-0.740	7.285	-0.102	0.919
Leave time 4	0.631	10.195	0.062	0.951
Move time 5	-2.276	14.339	-0.159	0.874
Leave time 5	0.561	12.534	0.045	0.964
Move Paperwork Interference	-0.205	1.885	-0.109	0.914
Leave Paperwork Interference	0.057	2.342	0.024	0.981
Move time 3* Paperwork Interference	0.392	2.812	0.139	0.890
Leave time 3* Paperwork Interference	-0.478	4.569	-0.105	0.917
Move time 4* Paperwork Interference	0.017	2.780	0.006	0.995
Leave time 4* Paperwork Interference	-0.424	3.646	-0.116	0.908
Move time 5* Paperwork Interference	0.519	5.157	0.101	0.920
Leave time 5* Paperwork Interference	-0.324	4.616	-0.070	0.944

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 105 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching associated with each level of agreement relative to the paperwork interference item; a “1” implies more interference and a “4” implies less interference.

Table 105. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Paperwork Interference Responses.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly agree; more interference)	19.49%	9.82%	10.52%	4.01%	37.64%
	2 (Somewhat agree)	16.47%	11.60%	8.88%	5.41%	36.36%
	3 (Somewhat disagree)	13.84%	13.66%	7.47%	7.26%	36.16%
	4 (Strongly disagree; less interference)	11.57%	16.02%	6.27%	9.67%	37.12%
Leavers	1 (Strongly agree; more interference)	9.61%	7.71%	11.56%	11.87%	34.98%
	2 (Somewhat agree)	10.11%	5.20%	8.31%	9.35%	29.17%
	3 (Somewhat disagree)	10.64%	3.48%	5.91%	7.31%	24.79%
	4 (Strongly disagree; less interference)	11.20%	2.31%	4.17%	5.70%	21.61%

Table 106 displays the Cohen's d effect sizes associated with each level of paperwork interference as a first-year teacher at each subsequent year and cumulatively across the first five years. As in the previous sub-section, we'll examine patterns in the effect sizes seen within each column for Movers and Leavers. It is common for some school districts to squeeze additional burdens and responsibilities into teachers' contractual obligations that can drastically cut down on their contact time with students and their time to prepare lessons, grade assessments, and reflect on their practice. These effect sizes for Movers shown that less interference of paperwork and other routine duties during the first year of teaching seems to be associated with a decreased risk of moving to another school in Years 2 and 4, as one would expect, but is actually linked to an increased risk of moving in Years 3 and 5. For Leavers, less interference of paperwork and other routine duties during the first year in the classroom is related to a reduction in the risk of leaving in Years 3, 4, and 5. In addition, the effect sizes associated with the risk of leaving in Years 3 through 5 increase in magnitude as there is less and less interference of outside work. This implies that the probability of leaving decreases as teachers are able to focus more and more on the job of teaching students.

Table 106. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Paperwork Interference.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly agree; more interference)	-0.113	0.103	-0.104	0.173	-0.053
	2 (Somewhat agree)	-0.226	0.206	-0.207	0.346*	-0.083
	3 (Somewhat disagree)	-0.339*	0.309*	-0.311*	0.519*	-0.088
	4 (Strongly disagree; less interference)	-0.452*	0.412*	-0.415*	0.692*	-0.065
Leavers	1 (Strongly agree; more interference)	0.032	-0.232	-0.202	-0.147	-0.171
	2 (Somewhat agree)	0.063	-0.464*	-0.404*	-0.295*	-0.318*
	3 (Somewhat disagree)	0.095	-0.695*	-0.607*	-0.442*	-0.441*
	4 (Strongly disagree; less interference)	0.126	-0.927*	-0.809*	-0.589*	-0.540*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Model C.8: Student behavior. The factor score capturing perceptions of student behavior in the first year was included in the base-time model as well as the interaction between time and student behavior to ensure the proportionality assumption would be met. Table 107 displays the coefficients, corrected standard errors, t-statistics, and p-values for the student behavior model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of student behavior. Furthermore, the betas for "Move Student Behavior" and "Leave Student Behavior" represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Student Behavior subscale fall 1 standard deviation above the mean.

Table 107. *Student Behavior Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.748	1.766	-0.990	0.326
Leave (Intercept)	-2.196	1.945	-1.129	0.263
Move time 3	-0.204	2.791	-0.073	0.942
Leave time 3	-0.827	3.219	-0.257	0.798
Move time 4	-0.826	3.036	-0.272	0.786
Leave time 4	-0.279	4.198	-0.067	0.947
Move time 5	-0.913	4.332	-0.211	0.834
Leave time 5	-0.141	4.741	-0.030	0.976
Move Student Behavior	-0.489	1.386	-0.353	0.725
Leave Student Behavior	-0.056	1.996	-0.028	0.978
Move time 3* Student Behavior	0.604	2.752	0.219	0.827
Leave time 3* Student Behavior	-0.411	2.642	-0.156	0.877
Move time 4* Student Behavior	0.084	2.243	0.038	0.970
Leave time 4* Student Behavior	-0.168	4.277	-0.039	0.969
Move time 5* Student Behavior	0.405	3.140	0.129	0.898
Leave time 5* Student Behavior	-0.129	5.683	-0.023	0.982

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 108 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of student behavior (average behavior) and for individuals with student behavior scores 1 standard deviation above the mean (better behavior); Figure 15 displays the yearly probabilities graphically.

Table 108. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Student Behavior Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average behavior	14.83%	12.44%	7.08%	6.53%	35.23%
	Better behavior	9.65%	13.74%	4.84%	6.04%	30.31%
Leavers	Average behavior	10.01%	4.64%	7.76%	8.81%	27.81%
	Better behavior	9.52%	2.96%	6.30%	7.43%	23.84%

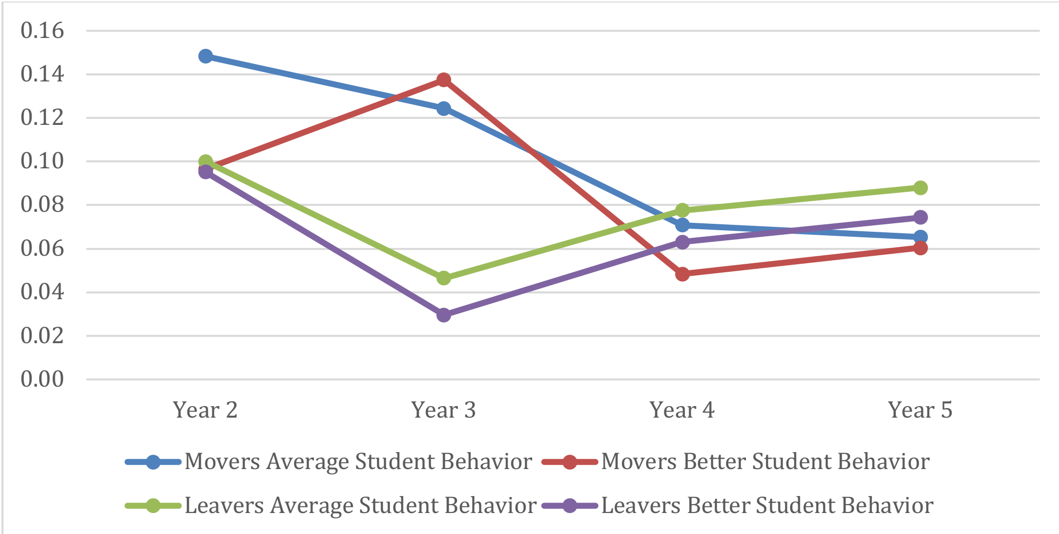

Figure 15. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Student Behavior Factor Scores.*

Table 109 displays the Cohen's d effect sizes associated with feeling more student behavior as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 109. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Student Behavior Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.270*	0.063	-0.223	-0.046	-0.123
Leavers	-0.031	-0.257*	-0.124	-0.102	-0.115

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

In contrast to teachers with average perceptions of student behavior, teachers who perceived more positive behavior from students in their first year of teaching (i.e., student behavior scores 1 standard deviation above the mean) were less likely to leave the teaching profession in Year 3 and were less likely to move in Year 2.

Model C.9: Job security and test scores. The variable capturing the amount that teachers worry about their job security being tied to student test scores in the first year was included in the base-time model as well as the interaction between time and job security concerns to ensure the proportionality assumption would be met. Table 110 displays the coefficients, corrected standard errors, t-statistics, and p-values for the job security concerns model estimated with sampling weights and replicate weights. This variable retains its original scale from the BTLS from 1 to 4 where "1" corresponds to the respondent strongly agreeing and "4" corresponds to the respondent strongly disagreeing with the statement that "I worry about the security of my job because of the performance of my students on state and/or local tests." Therefore, the intercepts for this model reflect the predicted logit hazards for individuals with a "0" on this item, a score that falls outside the range of responses for the variable. Since this variable was not centered, the intercepts are not meaningful in the context of the original scale. However, the betas for "Move Job Security" and "Leave Job Security" are meaningful and represent the predicted change in the logit hazards for a 1-unit increase in the response to this item, where such an increase reflects less concern about one's job security as they are tied to student test scores. Therefore, the betas reflect the change to the log-hazards of moving and leaving when there is less worry about job security.

Table 110. *Job Security Concern Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.618	4.029	-0.402	0.689
Leave (Intercept)	-3.190	4.034	-0.791	0.432
Move time 3	-0.277	5.485	-0.050	0.960
Leave time 3	1.060	12.023	0.088	0.930
Move time 4	-0.265	9.019	-0.029	0.977
Leave time 4	1.502	16.639	0.090	0.928
Move time 5	-2.274	17.808	-0.128	0.899
Leave time 5	-0.569	12.084	-0.047	0.963
Move Job Security	-0.024	1.649	-0.015	0.988
Leave Job Security	0.354	1.465	0.242	0.810
Move time 3* Job Security	0.001	2.165	0.000	1.000
Leave time 3* Job Security	-0.683	4.082	-0.167	0.868
Move time 4* Job Security	-0.165	2.987	-0.055	0.956
Leave time 4* Job Security	-0.660	5.302	-0.125	0.901
Move time 5* Job Security	0.442	5.980	0.074	0.941
Leave time 5* Job Security	0.125	4.144	0.030	0.976

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 111 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching associated with each level of agreement relative to the job security concerns item; a "1" implies more worry and a "4" implies less worry.

Table 111. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Job Security Responses.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly agree; more worry)	16.22%	12.81%	11.18%	3.01%	37.07%
	2 (Somewhat agree)	15.90%	12.55%	9.43%	4.49%	36.39%
	3 (Somewhat disagree)	15.58%	12.30%	7.93%	6.67%	36.38%
	4 (Strongly disagree; less worry)	15.26%	12.05%	6.66%	9.78%	37.24%
Leavers	1 (Strongly agree; more worry)	5.54%	7.88%	11.98%	3.63%	26.19%
	2 (Somewhat agree)	7.71%	5.80%	9.10%	5.73%	25.51%
	3 (Somewhat disagree)	10.64%	4.24%	6.87%	8.94%	27.43%
	4 (Strongly disagree; less worry)	14.50%	3.09%	5.15%	13.68%	32.16%

Table 112 displays the Cohen's d effect sizes associated with each level of job security concern as a first-year teacher at each subsequent year and cumulatively across the first five years. Looking generally across the table to find trends in the effect sizes, it appears that those teachers who are less worried during their first year about their job security being tied to their students' test scores are less likely to move to a new school in Year 4 but are more likely to move in Year 5. Furthermore, those teachers who are less worried during their initial year about their job security being linked to student performance are more likely to leave in Years 2 and 5, but are less likely to leave in Years 3 and 4. Interestingly, the effect sizes associated with the risk of leaving in Year 5 increase in magnitude becoming more and more positive as there is less and less worry about job security. This implies that the probability of leaving increases more and more in Year 5 for teachers who are less and less stressed in their first year about their student performance being tied to their job security. This is an unexpected finding.

Table 112. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Job Security.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly agree; more worry)	-0.013	-0.013	-0.104	0.230	-0.029
	2 (Somewhat agree)	-0.027	-0.026	-0.209	0.460*	-0.045
	3 (Somewhat disagree)	-0.040	-0.039	-0.313*	0.690*	-0.045
	4 (Strongly disagree; l ess worry)	-0.053	-0.051	-0.418*	0.920*	-0.025
Leavers	1 (Strongly agree; more worry)	0.195	-0.182	-0.169	0.264*	-0.083
	2 (Somewhat agree)	0.390*	-0.363*	-0.338*	0.528*	-0.103
	3 (Somewhat disagree)	0.585*	-0.545*	-0.507*	0.793*	-0.048
	4 (Strongly disagree; l ess worry)	0.780*	-0.726*	-0.676*	1.057*	0.077

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Model C.10: Content standards and satisfaction. The variable capturing the amount that content standards have a positive impact on teaching satisfaction in the first year was included in the base-time model as well as the interaction between time and content standards impact to ensure the proportionality assumption would be met. Table 113 displays the coefficients, corrected standard errors, t-statistics, and p-values for the content standards impact model estimated with sampling weights and replicate weights. This variable retains its original scale from the BTLS from 1 to 4 where "1" corresponds to the respondent strongly disagreeing and "4" corresponds to the respondent strongly agreeing with the statement that "State or district content standards have had a positive influence on my satisfaction with teaching." Therefore, the intercepts for this model reflect the predicted logit hazards for individuals with a "0" on this item, a score that falls outside the range of responses for the variable. Since this variable was not centered, the intercepts are not meaningful in the context of the original scale. However, the betas for "Move Content Standards" and "Leave Content Standards" are meaningful and represent the predicted change in the logit hazards for a 1-unit increase in the response to this item, where such an increase reflects more positive impact of content standards on teacher satisfaction. Therefore, the betas reflect the change to the log-hazards of moving and leaving when there is more positive influence of standards and accountability.

Table 113. *Content Standards Impact Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.470	2.947	-0.499	0.619
Leave (Intercept)	-2.697	5.272	-0.512	0.611
Move time 3	-1.455	7.043	-0.207	0.837
Leave time 3	-0.651	7.238	-0.090	0.929
Move time 4	-0.124	6.987	-0.018	0.986
Leave time 4	1.527	16.113	0.095	0.925
Move time 5	-2.069	13.900	-0.149	0.882
Leave time 5	2.072	11.012	0.188	0.851
Move Content Standards	-0.085	1.425	-0.060	0.952
Leave Content Standards	0.206	1.932	0.107	0.915
Move time 3* Content Standards	0.465	2.794	0.166	0.868
Leave time 3* Content Standards	-0.057	2.900	-0.020	0.984
Move time 4* Content Standards	-0.252	2.957	-0.085	0.932
Leave time 4* Content Standards	-0.797	5.885	-0.135	0.893
Move time 5* Content Standards	0.420	4.989	0.084	0.933
Leave time 5* Content Standards	-0.974	4.490	-0.217	0.829

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

Table 114 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching associated with each level of agreement relative to the content standards impact item; a "1" implies more negative influence and a "4" implies more positive influence.

Table 114. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Content Standards Responses.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly disagree; negative impact)	17.42%	7.27%	12.65%	3.90%	35.72%
	2 (Somewhat disagree)	16.23%	10.27%	9.37%	5.36%	35.53%
	3 (Somewhat agree)	15.10%	14.33%	6.87%	7.33%	37.23%
	4 (Strongly agree; positive impact)	14.04%	19.64%	5.00%	9.96%	40.91%
Leavers	1 (Strongly disagree; negative impact)	7.65%	3.92%	14.67%	19.90%	39.35%
	2 (Somewhat disagree)	9.24%	4.52%	8.69%	10.34%	29.05%
	3 (Somewhat agree)	11.12%	5.21%	5.01%	5.08%	24.03%
	4 (Strongly agree; positive impact)	13.32%	6.00%	2.84%	2.42%	22.75%

Table 115 displays the Cohen's d effect sizes associated with each level of content standards impact as a first-year teacher at each subsequent year and cumulatively across the first five years.

Table 115. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Content Standards.*

Outcome	Response	Year 2	Year 3	Year 4	Year 5	Cum.
Movers	1 (Strongly disagree; negative impact)	-0.047	0.209	-0.186	0.184	-0.046
	2 (Somewhat disagree)	-0.094	0.418*	-0.372*	0.369*	-0.051
	3 (Somewhat agree)	-0.141	0.627*	-0.558*	0.553*	-0.010
	4 (Strongly agree; positive impact)	-0.188	0.836*	-0.744*	0.737*	0.075
Leavers	1 (Strongly disagree; negative impact)	0.114	0.082	-0.326*	-0.423*	-0.349*
	2 (Somewhat disagree)	0.227	0.164	-0.652*	-0.846*	-0.603*
	3 (Somewhat agree)	0.341*	0.246	-0.978*	-1.270*	-0.746*
	4 (Strongly agree; positive impact)	0.454*	0.328*	-1.303*	-1.693*	-0.785*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Establishing trends in the effect sizes by looking across this table more broadly, it seems that teachers who indicate more positive impacts of the content standards on their job satisfaction in their first year of teaching are more likely to move to a new school in Years 3 and 5, but less likely to move in Year 4. In addition, these teachers are more likely to leave the profession in Years 2 and 3 but less likely to leave in Years 4 and 5.

Model C: All school climate and workplace conditions. All variables capturing school climate and workplace conditions were included in Model C to determine the relative impact of each predictor after partialling out the variability in turnover attributed to the other school climate characteristics and workplace conditions. Table 116 displays the coefficients, corrected standard errors, and t-statistics for Model C estimated with sampling weights and replicate weights. Note that p-values are not presented in this table.

The number of degrees of freedom of the replicate weights design was inferior to the number of estimates in this model (88). Therefore, it wasn't possible for R to compute p-values using the t distribution. To remedy this issue, it is recommended that number of replicates is increased, but no additional replicate weights were provided in the BTLS data, and so this is the final model.

Table 117 displays the Cohen's d effect sizes for moving and leaving associated with each type of school climate characteristic and workplace condition at each subsequent year and cumulatively across the first five years. Controlling for other school climate and workplace conditions, the effect sizes for leavers suggest that the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers experiencing greater parental support, greater access to materials and resources, and more positive impacts of content standards on their pedagogy during their initial year on the job as compared to teachers who reported average parental support, average access to materials, and neutral impacts of content standards on their teaching during their first year in the classroom. Furthermore, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were actually higher for teachers reporting greater pedagogical autonomy and higher levels of support from colleagues during their first year on the job relative to those students who reported average pedagogical autonomy and average support from faculty peers. When examining the effect sizes for movers, after controlling for other school climate and workplace conditions, the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers reporting greater support from their administration during their first year of work relative to those teachers reporting average support from school leadership.

Table 116. *School Climate and Workplace Conditions Model Estimates.*

	Moving			Leaving		
	Coeff.	SE	t	Coeff.	SE	t
(Intercept)	-2.377	10.808	-0.22	-4.364	12.051	-0.362
time 3	-1.441	17.567	-0.082	0.058	14.232	0.004
time 4	1.291	22.747	0.057	5.46	27.685	0.197
time 5	-2.103	42.344	-0.05	2.011	28.27	0.071
Pedagogical Autonomy	-0.296	2.585	-0.115	0.573	2.85	0.201
Curricular Autonomy	0.083	2.613	0.032	-0.646	3.07	-0.211
Administrative Support	-0.733	1.977	-0.371	-0.94	2.261	-0.416
Collegial Support	0.274	3.062	0.09	0.141	2.552	0.056
Parental Support	0.059	2.649	0.022	0.161	2.833	0.057
Materials Available	0.05	1.913	0.026	0.078	2.397	0.033
Paperwork Not Interfere	-0.079	2.031	-0.039	0.105	2.332	0.045
Better Student Behavior	-0.314	1.916	-0.164	0.002	2.343	0.001
Positive Job Security	0.086	1.884	0.046	0.333	1.722	0.193
Positive Standards	0.14	1.906	0.073	0.224	2.213	0.101
time 3*Pedagogical Autonomy	0.065	3.55	0.018	-1.066	5.058	-0.211
time 3*Curricular Autonomy	0.145	4.561	0.032	1.358	5.133	0.265
time 3*Administrative Support	0.65	3.923	0.166	0.621	5.067	0.123
time 3*Collegial Support	-0.128	4.945	-0.026	-0.124	3.577	-0.035
time 3*Parental Support	-0.393	4.975	-0.079	-0.475	4.097	-0.116
time 3*Materials Available	0.242	3.263	0.074	-0.14	3.807	-0.037
time 3*Paperwork Not Interfere	0.205	3.446	0.06	-0.243	3.462	-0.07
time 3*Better Student Behavior	0.433	3.744	0.116	-0.019	3.379	-0.006
time 3*Positive Job Security	-0.192	2.553	-0.075	-0.089	2.246	-0.04
time 3*Positive Standards	0.227	3.175	0.071	0.096	3.607	0.027
time 4*Pedagogical Autonomy	0.042	6.109	0.007	-0.014	6.399	-0.002
time 4*Curricular Autonomy	-0.035	5.123	-0.007	0.596	5.618	0.106
time 4*Administrative Support	-0.109	5.429	-0.02	1.369	5.342	0.256
time 4*Collegial Support	-0.165	4.825	-0.034	0.78	6.113	0.128
time 4*Parental Support	0.15	4.772	0.031	-0.658	5.415	-0.122
time 4*Materials Available	-0.461	4.57	-0.101	-0.758	3.631	-0.209
time 4*Paperwork Not Interfere	0.055	3.544	0.016	-0.305	4.231	-0.072
time 4*Better Student Behavior	0.237	3.409	0.069	-0.136	5.104	-0.027
time 4*Positive Job Security	0.079	4.179	0.019	-0.437	4.563	-0.096
time 4*Positive Standards	-0.546	3.719	-0.147	-0.775	5.773	-0.134

Table 116 (continued). *School Climate and Workplace Conditions Model Estimates.*

	Moving			Leaving		
	Coeff.	SE	t	Coeff.	SE	t
time 5*Pedagogical Autonomy	0.589	12.571	0.047	-0.621	6.327	-0.098
time 5*Curricular Autonomy	-0.208	8.003	-0.026	0.696	7.573	0.092
time 5*Administrative Support	0.241	11.874	0.02	0.92	9.491	0.097
time 5*Collegial Support	-0.906	8.607	-0.105	-0.322	9.858	-0.033
time 5*Parental Support	0.301	12.408	0.024	-1.077	6.502	-0.166
time 5*Materials Available	-0.716	8.142	-0.088	-0.17	7.066	-0.024
time 5*Paperwork Not Interfere	0.473	8.316	0.057	-0.245	5.802	-0.042
time 5*Better Student Behavior	0.321	8.346	0.039	0.316	8.861	0.036
time 5*Positive Job Security	0.432	7.232	0.06	0.29	6.059	0.048
time 5*Positive Standards	0.266	8.382	0.032	-0.776	5.637	-0.138

Table 117. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on School Climate and Workplace Conditions.*

Outcome	Condition	Yr 2	Yr 3	Yr 4	Yr 5	Cum.
Moving	Higher pedagogical autonomy	-0.16	-0.13	-0.14	0.16	-0.14
	Higher curricular autonomy	0.05	0.13	0.03	-0.07	0.04
	Higher administrative support	-0.40*	-0.05	-0.46*	-0.27*	-0.44*
	Higher collegial support	0.15	0.08	0.06	-0.35*	0.08
	Higher parental support	0.03	-0.18	0.12	0.2	0.09
	More materials available	0.03	0.16	-0.23	-0.37*	-0.15
	Paperwork doesn't interfere	-0.04	0.07	-0.01	0.22	-0.01
	Better student behavior	-0.17	0.07	-0.04	0.004	-0.07
	Positive job security	0.05	-0.06	0.09	0.29*	0.09
	Positive content standards	0.08	0.2	-0.22	0.22	-0.1
Leaving	Higher pedagogical autonomy	0.32*	-0.27*	0.31*	-0.03	0.30*
	Higher curricular autonomy	-0.36*	0.39*	-0.03	0.03	-0.02
	Higher administrative support	-0.52*	-0.18	0.24	-0.01	0.22
	Higher collegial support	0.08	0.01	0.51*	-0.1	0.49*
	Higher parental support	0.09	-0.17	-0.27*	-0.51*	-0.31*
	More materials available	0.04	-0.03	-0.37*	-0.05	-0.36*
	Paperwork doesn't interfere	0.06	-0.08	-0.11	-0.08	-0.11
	Better student behavior	0.001	-0.01	-0.07	0.18	-0.05
	Positive job security	0.18	0.13	-0.06	0.34*	0.003
	Positive content standards	0.12	0.18	-0.30*	-0.30*	-0.31*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Job Satisfaction. In this section, Model D is presented. This simple survival model predicts turnover trajectories conditioned on the lone factor score capturing job satisfaction.

Model D: Job satisfaction. The factor score capturing perceptions of job satisfaction in the first year was included in the base-time model as well as the interaction between time and job satisfaction to ensure the proportionality assumption would be met. Table 118 displays the coefficients, corrected standard errors, t-statistics, and p-values for the job satisfaction model estimated with sampling weights and replicate weights. Because this variable is a factor score with a mean of zero, the intercepts for this model reflect the predicted logit hazards for individuals at the mean for perceptions of job satisfaction; the betas for “Move Satisfaction” and “Leave Satisfaction” represent the predicted change in the logit hazards for teachers whose scores on the Perceptions of Job Satisfaction subscale fall 1 standard deviation above the mean.

Table 118. *Job Satisfaction Model Estimates.*

	Coefficient	SE	t	p
Move (Intercept)	-1.843	1.892	-0.974	0.333
Leave (Intercept)	-2.296	2.039	-1.126	0.264
Move time 3	-0.117	2.700	-0.043	0.966
Leave time 3	-0.724	3.535	-0.205	0.838
Move time 4	-0.553	3.421	-0.162	0.872
Leave time 4	-0.135	4.097	-0.033	0.974
Move time 5	-0.780	4.449	-0.175	0.861
Leave time 5	0.025	4.805	0.005	0.996
Move Job Satisfaction	-0.899	1.424	-0.631	0.530
Leave Job Satisfaction	-0.874	1.942	-0.450	0.654
Move time 3* Job Satisfaction	0.955	2.779	0.344	0.732
Leave time 3* Job Satisfaction	0.174	2.560	0.068	0.946
Move time 4* Job Satisfaction	-0.137	2.562	-0.054	0.957
Leave time 4* Job Satisfaction	0.691	3.322	0.208	0.836
Move time 5* Job Satisfaction	0.716	4.540	0.158	0.875
Leave time 5* Job Satisfaction	0.462	4.336	0.107	0.915

Note. Rows labeled “Move” compare Movers to Stayers; rows labeled “Leave” compare Leavers to Stayers.

Table 119 presents the yearly and cumulative predicted probabilities of moving and leaving over the first five years of teaching for those individuals at the mean of job satisfaction (average satisfaction) and for individuals with job satisfaction scores 1 standard deviation above the mean (greater satisfaction); Figure 16 displays the yearly probabilities graphically.

Table 119. *Yearly and Cumulative Predicted Probabilities of Moving and Leaving Conditioned on Job Satisfaction Factor Scores.*

Outcome	Experience	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	Average satisfaction	13.67%	12.34%	8.34%	6.76%	35.33%
	Greater satisfaction	6.05%	12.96%	3.13%	5.70%	25.30%
Leavers	Average satisfaction	9.15%	4.66%	8.09%	9.36%	27.84%
	Greater satisfaction	4.03%	2.37%	6.83%	6.40%	18.29%

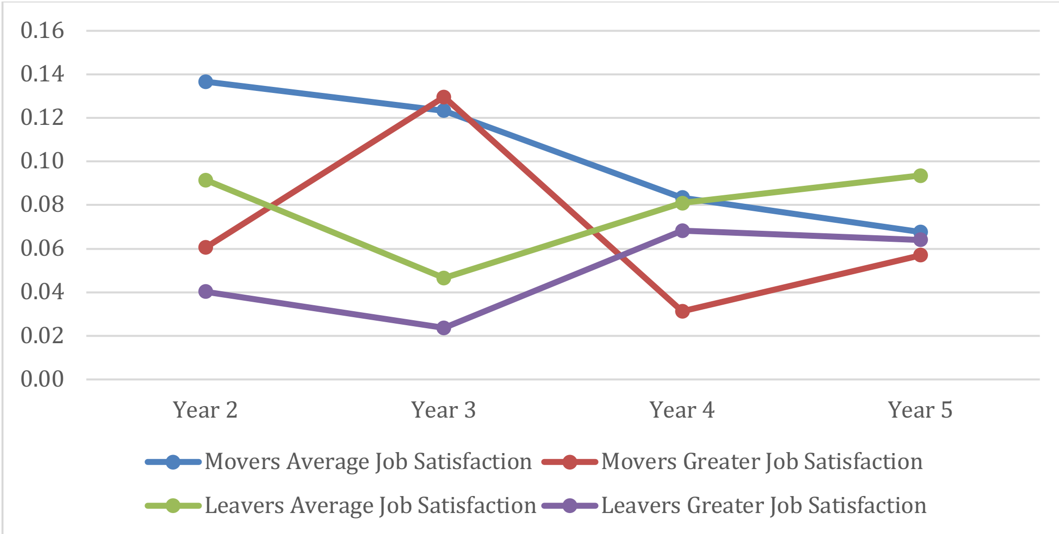

Figure 16. *Yearly Predicted Probabilities of Moving and Leaving Conditioned on Job Satisfaction Factor Scores.*

Table 120 displays the Cohen's d effect sizes associated with feeling more job satisfaction as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years.

Table 120. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Job Satisfaction Factor Score.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	-0.496*	0.031	-0.571*	-0.101	-0.263*
Leavers	-0.482*	-0.386*	-0.101	-0.227	-0.300*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*".

Contrasted with teachers indicating average perceptions of job satisfaction, teachers who reported more job satisfaction in their first year of teaching (i.e., job satisfaction scores 1 standard deviation above the mean) were less likely to leave the teaching profession in Years 2 or 3. In addition, teachers who reported more job satisfaction in their first year of teaching were less likely to move in Years 2 and 3 than teachers who reported average job satisfaction. Overall, the cumulative predicted probabilities of moving and leaving in any of Years 2 through 5 were lower for teachers feeling more satisfied with the job of teaching relative to those teachers experiencing average job satisfaction working in their schools.

Discrete-time, Competing Risks Hazards – Model Results

This section presents the estimates from the stepwise model building procedure discussed in Chapter 3, in which blocks of predictors are sequentially added to the model. It begins with the simplest model, predicting the competing risks turnover outcomes conditioned only on time. Then blocks of teacher covariates and school covariates are included in the model to explain variability in the outcome that is associated with characteristics and traits intrinsic to the individual teacher and the school environment that are likely not able to be manipulated by policy. Next, blocks of first-year teacher experience predictors are added to the model in an intentional, theory-based order to predict turnover outcomes; these variables are considered to be policy-amenable at the local, state, and national levels. First, programs and policies for novice teachers are included in the model, followed by perceptions of preparedness, and then by perceptions of school climate and workplace conditions. The final block of predictors captures teachers' job satisfaction. Although changes to educational policy may not have a direct effect on levels of satisfaction, it is hypothesized that this construct may moderate the relationships between the other first-year experience predictors and turnover. The next section presents the results of this moderation analysis.

In the sub-sections that follow, the results of modeling both with and without replicate weights are presented. Note that for models *without* replicate weights, the vast majority of predictors are significant. Those predictors that were not significant were all dummy-coded variables that captured one level of a multi-category nominal variable for which the rest of the associated dummy variables were significant; therefore, all non-significant predictors had to be retained to preserve the meaning of the dummy-coded categorical variables. Conversely, for the baseline model *with* replicate weights, the predictors are not significant as the standard errors are inflated to provide for more robust estimation. For all models built beyond baseline, the number of degrees of freedom for the replicate weights design was inferior to the number of estimates in these models. Therefore, it wasn't possible for R to compute p-values using the t-distribution. To remedy this issue, R recommends that number of replicates is increased, but no additional replicate weights were provided in the BTLS data. This means that the model-building process employing replicate weights could not rely on interpretation of p-values to establish which variables to retain in the model at each step and which to drop. Instead, AIC and deviance statistics from the models estimated without replicate weights will be discussed as a means to establish model fit. To date, there are no statistical software packages that can calculate fit indices for data from complex surveys modeled with replicate weights (Lumley & Scott, 2015), only data modeled with sampling weights.

In addition, hit ratios are reported, which are measures of model classification efficacy that compare the observed to the predicted turnover events to calculate an overall percentage of "correct" classification. There are three observed outcomes of interest, and the rule of thumb is that classification accuracy should be at least 25% greater than that achieved by chance. Therefore, hit ratios that are greater than or equal to 58% are desired. In the sections that follow, the reader will see that from Step 0 through Step 6 the goodness-of-fit statistics (i.e., the AIC and *-2LL* or deviance) decrease from model to model indicating improvement in model fit with the addition of more blocks of predictors. Simultaneously, the hit ratios from Step 1a through Step 6 actually decrease from model to model starting at 82% accuracy in Step 1a and dropping to 72% accuracy in Step 6. Initially, this contradiction between fit statistics and estimation accuracy seemed to be a cause for concern. However, a 2014 paper by Paul Allison, a pioneer in the application of survival models to social science research, investigates measures of fit for logistic regression and suggests that these contradictory findings are not uncommon (Allison, 2014b).

There are two approaches to assess fit for logistic models: 1) measures of predictive power including indicators of estimation accuracy like hit ratios, and 2) goodness-of-fit statistics like deviance (Allison, 2014b). In the paper, Allison makes the argument that measures of predictive power and goodness-of-fit statistics are testing very different things (2014b). He explains that it is not uncommon for models with high predictive power to yield poor goodness-of-fit; and conversely, it is not uncommon for models that fit the data well by goodness-of-fit statistics to exhibit low predictive power (Allison, 2014b). The paper demonstrates "what goodness-of-fit statistics are testing is *not* how well you can predict the dependent variable, but whether you could do even *better* by making the model more complicated" (Allison, 2014b). This distinction is an important one to consider when reviewing measures of fit for the models that follow.

Step 0: Competing turnover risks regressed on time only. The baseline model is conditioned only on time. A discrete-time, competing risks hazards model was estimated in R including just the dichotomous indicators of time (i.e., year of teaching or BTLS wave). Table 121 displays the results of this model with and without replicate weights.

Table 121. *Baseline Model of Turnover Conditioned on Time Only.*

		With Replicates			Without Replicates		
	Coefficient	SE	t	p	SE	t	p
Move (Intercept)	-1.686	1.783	-0.946	0.347	0.017	-16.013	<.001
Leave (Intercept)	-2.172	1.844	-1.178	0.242	0.025	-33.399	<.001
Move time 3	-0.268	2.838	-0.094	0.925	0.020	-35.608	<.001
Leave time 3	-0.823	3.319	-0.248	0.805	0.022	-14.968	<.001
Move time 4	-0.718	3.161	-0.227	0.821	0.023	-43.646	<.001
Leave time 4	-0.333	4.173	-0.080	0.937	0.022	-9.432	<.001
Move time 5	-1.019	4.140	-0.246	0.806	0.011	-159.027	<.001
Leave time 5	-0.209	4.451	-0.047	0.963	0.013	-165.735	<.001

Note. Rows labeled "Move" compare Movers to Stayers; rows labeled "Leave" compare Leavers to Stayers.

The AIC for the model without replicates weights is 255,707.5, and the residual deviance is 255,691.6; these are the baseline fit statistics against which all subsequent models will be compared to determine if fit has been improved with the inclusion of predictors beyond the base-time specification.

Step 1a: Inclusion of teacher covariates. The block of teacher covariates were included in the next step of model building. A discrete-time, competing risks hazards model was estimated in R including dichotomous indicators of time, teacher covariates, and all interactions between those covariates and time to ensure the assumption of proportional hazards was met. The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 217,089, and the residual deviance is 216,897 signaling an improvement in fit over the baseline model conditioned on time only. Hit ratios were 81.6% (above the 58% desired threshold) indicating turnover events were classified correctly by the model for nearly four-fifths of cases. All teacher covariates were retained moving into the next step.

Step 1b: Inclusion of school covariates. The block of school covariates were included in the next step of model building. A discrete-time, competing risks hazards model was estimated in R including dichotomous indicators of time, teacher covariates, school covariates, and all interactions between those covariates and time to ensure the assumption of proportional hazards was met. The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 197,850.2, and the residual deviance is 197,546.2 signaling an improvement in fit over the model from Step 1a. Hit ratios were 80.8%, falling above the 58% desired threshold but marking a decrease in classification efficacy from the previous model. All school covariates were retained moving into the next step.

Step 2: Inclusion of first-year teacher programs and policies. The block of variables capturing first-year teacher programs and policies were included in the next step of model building. A discrete-time, competing risks hazards model was estimated in R including dichotomous indicators of time, all covariates and time-interactions from Step 1b, the dichotomous indicators of first-year programs and policies, and all interactions between those predictors and time to ensure the assumption of proportional hazards was met. The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 184,756, and the residual deviance is 184,356 signaling an improvement in fit over the model from Step 1b. Hit ratios were 78.7%, which is above the 58% desired threshold but indicates a decrease in classification efficacy from the previous model. Because all Step 2 predictors and their interactions with time were significant in the model without replicate weights, these variables were retained moving into the next step.

Table 122 presents the effect sizes associated with having each of these first-year programs and policies at each subsequent year and cumulatively across the first five years, after controlling for teacher covariates, school covariates, and other first-year experiential predictors.

Table 122. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on First-year Programs and Policies Controlling for Teacher/School Covariates.*

Outcome	Experience	Yr 2	Yr 3	Yr 4	Yr 5	Cum.
Moving	Induction	-0.17	-0.1	0.16	0.22	0.12
	Mentoring	-0.01	-0.14	-0.78*	-0.88*	-0.26*
	Reduced Schedule	-0.14	0.26*	0.29*	-0.1	0.23
	Common Planning	0.16	0.14	0.35*	-0.37*	0.2
	Seminars	0.38*	-0.15	-0.19	-0.04	-0.05
	Extra Help	-0.11	-0.01	0.55*	-0.37*	0.06
Leaving	Induction	-0.22	-0.27*	0.52*	-0.61*	0.48*
	Mentoring	-0.40*	-0.2	0.16	0.52*	0.28*
	Reduced Schedule	-0.36*	0.02	-0.48*	0.40*	-0.30*
	Common Planning	0.41*	0.07	-0.24	-0.55*	-0.26*
	Seminars	-0.32*	-0.49*	-0.41*	-0.12	-0.40*
	Extra Help	-0.28*	-0.27*	-0.05	0.05	-0.07

Notes. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effect sizes for covariates entered in previous blocks not shown.

When examining the cumulative effect sizes for Movers, after controlling for teacher covariates, school covariates, and other first-year programs and policies, the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for first-year teachers receiving mentoring from a master teacher relative to those teachers who did not receive mentoring ($d = -0.26$). After partialling out the variability in turnover outcomes attributed to teacher covariates, school covariates, and other first-year programs and policies, the cumulative effect sizes for Leavers suggest that the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for first-year teachers experiencing a reduced teaching load ($d = -0.30$), common planning time with colleagues ($d = -0.26$), and seminars for new teachers ($d = -0.40$) as compared to those first-year teachers who did not experience these programs and policies. Furthermore, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were actually higher for first-year teachers who received mentoring ($d = 0.48$) and induction ($d = 0.28$) relative to those teachers who did not receive these additional supports.

Looking at the trends in the effect sizes from year to year for these programs and policies, it appears that mentoring, reduced teaching load, seminars for novice teachers, and extra classroom assistance experienced during the first year of teaching are associated with immediate reductions in the rates of leaving the profession in Year 2. This positive association with reduced rates of leaving is sustained for teachers attending seminars for novice practitioners for three consecutive years of career decisions and is also sustained for teachers who receive extra assistance in the classroom for two consecutive years. Also worth noting is the negative association between common planning time for first-year teachers and increased rates of leaving in Year 2. Interestingly, it seems that a positive relationship between mentoring in the first year and moving to a new school does not emerge until later in the early career window in Years 4 and 5.

Step 3: Inclusion of perceptions of preparedness. The next block of variables added to the model contains just one predictor – the factor score for perceptions of preparedness to teach. A discrete-time, competing risks hazards model was estimated in R including dichotomous indicators of time; all covariates, predictors, and time-interactions from Step 2; the preparedness factor score; and the interaction between preparedness and time to ensure the assumption of proportional hazards was met. The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 184,110.5, and the residual deviance is 183,694.5 signaling an improvement in fit over the model from Step 2. Hit ratios were 77.9% coming in above the 58% desired threshold but signaling a decrease in classification efficacy from the previous model. Because the preparedness factor score variables and its interaction with time were significant in the Step 3 model without replicate weights, these variables were retained moving into the next step.

Table 123 displays the Cohen's d effect sizes associated with feeling more prepared as a first-year teacher (i.e., having a factor score falling 1 standard deviation above the mean) at each subsequent year and cumulatively across the first five years, after controlling for teacher and school covariates and first-year programs and policies.

Table 123. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Preparedness Factor Score Controlling for Teacher/School Covariates and First-year Teaching Programs and Policies.*

Outcome	Year 2	Year 3	Year 4	Year 5	Cumulative
Movers	0.11	-0.03	-0.27*	-0.29*	-0.12
Leavers	0.13	-0.13	-0.38*	-0.29*	-0.32*

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effects sizes for covariates and predictors in entered in previous blocks not show.

After partialling out the variability in turnover outcomes attributed to teacher and school covariates and first-year programs and policies, the cumulative effect sizes for Leavers suggest that the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers reporting greater preparedness for their first year of teaching as compared to those teachers who indicated average levels of preparedness ($d = -0.32$). Examining the trends in the effect sizes from year to year, the estimates suggest that a positive association between first-year preparedness and reducing the rates of either turnover outcome does not develop until later in the early career window in Years 4 and 5.

Step 4: Inclusion of school climate and workplace conditions. The block of variables capturing school climate and workplace conditions were included in the next step of model building. A discrete-time, competing risks hazards model was estimated in R including dichotomous indicators of time; all covariates, predictors, and time-interactions from Step 3; the variables capturing perceptions of the teaching environment including school climate and workplace conditions; and the interactions among these environmental variables and time to ensure the assumption of proportional hazards was met. The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 170,217, and the residual deviance is 169,641 signaling an improvement in fit over the model from Step 3. Hit ratios were 72.9%, which is above the 58% desired threshold but does denote a decrease in classification efficacy from the previous model. Because all Step 4 predictors and their interactions with time were significant in the model without replicate weights, these variables were retained moving into the next step.

Table 124 presents the effect sizes associated with each first-year environmental teaching variable at each subsequent year and cumulatively across the first five years, after controlling for teacher covariates, school covariates, first-year programs and policies, perceptions of preparedness, and other school climate and workplace conditions.

Considering the cumulative effect sizes for Movers, after controlling for teacher and school covariates, first-year programs and policies, and perceptions of preparedness, the cumulative predicted probabilities of moving in any of Years 2 through 5 were actually higher for teachers indicating more positive impacts of content standards on their teaching relative to those teachers reporting neutral relationships of the standards to their pedagogy during their first year of work ($d = 0.25$). After partialling out the variability in turnover outcomes attributed to teacher and school covariates, first-year programs and policies, perceptions of preparedness, and other indicators of school climate and workplace conditions, the cumulative effect sizes for Leavers suggest that the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers reporting greater access to materials and resources as compared to those teachers who were neutral on this item during their first year of teaching ($d = -0.58$). Furthermore, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were actually higher for teachers who reported greater pedagogical autonomy ($d = 0.26$), higher collegial support ($d = 0.27$), and better student behavior ($d = 0.29$) relative to those teachers who experienced average pedagogical autonomy, collegial support, and student behavior during their initial year in the classroom.

Looking at the trends in the effect sizes from year to year for these environmental conditions, it appears that higher administrative support for first-year teachers is the one factor that is associated with immediate reductions in the rates of moving and leaving in Year 2. While this positive relationship with administrative support is not sustained into Year 3 for either turnover outcome, it does reappear in Years 4 and 5 with respect to reductions in the rates of moving to a new school. Interestingly, greater collegial support for first-year teachers is related to increased rates of moving schools in Year 2. Looking at the effect sizes in later years, the estimates suggest that a positive association between greater curricular autonomy in the first year and reducing the rates of either turnover outcome does not develop until Year 5. Similarly, a positive relationship between the impact of content standards on teacher's satisfaction and reducing the rates of either turnover outcome does not emerge until Year 4.

Table 124. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned Environmental Teaching Conditions Controlling for Teacher/School Covariates, First-year Teaching Programs and Policies, and Preparedness.*

	Moving					Leaving				
	Yr 2	Yr 3	Yr 4	Yr 5	Cum.	Yr 2	Yr 3	Yr 4	Yr 5	Cum.
Higher pedagogical autonomy	-0.09	-0.10	-0.22	0.11	-0.14	0.12	-0.21	0.27*	0.04	0.26*
Higher curricular autonomy	-0.06	0.05	0.05	-0.26*	0.05	-0.21	0.02	0.01	-0.34*	<.01
Higher administrative support	-0.41*	0.12	-0.50*	-0.64*	<.01	-0.43*	-0.21	0.08	0.46*	0.07
Higher collegial support	0.25*	0.13	-0.13	-0.07	0.09	-0.03	0.14	0.27*	-0.33*	0.27*
Higher parental support	0.00	-0.05	0.02	0.34*	-0.04	0.15	-0.14	-0.19	-0.47*	-0.18
More materials available	0.05	0.20	-0.03	0.28*	0.16	0.07	-0.11	-0.60*	0.54*	-0.58*
Paperwork doesn't interfere	0.17	-0.08	-0.10	0.30*	-0.08	0.14	-0.04	-0.18	-0.05	-0.17
Better student behavior	-0.20	0.07	0.21	0.10	0.11	-0.12	-0.15	0.30*	0.41*	0.29*
Positive job security	0.04	-0.09	0.18	0.10	-0.02	0.20	0.09	0.18	0.38*	0.18
Positive content standards	-0.06	0.36*	-0.32*	0.08	0.25*	0.10	0.18	-0.25*	0.06	-0.23

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effects sizes for covariates and predictors in entered in previous blocks not show.

Step 5: Inclusion of perceptions of job satisfaction. The final block capturing job satisfaction was included in the last step of model building. A discrete-time, competing risks hazards model was estimated in R including dichotomous indicators of time; all covariates, predictors, and time-interactions from Step 4; the factor score capturing perceptions of job satisfaction; and the interaction of job satisfaction and time to ensure the assumption of proportional hazards was met. The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 161,121, and the residual deviance is 160,529 signaling an improvement in fit over the model from Step 4. Hit ratios were 73.4%, which is above the 58% desired threshold but indicates a decrease in classification efficacy from the previous model. Because all Step 5 predictors and their interactions with time were significant in the model without replicate weights, these variables were retained for the final model.

Table 125 presents the effect sizes associated with the factor score for job satisfaction after controlling for teacher covariates, school covariates, first-year programs and policies, perceptions of preparedness, and school climate and workplace conditions. After partialling out the variability in turnover outcomes attributed to teacher and school covariates, first-year programs and policies, perceptions of preparedness, and school climate and workplace conditions, the cumulative effect sizes for Movers suggest that the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers reporting greater levels of job satisfaction in their first year as compared to those teachers who experienced average job satisfaction ($d = -0.37$). Considering trends from year to year in the effect sizes, the estimates suggest that job satisfaction in the first year is associated with immediate reductions in the rates of both moving and leaving in Year 2, and this relationship with job satisfaction is sustained for the leaving outcome into Year 3.

Table 125. *Cohen's d Effect Sizes for Predicted Probabilities Conditioned on Satisfaction Controlling for Teacher/School Covariates, First-year Teaching Programs and Policies, Preparedness, and Environmental Teaching Conditions.*

Outcome	Yr 2	Yr 3	Yr 4	Yr 5	Cum.
Moving - Higher Job Satisfaction	-0.59*	-0.05	-0.41*	-0.12	-0.37*
Leaving - Higher Job Satisfaction	-0.69*	-0.48*	-0.21	0.06	-0.21

Note. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effects sizes for covariates and predictors in entered in previous blocks not show.

Discrete-time, Competing Risks Hazards – Job Satisfaction as a Moderator

This section presents the estimates from the moderation analysis outlined in Chapter 3 that explores the interaction of teachers' job satisfaction with the relationships between their first-year teaching experiences and their early career turnover decisions within the first five years. This stepwise modeling procedure builds upon the models presented in the previous section. Specifically, the procedure involved including blocks of predictors from Steps 2 through 4 of the model-building process that yielded a Cohen's *d* effect size greater than or equal to 0.25 for the cumulative effect across the first five years of teaching was crossed with teachers' job satisfaction factor scores to create an interaction term. A standardized difference of 0.25 was used as an inclusion criterion in keeping with the What Works Clearinghouse (WWC, 2014) standards.

These interactions were included in the next set of models following the same stepwise procedure used in the previous sections. First, the interactions between satisfaction with specific first-year programs and policies for novice teachers are included in the model (Step 6), followed by the interaction of satisfaction with perceptions of preparedness (Step 7), and then by the interactions of satisfaction with specific perceptions of school climate and workplace conditions (Step 8). The sub-sections that follow present the results from each of these models.

Step 6: Interaction of job satisfaction with first-year teacher programs and policies. The interaction terms crossing job satisfaction with specific first-year teacher programs and policies were included in this step of model building. More specifically, teachers' job satisfaction factor scores were crossed with the following first-year teacher programs and policies: a) Induction, b) Mentoring, c) Reduced Schedule, d) Common Planning, and e) Seminars, all of which yielded cumulative effect sizes larger than 0.25 in Step 2. No interaction was explored for "Extra Help" because the cumulative effect size across the first five years of teaching was less than 0.25 and deemed to be not substantively important enough to warrant the exploration of moderation (WWC, 2014). Following the procedure used for previous models, the full results are presented in Appendix E, and only the effect size estimates are presented here. The AIC for the model without replicates weights is 159,195.5, and the residual deviance is 158,523.5, signaling improved fit over the model from Step 5. Hit ratios were 71.8%, coming in above the 58% desired threshold but demonstrating a decrease in classification efficacy from the previous model.

Table 126 presents the effect sizes associated with feeling average job satisfaction and greater job satisfaction in the presence of experiencing each first-year program and policy for Movers, after controlling for teacher covariates, school covariates, and other first-year experiential predictors. Table 127 presents the same effect sizes for Leavers. Examining the cumulative effect sizes, it appears that job satisfaction moderates the relationships between induction participation, reduced teaching load, common planning time, and attending seminars for novice and both turnover outcomes (moving and leaving). More specifically, the effect size differences for movers suggest that the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers experiencing greater job satisfaction in combination with participating in an induction program ($d = -0.36$), teaching a reduced schedule ($d = -0.35$), utilizing common planning time with colleagues ($d = -0.87$), and attending seminars for first year teachers ($d = -0.84$) compared to those teachers who engaged with the same programs and policies but felt average levels of job satisfaction. Similarly, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers experiencing greater job satisfaction in combination with participating in an induction program ($d = -0.50$) and utilizing common planning time with colleagues ($d = -0.52$) compared to those teachers who engaged with the same programs and policies but reported average levels of job satisfaction. Furthermore, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were actually higher for teachers reporting greater satisfaction who received a reduced teaching course load ($d = 0.85$) and attended seminars for first year teachers ($d = 0.62$) relative to those teachers who received those same supports in their first year but felt average levels of job satisfaction.

Table 126. *Cohen's d Effect Sizes for Predicted Probabilities of Moving Conditioned on the Interaction of Satisfaction with First-year Programs and Policies.*

	Average Satisfaction				Higher Satisfaction				
Program/Policy	Year 2	Year 3	Year 4	Year 5	Year 2	Year 3	Year 4	Year 5	Cumulative
Induction	0.09	-0.03	0.31*	0.02	0.16	0.18	-0.14	0.77*	-0.36*
Mentoring	0.01	-0.70*	-0.40*	-0.58*	-0.28*	-0.70*	-0.31*	0.40*	0.04
Reduced Schedule	-0.29*	0.26*	-0.07	-0.23	-0.55*	0.56*	0.15	0.07	-0.35*
Common Planning	0.09	<.01	0.24	-0.29*	0.37*	0.04	-0.36*	-0.17	-0.87*
Seminars	-0.04	-0.33*	-0.24	0.48*	-0.33*	-0.34*	0.49*	-0.45*	-0.84*

Notes. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effect sizes for covariates entered in previous blocks not shown.

Table 127. *Cohen's d Effect Sizes for Predicted Probabilities of Leaving Conditioned on the Interaction of Satisfaction with First-year Programs and Policies.*

	Average Satisfaction				Higher Satisfaction				
Program/Policy	Year 2	Year 3	Year 4	Year 5	Year 2	Year 3	Year 4	Year 5	Cumulative
Induction	0.03	0.34*	0.46*	-0.12	0.27*	0.41*	0.47*	-0.96*	-0.50*
Mentoring	-0.01	-0.36*	0.25*	-0.31*	-0.07	-0.14	0.20	-0.36*	0.23
Reduced Schedule	-0.52*	0.10	-0.49*	0.23	-0.38*	-0.26*	-0.60*	0.86*	0.85*
Common Planning	0.44*	-0.03	-0.20	-0.11	0.74*	-0.43*	-0.47*	-0.68*	-0.52*
Seminars	-0.37*	-0.33*	-0.22	-0.08	-0.62*	-0.45*	0.33*	-0.33*	0.62*

Notes. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effect sizes for covariates entered in previous blocks not shown.

Step 7: Interaction of job satisfaction with perceptions of preparedness. The next step in model-building includes the interaction term crossing job satisfaction with the factor scores for perceptions of preparedness, which yielded a cumulative effect size larger than 0.25 in Step 3. The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 159,270.3, and the residual deviance is 158,582.3, signaling a decrease in fit of this model compared to Step 6. Therefore, the results that follow should be interpreted with caution given the poorer fit of this model. Hit ratios were 72.8%, which falls above the 58% desired threshold and marks a slight increase in classification efficacy from the previous model.

Table 128 presents the effect sizes associated with feeling average job satisfaction and greater job satisfaction in the presence of feeling greater preparedness to teach for both Movers and Leavers, after controlling for teacher covariates, school covariates, and the first-year experiential predictors (i.e., programs and policies for novice teachers).

Table 128. *Cohen's d Effect Sizes for Predicted Probabilities of Moving and Leaving Conditioned on the Interaction of Satisfaction with Preparedness.*

	Average Satisfaction – Higher Preparedness				Higher Satisfaction – Higher Preparedness				
Outcome	Yr 2	Yr 3	Yr 4	Yr 5	Yr 2	Yr 3	Yr 4	Yr 5	Cum.
Movers	0.07	-0.03	-0.22	-0.17	-0.01	-0.22	-0.05	-0.27*	0.19
Leavers	0.09	-0.03	-0.18	-0.12	0.07	-0.04	0.01	-0.23	-2.59*

Notes. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effect sizes for covariates entered in previous blocks not shown.

From the cumulative effect sizes, it appears that job satisfaction moderates the relationship between preparedness and leaving (but not moving) within the first five years of teaching. The effect size differences for Leavers suggest that the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers experiencing greater job satisfaction in combination with feeling more prepared for their first year in the classroom ($d = -2.59$) compared to those teachers who felt the same level of preparedness but only average levels of job satisfaction.

Step 8: Interaction of job satisfaction with school climate and workplace conditions. The final step includes the interactions crossing job satisfaction with specific school climate and workplace conditions. More specifically, teachers' job satisfaction factor scores were crossed with the following environmental predictors: a) Pedagogical Autonomy, b) Collegial Support, c) Access to Materials, d) Student Behavior, and e) Content Standards Influence, all of which yielded cumulative effect sizes larger than 0.25 in Step 4. No interaction was explored for: a) Curricular Autonomy, b) Administrative Support, c) Parental Support, d) Paperwork Interference, and e) Job Security because the cumulative effect sizes across the first five years of teaching were less than 0.25 for these predictors and deemed to be not substantively important enough to warrant the exploration of moderation (WWC, 2014). The results of this model both with and without replicate weights are displayed in Appendix E. The AIC for the model without replicates weights is 159,938.8, and the residual deviance is 159,170.8, signaling a decrease in fit of this model compared to Step 7. Therefore, the results that follow should be interpreted with caution given the poorer fit of this model. Hit ratios were 68.6%, falling above the 58% threshold and indicating a decrease in classification efficacy from the previous model.

Table 129 presents the effect sizes associated with feeling average job satisfaction and greater job satisfaction in the presence of each environmental condition with respect to school climate and workplace experiences for Movers, after controlling for teacher covariates, school covariates, first-year experiential predictors, and preparedness. Table 130 presents the same effect sizes for Leavers. Interpreting the cumulative effect sizes, it seems that job satisfaction moderates the relationships between classroom autonomy, collegial support, and student behavior and leaving; additionally, job satisfaction moderates the relationship between collegial support and moving. More specifically, the effect size differences for movers suggest that the cumulative predicted probabilities of moving in any of Years 2 through 5 were actually higher for teachers experiencing greater job satisfaction in combination with receiving greater support from colleagues ($d = 0.33$) compared to those teachers who received the same level of support from their coworkers but felt only average levels of job satisfaction. Conversely, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers experiencing greater job satisfaction in combination with higher pedagogical autonomy ($d = -1.28$), greater collegial support ($d = -0.55$), and better student behavior ($d = -0.97$) compared to those teachers who experienced the same environmental conditions in their schools but reported only average levels of job satisfaction.

Table 129. *Cohen's d Effect Sizes for Predicted Probabilities of Moving Conditioned on the Interaction of Satisfaction with School Climate and Workplace Conditions.*

	Average Satisfaction				Higher Satisfaction				
Environmental Condition	Year 2	Year 3	Year 4	Year 5	Year 2	Year 3	Year 4	Year 5	Cumulative
Higher Pedagogical Autonomy	-0.05	-0.17	-0.12	0.06	0.07	-0.35*	-0.33*	-0.15	0.20
Higher Collegial Support	0.22	-0.06	-0.08	-0.08	0.24	0.09	-0.04	0.04	0.33*
Greater Material Availability	-0.03	0.45*	-0.03	-0.05	-0.11	0.49*	0.03	0.15	0.07
Better Student Behavior	-0.12	0.07	0.07	0.10	-0.15	0.35*	<0.01	-0.05	-0.02
More Positive Content Standards	-0.06	0.31*	-0.31*	<0.01	-0.31*	0.23	-0.09	0.17	-0.05

Notes. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effect sizes for covariates entered in previous blocks not shown.

Table 130. *Cohen's d Effect Sizes for Predicted Probabilities of Leaving Conditioned on the Interaction of Satisfaction with School Climate and Workplace Conditions.*

	Average Satisfaction				Higher Satisfaction				
Environmental Condition	Year 2	Year 3	Year 4	Year 5	Year 2	Year 3	Year 4	Year 5	Cumulative
Higher Pedagogical Autonomy	0.03	-0.22	0.15	0.07	-0.02	-0.57*	-0.23	-0.31*	-1.28*
Higher Collegial Support	-0.01	-0.01	0.13	-0.32*	0.02	0.15	0.18	-0.18	-0.55*
Greater Material Availability	0.13	-0.05	-0.54*	0.20	0.19	0.15	-0.33*	0.54*	0.09
Better Student Behavior	0.12	-0.28*	0.27*	0.38*	0.07	-0.02	0.18	0.21	-0.97*
More Positive Content Standards	0.17	0.28*	-0.52*	-0.07	0.05	0.34*	-0.16	0.24	0.10

Notes. Effect sizes that exceed the WWC (2014) criterion of .25 in magnitude are denoted with an "*". Effect sizes for covariates entered in previous blocks not shown.

CHAPTER 5: DISCUSSION

In recent years, the plight of early career teacher turnover has had significant financial ramifications for our nation's schools and districts (Haynes, Maddock, & Goldrick, 2014) and has posed a serious threat to achieving educational equity with the most disadvantaged schools experiencing the highest rates of turnover (Ingersoll & May, 2012; Ronfeldt, Loeb, & Wyckoff, 2013). As a result, policymakers and researchers have made efforts to determine how we can keep new teachers in the profession and in their schools for the long term. The issue of early career teacher retention is strongly tied to the evolution of a teacher's professional identity such that the first-year experiences that shape each teacher's identity-making process are likely to have lasting impacts on his or her career decisions far beyond the first year in the classroom (Lindqvist & Nordanger, 2016). While extensive research has been conducted to investigate the correlates of general teacher turnover, the majority of studies are either cross-sectional in nature or cover a limited timeframe of teachers' careers (i.e., the first and second years only). Therefore, there is a need for a longitudinal investigation of beginning teacher career paths spanning three or more to identify the experiences occurring in a teacher's first year on the job that contribute to their decisions to stay, move schools, or leave the profession altogether beyond the initial two-year window.

Using a nationally representative sample, this study contributes to understanding the complexities of secondary beginning teacher turnover by charting the landscape of this phenomenon in the U.S. across different types of schools and different types of teachers with varying pre-service experiences, varying in-service first-year experiences, and varying career decisions made over the course of two to five years in the classroom. Early career teachers were of particular interest due to the steadily increasing rates of turnover for this group of educators relative to their middle-to-late career peers. Moreover, the scope of analysis was focused at the secondary level (i.e., middle and high school) due to the alternative labor market opportunities available to secondary teachers as a result of their pre-service content training and subject-matter expertise.

This chapter synthesizes the findings across the survival models reported in Chapter 4, situates the findings in the context of the research literature summarized in Chapter 2, discusses their implications for education policy, reviews methodological limitations, and suggests areas for further research.

Research Question 1

This section summarizes the findings from Chapter 4 that answer the first research question: *What are the first-year experiences for teachers in the sample and how do they compare between teachers who are retained in their first school placements (i.e. stayers) and teachers who voluntarily or involuntarily turn over in later years (i.e. movers and leavers)?* The analyses conducted to address this question compared the first-year experiences of teachers who remained in their school for 5 years (Always Stayers), teachers who moved to a new school sometime between Years 2 and 5 (Ever Movers), and teachers who left the profession sometime between Years 2 and 5 (Ever Leavers). The sub-sections that follow are organized using the four domains of interest from the conceptual model that encapsulate the first-year teacher experience: 1) first-year teacher programs and policies, 2) perceptions of preparedness to teach, 3) perceptions of school climate and workplace conditions, and 4) perceptions of job satisfaction. Interpreting the results from analyses conducted for the first research question relied on making effect size comparisons were made for the three turnover trajectory groups in two ways – first, by calculating effect sizes for individual items from the BLTS as they related to the turnover outcome, and second, by calculating effect sizes for scale scores as they related to the turnover outcome.

First-year Teacher Programs and Policies and Turnover

The effect size estimates for programs and policies for first-year teachers suggest that differences exist between those who stay and those who leave with respect to their access to mentoring from a master teacher and their attendance at seminars for novice teachers. Teachers who stayed at their first placement school for five consecutive years reported engaging with these first-year teacher experiences more often than those practitioners who left within that same five-year window. Therefore, one could conclude that providing mentoring and seminars for first-year teachers might curb rates of leaving the field of education. With respect to teachers who seek employment at another school, it does not appear from this set of analyses that there are any specific programs or policies that mitigate rates of moving. Studies have shown that first-year teachers who work with a mentor are more likely to return for the second year of teaching (Ingersoll & Smith, 2004; Conderman & Stephens, 2000; Delgado, 1999; Rowley, 1999). This dissertation research evolves this finding further, suggesting that mentoring in the first year may increase rates of retention in the profession beyond the second year of teaching.

Perceptions of Preparedness to Teach and Turnover

Results from the analyses for perceptions of preparedness imply that there are specific aspects to teacher preparedness experienced in the first year that may make a difference in turnover decisions for early career teachers. More specifically, compared to both teachers who moved and teachers who left, teachers who remained in their first placement school for five years felt more prepared to handle issues of classroom management and discipline and felt more prepared to select instructional methods for their lessons during their first year on the job. In addition, teachers who stayed for five years perceived themselves as being better prepared to assess their students and select materials for their lessons compared to teacher who eventually left the profession.

When comparing these turnover groups on their preparedness scale scores, teachers who stayed had more positive perceptions of their preparedness during their first year of teaching compared to teachers who eventually left; this was not true for teachers who moved schools in later years as there was not a substantive association between their preparedness and their turnover outcome. Studies have shown that, for first-year teachers, ending the school year with feelings of self-efficacy has been found to be significantly correlated with feeling prepared for the job of teaching (Tschannen-Moran et al., 1998), and both constructs predict teacher retention for the next school year (Glickman & Tamashiro, 1982; Marvel, Lyter, Peltola, Strizek, & Morton, 2006). The results from this study extend this finding and suggest that the relationship between turnover and perceptions of preparedness in the first year may linger beyond the second year.

The finding for Leavers indicates that there may be stronger preparation needed for pre-service teacher candidates to ensure that they enter the classroom in their first year feeling competent, well-equipped, and fully able to do the job of teaching. It seems that the areas where novice teachers may need greater preparation is with classroom management and discipline, selecting appropriate instructional methods, assessing students, and selecting materials for their lessons. Therefore, providing more comprehensive pre-service teacher training in these areas may help decrease the rates of leaving as novice teachers enter the school year feeling more prepared for the work that lies ahead of them.

Perceptions of School Climate and Workplace Conditions and Turnover

Seven smaller sub-domains within the broader construct of school climate and workplace conditions were investigated in relation to turnover trajectories. From the analyses conducted for the first research question, it appears that there are certain aspects of the school environment that may make a difference in the career decisions for new teachers when it comes to moving, leaving, and both turnover outcomes – 1) pedagogical autonomy, 2) student behavior, 3) administrative support, 4) parental support, and 5) availability of resources. Conversely, three aspects of the school environment and the workplace appeared to have no association with turnover trajectories – collegial support, curricular autonomy (e.g., selecting textbooks and selecting content to cover), and the role of standards and accountability (e.g., job security as it is tied to student test scores and the impact of content standards). The lack of a relationship with turnover for these three factors is interesting in light of what other researchers have found to be formative experiences that greatly impact teacher retention decisions (Little & McLaughlin, 1993; Yee, 1990; Clotfelter, Ladd, Vigdor, & Diaz, 2004).

Two sub-domains emerged from the analyses as being substantively important when contrasting Movers with Stayers. When comparing teachers who moved to a new school against teachers who stayed for five years, Stayers had higher scale scores for pedagogical autonomy (e.g., assess students, select teaching techniques, assign homework, and discipline students) and student behavior. This means that teachers who obtained employment in a different school from their first placement experienced less pedagogical autonomy and worse student behavior during their first year. Therefore, placing trust in one's first-year teachers to make sound decisions about their own pedagogy may curb the rates of teachers moving to new schools. Furthermore, while student behavior may not completely drive teachers away from the profession, it may be driving teachers away from schools with student disciplinary issues. Consequently, improving student behavior and/or mitigating the negative effects of student behavior on the broader school climate may be critical for addressing the localized effects of turnover that occur when teachers migrate to other schools. Other researchers have come to similar conclusions regarding the importance of teacher autonomy and student behavior in the turnover decision-making process. Studies have shown that retention is directly related to teacher autonomy and control of the work environment (Weiss, 1999; Stockard & Lehman, 2004) and teacher participation in decision-making processes at school (Yee, 1990). Furthermore, teacher perceptions of student misbehavior have been found to have considerable effects on teacher turnover intentions (Tsouloupas, Carson, Matthews, Grawitch, & Barber, 2010). What is unique about the findings from this dissertation research however is that low pedagogical autonomy and poor student behavior are linked specifically to the outcome of moving, as opposed to the broader turnover outcome.

Three sub-domains of the school environment seem to be relevant when comparing Stayers to teachers who turn over regardless of the path chosen (move or leave). The findings suggest that teachers who stay in their schools throughout their early career receive more support from their administrators, experience more support from parents, and have greater access to resources and materials in their first year of teaching compared to those teachers who eventually move or leave in the five-year window. An interesting result to note from the comparison of scale scores for administrative support is that the effect size was larger for teachers who move. This implies that while focusing on administrative support for first-year educators may help to mitigate the rates of both types of turnover, increasing administrative support for brand new practitioners may be more critical for addressing the localized effects of turnover that occur when teachers migrate to other schools as opposed to the broader, national impacts of turnover that result from teachers leaving the field. This is an interesting finding, which dovetails with the results of a 2004 study on teacher attrition; Harrell, Leavell, van Tassel and McKee (2004) found that administrator support may be less important with regards to the specific decision to leave teaching than other researchers have suggested in the past (e.g., Russell, Williams, & Gleason-Gomez, 2010; Tickle, Chang, & Kim, 2011; Ingersoll, 2001).

With respect to the comparison of parental support scale scores, the results from this study reinforce what other researchers have found (e.g., Skaalvik & Skaalvik, 2011) and suggest that supporting learning both at school and at home increases the chances of success for students and teachers, which may be a key component of general retention (i.e., preventing both moving and leaving). Furthermore, the analyses for environmental conditions demonstrate that availability of materials such as textbooks, supplies, and copy machines in the first year is be an important factor in the early career decisions of teachers such that first-year teachers who have access to tangible resources are more likely to stay. Given that second-year teachers are nearly twice as likely to exit high-poverty schools where access to resources and availability of materials is scarce (Goldring, Taie, & Riddles, 2014), this finding is not surprising. However, what is unique about the implication from this dissertation study is that access to resources in the first year of teaching may affect turnover decisions beyond the second year.

Perceptions of Job Satisfaction and Turnover

Prior to examining the job satisfaction scale score comparisons from the first set of analyses, the initial item-level comparisons across turnover trajectory groups (comparing Always Stayers, Ever Movers, and Ever Leavers) yielded some interesting findings. The only measure of satisfaction that did not meaningfully differentiate between turnover groups was salary satisfaction. This actually contradicts what other researchers have indicated is a critical component for increasing both teacher recruitment and retention (Allegretto & Mishel, 2016; Carver-Thomas & Darling-Hammond, 2017). Furthermore, it was fitting that individuals who eventually left the profession indicated that they thought about leaving teaching for a higher paying job during their first year of work more often than those practitioners who stayed. Similarly fitting, individuals who eventually moved to another school responded that they thought about transferring to another school during their first year on the job more often than those who remain teaching in their first placement school. In both cases, it seems that teachers' perceptions of their satisfaction on these two dimensions and their turnover intentions developed in the first year tend to manifest as one would expect later in their actual career decisions to move or leave. This finding is in line with the literature on the process of teachers finalizing turnover decisions from turnover intentions (Cha, 2008); in fact, there is research that suggests teacher turnover intentions are a strong predictor of actual turnover (Price, 2004).

When comparing satisfaction scale scores, perceptions of job satisfaction in the first year differed between Stayers and Movers as well as Stayers and Leavers. Teachers who stayed in their first school for five years tended to have greater job satisfaction in their first year relative to those who switched schools and those who left the teaching profession altogether. These findings suggest that lower levels of job satisfaction during the first year of teaching may be fueling both types of turnover in our nation's schools which confirms what other studies from the literature on turnover have found (Skaalvik & Skaalvik, 2011; Cha, 2008; Billingsley & Cross, 1992; Liu & Ramsey, 2008).

Research Question 2

This section summarizes the findings from Chapter 4 that answer the second research question: *What first-year teacher experiences predict voluntary and involuntary turnover at the end of years 1, 2, 3, and 4? And, how does satisfaction with teaching in the first year interact with the three other facets of the first-year experience (e.g. act as a moderator) to predict voluntary and involuntary turnover across the early career window of years 1 through 4?* The analyses conducted to address this question employed survival analysis to explore the relationships between teachers' first-year experiences and how long they "survived" in their first placement school. In these survival models, teachers' first-year experiences were used to predict both *when* they succumbed to turnover and *how* (i.e., moving to a new school or leaving the teaching profession). Interpreting the results from these analyses relied on making effect size comparisons looking across time year-by-year but also cumulatively within the five-year window that comprises one's "early career."

The sub-sections that follow are again organized by using the four domains of interest from the conceptual model that encapsulate the first-year teacher experience: 1) first-year teacher programs and policies, 2) perceptions of preparedness to teach, 3) perceptions of school climate and workplace conditions, and 4) perceptions of job satisfaction. Within each sub-section, three models are discussed: 1) the survival models conditioned on predictors from that domain/block only labeled as Models A, B, C, and D in Chapter 4, 2) the survival models built using the stepwise procedure conditioned on teacher and school covariates and potentially other domains/blocks of predictors labeled as Steps 2, 3, 4, and 5 in Chapter 4, and 3) the survival models built to investigate the moderating nature of job satisfaction labeled as Steps 6, 7, and 8 in Chapter 4. Furthermore, two distinct comparisons were made in each model and these are addressed separately within each sub-section: 1) Movers versus Stayers, and 2) Leavers versus Stayers.

Since the second research question targets teacher survival over time, these sub-sections address the relationships of first-year experiences with turnover chronologically starting with Year 2 and ending with Year 5. For the purpose of streamlining this discussion, only those first-year experiences are addressed where an immediate relationship with turnover appeared in Year 2 or where an obvious pattern of association with turnover emerged over two or more consecutive years in the timeline. Cumulative relationships are also addressed to examine the relationships of first-year experiences with turnover over the span of one's early career.

First-year Teacher Programs and Policies and Turnover

Movers versus Stayers. For the model conditioned on the six first-year teacher programs and policies only (Model A), there were no substantially large effect sizes for any of these programs or policies in Years 2 or 3 implying that there is a delay in the emergence of relationships with moving to a new school. In Year 4, a positive relationship surfaces for mentoring such that teachers who were advised by a master teacher in their first year of teaching were less likely to move to a new school in Year 4. This positive relationship was sustained into Year 5. In addition, the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers who received mentoring in their first year relative to teachers who were not mentored. For the model conditioned on a block of teacher and school covariates in addition to the six programs and policies (Step 2), the same exact relationships between mentoring and moving emerged in Years 4 and 5 and cumulatively over the entire early career. The takeaway here is that mentoring matters when it comes to preventing teachers from moving to a new school, but noticeable impacts of mentoring with respect to moving may be delayed until later in the early career window.

Mentoring yielded a positive association with curbing moving, but there were also some programs and policies that actually may have contributed to teachers moving. For the model conditioned on the six first-year teacher programs and policies only (Model A), the cumulative predicted probabilities of leaving in any of Years 2 through 5 were actually higher for teachers who received extra classroom assistance compared to teachers who did not receive this additional help in the classroom in their first year. Receiving extra classroom assistance is often indicative of having at least one student who is part of a special population (e.g., students with special needs or English Language Learners). Teaching these types of students can contribute to additional stress for a first-year teacher that could contribute to moving to a new school. Furthermore, having to co-teach can be an additional stressor on a novice teacher that could influence the decision to move to another school.

Once the block of teacher and school covariates was included in the model alongside the six programs and policies (Step 2), a different picture emerged. First-year teachers who attended seminars for novices in their initial year on the job were more likely to move in Year 2. Time is a previous commodity for first-year teachers so if attendance at these seminars was an additional requirement put in place by their school or district, it is possible that this mandate could contribute to feeling overwhelmed with work and push a teacher to move to a new school. Receiving a reduced teaching schedule in the first year was also associated with increased rates of moving in Years 3 and 4. In this case, it’s possible that new teachers who are given a smaller course load in their first year may have difficulty in subsequent years transitioning to a full schedule with greater demands of time. It seems that these teachers tend to make it through a challenging second year of teaching a full load and then switch schools.

In spite of these negative findings, it also appears that increased job satisfaction moderates the relationships between moving and induction participation, reduced teaching load, common planning time, and attending seminars for novices (Step 6). The cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers experiencing greater job satisfaction in combination with participating in an induction program, teaching a reduced schedule, utilizing common planning time with colleagues, and attending seminars for first-year teachers compared to those teachers who engaged with the same programs and policies but felt average levels of job satisfaction. This means that the negative relationships with moving that were found for seminars and reduced teaching schedule can be mitigated when job satisfaction is high for first-year teachers.

Leavers verses Stayers. For the model conditioned on the six first-year teacher programs and policies only (Model A), mentoring, reduced teaching load, and attending seminars were associated with reduced rates of leaving teaching in Year 2. This positive association for seminars is sustained through Years 3 and 4, which is an interesting finding in light of the negative association found between attending first-year seminars and moving. Furthermore, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers who received mentoring and attended seminars for new teachers in their first year relative to teachers who did not have these first-year experiences.

For the model conditioned on a block of teacher and school covariates in addition to the six programs and policies (Step 2), more positive relationships emerged when we take teacher and school characteristics into account. In Year 2, as with the previous model, mentoring, a reduced teaching load, and attending seminars were still associated with reduced rates of leaving teaching but extra classroom assistance also emerged, and that the positive association between extra classroom assistance and leaving was sustained through Year 3. This is another interesting result considering the negative association that was found between extra help and moving schools. Looking across the early career timeline, the cumulative effect sizes for Leavers suggested that the predicted probabilities of leaving in any of Years 2 through 5 were lower for first-year teachers who experienced a reduced teaching load and attended seminars but also for teachers who received common planning time with colleagues.

In spite of these positive cumulative findings, common planning time also appears to be related to leaving the profession more immediately. For the model conditioned on the six first-year teacher programs and policies only (Model A), common planning time in the first year was linked to higher rates of leaving teaching in Year 2. The same was true for the model conditioned on a block of teacher and school covariates in addition to the six programs and policies (Step 2). While in theory common planning time sounds very beneficial to new teachers, it is important to remember that scheduling required planning time to meet with colleagues during the school day means carving time out of teachers' prep periods to plan and grade. New teachers may have difficulty balancing these commitments, and feeling the constraints of time may drive them away from the job.

For the model conditioned on a block of teacher and school covariates in addition to the six programs and policies (Step 2), the cumulative effect sizes also bore out some contradictory findings. The cumulative predicted probabilities of leaving in any of Years 2 through 5 were actually higher for first-year teachers who received mentoring and induction relative to those teachers who did not receive these additional supports. It seems that once we account for teacher and school covariates, the positive association between mentoring and decreasing leaving rates in the long term that we discussed previously actually reverses in direction to become negative. If we consider the patterns in the effect sizes for mentoring across both the moving and leaving models, there is a reasonable explanation for this. It is possible that the initial benefits of mentoring keep teachers from leaving the profession in Year 2. Then, as a teacher progresses through their early career, the impact of mentoring shifts to keeping teachers from moving to a new school in Years 4 and 5. But overall, it seems that while mentoring can keep teachers from moving in the long term, those teachers who want to exit the profession are going to leave regardless of the mentoring they received in their first year.

In sum, these models appear to indicate that all the programs and policies for first-year teachers are linked to a reduction in rates of leaving with the exception of participation in an induction program. In fact, it may be the case that induction actually increases rates of leaving over the long term. However, this negative association is moderated in the presence of higher job satisfaction. From the moderation analyses (Step 6), the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers experiencing greater job satisfaction in combination with participating in an induction program compared to those teachers who had induction but reported average levels of job satisfaction. This was also the case for first-year teachers who had high levels of satisfaction and were given common planning, which may help to negate the association between common planning time and increased rates of leaving in Year 2.

Perceptions of Preparedness to Teach and Turnover

Feeling prepared to teach had an indisputably positive association with reducing the risk of both types of turnover.

Movers versus Stayers. For the model conditioned on the preparedness scale score only (Model B), teachers with more positive perceptions of their preparation for their first year (i.e., preparedness scores one standard deviation above the mean) were less likely to move in Year 4 than teachers who perceived their level of preparedness as average. However, once teacher and school covariates were included in the model (Step 3), a more consistent pattern emerged showing a positive association between first-year preparedness and reducing the rates of moving in both Years 4 and 5. This implies that the benefits of teachers' initial feelings of preparedness may not manifest in their decisions to move or stay until later in the early career window. Job satisfaction did not moderate this relationship between preparedness and moving (Step 7).

Leavers versus Stayers. Similar results were found for the model comparing Leavers to Stayers. For the model conditioned on the preparedness scale score only (Model B), teachers with more positive perceptions of their preparation for their first year (i.e., preparedness scores one standard deviation above the mean) were less likely to leave in Years 4 and 5 than teachers who perceived their level of preparedness as average. This same relationship emerged from the model including teacher and school covariates and the block of predictors capturing programs and policies (Step 3). However, this model also yielded a substantial cumulative effect size for Leavers suggesting that the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers reporting greater preparedness for their first year of teaching as compared to those teachers who indicated average levels of preparedness. This means that feeling prepared in one's first year of teaching may have longer term impacts when it comes to deciding whether or not to stay in the field of education. Job satisfaction did not moderate this relationship between preparedness and leaving (Step 7).

Perceptions of School Climate and Workplace Conditions and Turnover

Movers versus Stayers. For the model conditioned on the school climate and workplace conditions scale score only (Model C), a fairly consistent relationship surfaces between administrative support and moving. First-year teachers who indicated that they felt higher levels of administrative support were less likely to move in Year 2 compared to first-year teachers who reported average levels of support from their administration. While this positive relationship with administrative support is not sustained into Year 3, it does reappear in Years 4 and 5 with respect to reductions in the rates of moving to a new school. Furthermore, the cumulative predicted probabilities of moving in any of Years 2 through 5 were lower for teachers reporting greater support from their administration during their first year of work relative to those teachers reporting average support from school leadership. This implies a long-term association between having a supportive administration and making the decision to move or stay. The results for administrative support were fairly stable even once we included additional blocks of predictors to capture teacher and school covariates, programs and policies, and preparedness (Step 4). The same positive relationships between high administrative support and lower rates of moving appeared in Years 2, 4, and 5. However, the cumulative association disappeared. As a result, no moderation was explored with respect to administrative support, turnover, and job satisfaction (Step 8).

While it seems that more support from administrators matters for keeping teachers from migrating to other schools, there are some climate-related factors that do appear to increase the rates of moving. The model conditioned on the school climate and workplace conditions scale score only (Model C) does not yield any practically important effect sizes. However, once we included additional blocks of predictors to capture teacher and school covariates, programs and policies, and preparedness (Step 4), two unexpected factors emerged that surprisingly seem to be related to increased rates of moving. Teachers who indicated higher levels of collegial support than average in their first year were more likely to move in Year 2. In addition, first-year teachers who indicated a positive relationship of the content standards to their job satisfaction were cumulatively more likely to move across the early career window.

To make sense of the negative association between collegial support and increased rates of moving, we can go back to the items that comprise the collegial support scale score to make a conjecture about this relationship. The three BTLS items used to create the factor scores for the colleague support scale were: 1) Rules for student behavior are consistently enforced by teachers in this school, even for students who are not in their classes; 2) Most of my colleagues share my beliefs and values about what the central mission of the school should be; and 3) There is a great deal of cooperative effort among the staff members. While these items do capture the professional supports teachers might hope to receive from fellow faculty members, what is noticeably absent from this set of items is anything that portrays the idea of friendship. Developing informal relationships with colleagues that extend beyond the realm of work into friendship has been shown to be an important factor in teacher retention (Jarzabkowski, 2009). Yet this is not captured in the model by collegial supports, which is one plausible explanation for this contradictory result. It is also possible that supportive colleagues might encourage struggling teachers to seek out another teaching environment that better suits them as a professional.

The negative association between the content standards and rates of moving in Year 2, while unexpected, could be explained by considering the wording of the item from the BTLS: “State or district content standards have had a positive influence on my satisfaction with teaching.” The double-barreled nature of this item might have influenced the way teachers responded to it yielding a strange result. There is a difference between the content standards set forth by one’s district and the content standards required by the state. Standards created by the district are typically a list of curriculum objectives for a course generated internally by teachers who work within the district. While they may evolve from a set of state standards, district standards tend to be much easier to work with as they align naturally with the materials, textbooks, and existing curricula already in use in the district. State-mandated standards are different in that the language of state standards is not always teacher- or student-friendly, and there is usually resistance to use them to avoid “teaching to the test.”

Leavers versus Stayers. For the model conditioned on the school climate and workplace conditions scale scores only (Model C), a more complicated picture emerges for Leavers. First-year teachers who indicated that they felt higher levels of curricular autonomy and administrative support were less likely to leave in Year 2 compared to first-year teachers who reported average levels of support in these domains. This implies that first-year teachers who are given the freedom to select textbooks and materials to use with their students and select content and topics to teach in their lesson are less likely to leave the profession. This suggests that these teachers are allowed to be flexible with the ways in which they cover the content standards and this level of autonomy might keep them in the profession. Looking towards the back end of the early career timeline, first-year teachers who experience high levels of parental support and are high levels of satisfaction with the content standards leave less often than teachers who indicated having average levels of support and satisfaction in these two domains. Looking more long term, the cumulative predicted probabilities of leaving in any of Years 2 through 5 were lower for teachers experiencing greater parental support and more positive impacts of content standards on their pedagogy as well as greater access to materials and resources during their initial year on the job as compared to teachers who reported average levels of these types of supports.

While none of these results are surprising, many of these relationships disappear when we include blocks of predictors that capture teacher and school covariates, programs and policies, and preparedness (Step 4). In this more specified model, administrative support for first-year teachers emerges as an important factor in curbing rates of leaving in Year 2, and cumulatively across the early career window, greater access to materials and resources in the first year stands out as an important element for keeping teachers in the profession.

Although administrative support and access to resources are definitively important to preventing teacher attrition from the field, these models uncovered some interesting and unexpected relationships with specific indicators of school climate that appear to be related to increased rates of leaving teaching. For both the model conditioned on the school climate and workplace conditions scale scores only (Model C) and the model that included additional blocks of predictors (Step 4), higher levels of collegial support were affiliated with increased cumulative probabilities of leaving across Years 2 through 5, similar to the results discussed for Movers. Potential reasons for this finding are detailed in the previous section (Movers versus Leavers). However, higher pedagogical autonomy in the first year was also linked to increased rates of leaving in Year 2 as well as cumulatively across Years 2 through 5 in both conditional models (Model C and Step 4). This implies that giving new teachers the freedom to select their own teaching techniques, set their own classroom management and discipline procedures, control the amount of homework they assign, and make decisions about assessing students may be an overwhelming amount of autonomy, and this lack of structure could contribute to teachers leaving in Year 2. Furthermore, high levels of pedagogical autonomy can also have longer term ramifications with respect to teachers making decision to leave or stay later in the early career timeline.

When the model includes blocks of predictors to capture teacher and school covariates, programs and policies, and preparedness (Step 4), better student behavior also appears to have a negative relationship with rates of leaving in Years 4 and 5 and has the same negative association with cumulative rates of leaving in Years 2 through 5. This means that teachers who indicate more positive school-wide student behaviors are actually more likely to exit the profession over the course of their early career. It is possible that positive student behaviors may not be enough to keep teachers in the field such that teachers who want to exit the profession are going to leave regardless of how students in the school behave. Furthermore, when considering the items uses to create the student behavior scale score, it is important to remember to that this scale does not capture positive student-teacher relationships – it only includes measures of tardiness, absenteeism, and other indicators about how well students follow the rules. That does not necessarily equate with relationship-building between a teacher and his or her students.

Research has shown that teachers who are able to keep positive relations with their pupils are more likely to remain motivated, enthusiastic, enjoy their workplace, and stay at their job (Grayson & Alvarez, 2008).

In spite of the negative relationships found for leaving with pedagogical autonomy, collegial support, and student behavior, the moderation analysis (Step 8) showed that in the presence of higher levels of first-year job satisfaction, increased levels of all three of these school climate factors were associated with decreases in the rates of leaving the profession.

Perceptions of Job Satisfaction and Turnover

Job satisfaction has an unequivocally positive association with curbing the rates of both types of turnover.

Movers versus Stayers. For the model conditioned on job satisfaction scale scores only (Model D), teachers with higher than average levels of job satisfaction in their first year were less likely to move in Year 2, Year 4, and cumulatively across Years 2 through 5. This finding remained consistent even when additional blocks of predictors were included to capture teacher and school covariates, programs and policies, preparedness, and school climate and workplace conditions (Step 5).

Leavers versus Stayers. When conditioning on job satisfaction scale scores only (Model D), teachers with higher than average levels of initial job satisfaction in Year 1 were less likely to leave in Years 2 and 3 as well as cumulatively across the first five years of their early careers. Although the cumulative positive relationship between job satisfaction and leaving disappeared with the inclusion of additional blocks of predictors (Step 5), the results were sustained for Years 2 and 3 such that first-year teachers with higher than average levels of job satisfaction were more likely to stay in the profession into their second and third years.

Comparison of the Results to Other Findings from the Literature

With respect to Research Question 2, there are a number of findings that are different than what has been reported in previous research, but there were also some consistencies with existing research on turnover and complementary extensions of implications from other word. Such comparisons to other study findings are detailed in the sub-sections that follow.

First-year teacher programs and policies. Studies have shown that first-year teachers who work with a mentor who teaches in the same subject or grade level are more likely to return for the second year of teaching (Ingersoll & Smith, 2004; Conderman & Stephens, 2000; Delgado, 1999; Rowley, 1999; Ingersoll & Strong, 2011). Similarly, this dissertation research expands upon results from those studies and suggests that mentoring is related to reducing the rates of moving within the first five years, not just in the second year. However, the association between mentoring and leaving in the early career is more murky. While mentoring was associated with reduced rates of leaving immediately in the second year in this study, the results also suggest that, in the longer term, mentoring experiences from the first year of teaching are actually associated with a rise in leaving rates. There were similarly contradictory findings to the literature on induction programs (Rosenholtz, 1989; Feiman-Nemser, 2003; Weiss, 1999; Smith & Ingersoll, 2004; Ingersoll & Strong, 2011), and this dissertation research suggests that formal induction participation during the first year is related to increases in cumulative leaving rates in the first five years of teaching.

There were also mixed results for the four other programs and policies explored in this study. The results suggest that having a reduced teaching load is a good policy for curbing leaving rates but actually may contribute to teachers moving to new schools. The same pattern of contradictory findings was seen for receiving extra classroom assistance and attending seminars for first-year teachers – these appear to be positive policies for reducing leaving but may increase the likelihood of teachers moving. The findings for common planning time are interesting in that the association with turnover is dependent on time. Common planning time is related to increased rates of leaving in Year 2 but by Year 5 that relationship completely inverts. Furthermore, cumulatively over the five-year window, common planning time appears to be a good policy for decreasing leaving rates.

Perceptions of preparedness. Prior research has shown that teachers ending the school year with greater self-efficacy is significantly correlated with feeling prepared for the job of teaching (Tschannen-Moran et al., 1998), and high levels of self-efficacy and preparedness both predict teacher retention for the next school year (Glickman & Tamashiro, 1982; Marvel, Lyter, Peltola, Strizek, & Morton, 2006; Siwatu, 2011; Flanagan, 2010). This study confirms those positive findings for both the moving and leaving outcome.

School climate and workplace conditions. Several studies have shown that schools that retain their first-year teachers tend to be positive workplaces with collegial and supportive social and organizational structures put in place (Yee, 1990; Choy, Chen, & Ross, 1998; Little, 1982, Little & McLaughlin, 1993; Rosenholtz, 1989; Billingsley & Cross, 1992). Examples of these positive structures include opportunities for collegial interaction (Yee, 1990), regularly scheduled collaboration among teachers for professional development (Ingersoll & Smith, 2004), teacher autonomy and control of the work environment (Weiss, 1999; Stockard & Lehman, 2004), teacher participation in decision-making processes at school (Yee, 1990), administrative and faculty support for student discipline (Yee, 1990; Billingsley & Cross, 1992), and cooperation with parents (Skaalvik & Skaalvik, 2011).

The findings from this study confirmed some of these relationships for reducing leaving rates (but not moving rates) including having high levels of curricular autonomy and control, feeling greater levels of support from parents, and having ready access to the resources and materials needed to do the job of teaching. However, the results of this dissertation research do conflict with the literature regarding high levels of pedagogical autonomy, greater collegial support, and more positive student behavior. The survival analyses discussed in this work suggest that these particular first-year teacher experiences are associated with increased turnover rates in the early career.

The results from this study for the relationship between content standards and turnover were unexpected, especially given the wording of the item used to capture this construct: "State or district content standards have had a positive influence on my satisfaction with teaching." One would assume that a more positive influence of the content standards on a teacher's satisfaction levels would be associated with reductions in the rates of moving and leaving. However, this study found the conflicting relationships between the two turnover outcomes – a more positive role of the content standards was associated with decreased rates of leaving (as expected) but increased rates of moving. Other studies have shown that the mere presence of more stringent accountability systems in some schools can have adverse effects on retention rates because such system can exacerbate the challenges teachers face to serve their low-performing students (Clotfelter, Ladd, Vigdor, & Diaz, 2004). Therefore, it is possible that the teachers in this study felt the content standards positively influenced their job satisfaction levels, but there could have been unmeasured negative impacts of the standards on their other first-year experiences that contributed to higher rates of moving.

Of all the school climate factors that influence first-year teacher turnover decisions, the literature consistently emphasizes the importance of strong school leadership and the principal's administrative style (Billingsley & Cross, 1992; Russell, Williams & Gleason-Gomez, 2010; Tickle, Chang, & Kim, 2011). The results from this dissertation research confirm this finding – higher levels of administrative support had a very clear and consistent relationship with reducing rates of both moving and leaving for early career teachers.

Job satisfaction. Teachers' job satisfaction has been found to be predictive of both intent to leave the teaching profession (Skaalvik & Skaalvik, 2011) and actually leaving the field (Cha, 2008). This dissertation research confirms those positive findings for both the moving and leaving outcome and makes the claim that job satisfaction is association with reductions in both types of turnover during one's early career. In addition, other studies suggest that job satisfaction in the first year in the classroom is the *most* important influence on turnover and retention decisions (Stockard & Lehman, 2004). While this dissertation study does not make claims about the relative importance of each of the first-year experiential predictors used in the models, the results of this study demonstrate that having high levels of job satisfaction may be critical for first-year teachers as it moderates many of the relationships between specific first-year teacher experiences and turnover decisions to further reduce rates of leaving and moving.

Limitations

Despite the rigor of the research design and methodology, there were inherent limitations to the inferences that could be drawn from this work. These limitations are detailed in the sections that follow.

Exclusions

The exclusion of some categories of teachers limits the generalizability of inferences based on this analysis. The BLTS sample comprises full-time and part-time teachers, itinerant teachers, long-term substitute teachers, administrators, support staff, librarians, and other school-based staff who taught at least one regularly scheduled class (excluding library skills classes) in the 2007-2008 school year in grades K-12 in a public school setting. Since NCES limited the sampling frame to public schools only (including public charters), it may not be appropriate to generalize the findings of this study to novice teachers who work in other school settings (e.g., private, religious, and boarding schools). Moreover, the decision to focus on full-time classroom-based practitioners for the research and omit all other types of school-based educators means that conclusions should be applied with great caution to teachers who serve other roles in schools. In addition, the study was limited to middle and high school beginning teachers only, such that generalizing inferences to novice teachers in early childhood, elementary, and post-secondary contexts may not be appropriate. While the findings from this study may not be readily applied to all subpopulations of early career teachers, the analyses attempted to estimate sound, unbiased relationships for the subpopulation of interest.

Focus on the First-year Experience

The analyses conducted in this dissertation research only focused on teachers' experiences from their first year of teaching at their first school placement. For those teachers who remained in their first school placement beyond their first year (i.e., teachers who did not leave or move), the experiences from the second, third, and fourth year of teaching in that school presumably could have had some influence on their retention and turnover decisions in subsequent years, although these effects were not modeled. Furthermore, while some studies have shown that experiences gained during the pre-service preparation stage impact future career intentions and turnover decisions of novice teachers (DeAngelis, Wall, & Che, 2013), such effects were not explored in this study.

Secondary Data Analysis

NCES is a reputable source of data that sets standards to provide "high quality, reliable, useful, and informative statistical information for public policy decision-makers and for the general public" (NCES Standards, 2002, p.1), and this dissertation research employed a secondary data analysis approach to address the research questions. Consequently, such an approach removed the ability to follow-up with study participants and conduct further data collection that could strengthen the validity of inferences made. Furthermore, this research was limited to exploration of only that information which was collected in the original waves of survey administration. As a result, the conceptual framework for this research was limited to include only those constructs that could be operationalized by available data in the BTLS. This means that the conceptual model is not comprehensive; there may be other unobserved variables that are related to turnover according to the literature that were not measured by the BTLS and therefore could be included in this research.

Duration of the Study

The literature in the field of teacher turnover often defines the first five years on the job as the "early career" stage when teachers are continuously developing their pedagogical skills and evolving their professional identities. This is also the stage in which we see much higher rates of turnover relative to teachers who are mid-career. Nine percent of new teachers turn over before the school year even comes to a close (Fideler & Haselkorn, 1999); somewhere between 10 and 15 percent of teachers leave the profession after completing just one year (Gray, Taie, & O'Rear, 2015); 20 percent of early career teachers exit within their first three years (Henke, Chen, Gies, & Knepper, 2000), and between 40 and 50 percent attrite within their first five years (Raue, Gray, & O'Rear, 2015). With these trends in mind, the BTLS was designed to gather data from novice teachers during their first five years of teaching only. Although the five-year mark is not an arbitrary cut-off, the design of the BTLS did preclude the ability of this study to examine teacher turnover and retention decisions beyond the fifth year.

Timing of the Study

The BTLS conducted data collection in the U.S. beginning in the 2007-2008 school year and concluding with the 2011-2012 school year. Given this time frame, the first and second waves of survey administration coincided with the Great Recession, which lasted from December 2007 to June 2009, and the economic effects of which were felt long after the summer of 2009. With this historical context in mind, it is possible that trends in early career teacher turnover were different from 2007 through 2012 than they are now due to the state of the economy and the job market in the U.S. at the time participants were studied.

Observational Data and Unobserved Factors

It should be emphasized that this study cannot make causal inferences and does not intend to do so. The BTLS data is observational in nature and does not employ experimental controls or random assignment. As a result, selection bias cannot be ruled out as a source of variation in the outcomes. There may be systematic differences among teachers who stay, move, or leave that are due to unmeasured variables. In light of this limitation, this dissertation research aimed to make inferences about associations among factors (i.e., first-year experiences and early career decisions) rather than establish cause-effect relationships. As with any nonexperimental study, the findings are vulnerable to omitted variable bias from unobserved factors that may confound the effects of first-year experiences on turnover and retention decisions, yielding biased estimates.

Clustering

Clustering of a very small number of teachers in the sample within their schools and districts was ignored in the research design. The unweighted analytic sample for this study included approximately 1,150 teachers nested in roughly 1,000 schools and 900 districts. Since the majority of these schools and districts contribute only one teacher to the final sample, multilevel survival models were not explored. When there are relatively few individuals clustered within a level, hierarchical models provide no marked benefit over single-level models as there is little to no difference in the degrees of freedom by level (Cannady, 2011). Mullens and Kasprzyk (1996) argue that the sampling design for SASS actually prohibits the use appropriate use of multilevel modeling due to the small number of teachers sampled within schools. In the first five waves of the BTLS, there are on average 1.1 beginning secondary teachers per public school (before weighting). Such sparse data did not warrant the use of hierarchical analyses (Mullens & Kasprzyk, 1996).

Implications

Although this dissertation is a correlational study employing observational data and cannot make causal claims about the links between first-year teacher experiences and turnover outcomes, it raises a number of issues relevant to policymakers, researchers, and practitioners.

First, there appear to be differences in the mechanisms that drive the moving and leaving phenomena for beginning teachers. Certain first-year experiences that were shown to be positively related to reducing rates of one outcome either had no association with reductions in the other outcome or, in some cases, yielded the opposite direction for the association increasing the odds of the other outcome. For example, a reduced teaching load, attending seminars for novice teachers, receiving extra classroom assistance were linked to reductions in rates of leaving but increases in rates of moving for early career teachers. These contradictory findings suggest that policymakers, researchers, and school administrators may want to treat the two turnover pathways as separate problems with potentially separate solutions.

Furthermore, this finding supports my decision to honor two competing perspectives on turnover when developing the conceptual framework for this research by treating Stayers, Leavers, and Movers as distinct groups of teachers. The first is the organizational perspective, which isolates the impacts of teacher turnover at the school, district, or state level and frames staffing concerns as more localized in scope. The second is a labor force perspective that examines the overall quality of the teacher workforce for the country as a whole and considers the effects of turnover on a national scale. The findings from this study suggest that addressing turnover at the macroscopic, national level (reducing level rates) and at the microscopic, local level (reducing moving rates) may require different strategies.

Second, this research demonstrates that there are three first-year teacher experiences that seem to resonate most with beginning teachers to reduce rates of either type of turnover in the first five years: 1) perceptions of preparedness to teach, 2) job satisfaction, and 3) administrative support. There are two additional first-year experiences that new teachers appear to weigh more heavily than others when making the decision to stay in the profession rather than leave for another career: 1) parental support and 2) access to resources and materials. This study also supports the finding that salary satisfaction may not play a meaningful role in turnover decision-making for early career teachers. Thus, implementing salary increase initiatives to recruit and retain beginning teachers appears to be ill-conceived from a policy perspective.

Third, this research illuminated several first-year teacher experiences that warrant deeper investigation to determine the positive and negative impacts they may have on new teachers, which appear contribute in very complex ways to their decisions to move or leave. These experiences include mentoring, induction, reduced teaching loads, required seminars for first-year teachers, common planning time, extra classroom assistance, collegial support, pedagogical autonomy, student behavior, content standards and accountability systems.

Finally, from the patterns established in the discussion of Research Questions 1 and 2, it seems that there may be more policy-amendable variables that can be manipulated in the first year of teaching to prevent leaving than there are to prevent moving. This implies that curbing rates of moving to minimize the localized impacts of teacher migration to other schools may be a more difficult endeavor than reducing rates of leaving the profession.

Areas for Further Research

The goal of this non-experimental study was to identify promising areas for deeper analysis, where the links between early career teacher turnover, programs and policies and policies for first-year teachers, preparedness to teach in the first year, school climate and workplace conditions, and job satisfaction merited investigation. The findings suggest several rich areas for further research.

First, the emergence of job satisfaction as an important moderator for some of the relationships between first-year teacher experiences and turnover outcomes raises the question of whether or not there is a mediating relationship at play. While job satisfaction was explored as a moderator in this work to see if it influenced the *strength* of relationships between first-year experiences and turnover, future research could investigate job satisfaction as a mediator that potentially *explains* these same relationships.

Second, this study used measures collected in the first year of teaching to predict later outcomes observed in the second, third, fourth, and fifth years of teaching. It may be naïve to assume that the "potency" of a teacher's first-year experiences resonates into turnover decisions made in later years without fading out. To address this limitation, future research could incorporate time-varying measures on the constructs of interest (i.e., job satisfaction, perceptions of preparedness and self-efficacy, school climate and working conditions) captured in Years 2, 3, 4, and 5 in order to: 1) determine how teachers' experiences may change over time from the first year into subsequent years, and 2) explore how the relationships between those experiences and turnover decisions change over time. In addition, future work with this topic could include "Returners" as an outcome to determine if there are protective factors experienced in the early career that may eventually offset the risk factors associated with moving and leaving to bring former educators back to the profession.

Third, this study focused on full-time beginning teachers in their first five years on the job in secondary level schools (i.e., middle and high schools). A natural line of inquiry that follows from this work then is to see if the first-year experiences that appear to shape the turnover decisions of secondary teachers are the same experiences that can be linked to retention over time for other groups of teachers such as elementary school teachers, part-time teachers, and teachers who are entering the mid-career window (i.e., their sixth year).

Fourth, this dissertation research did not make a distinction between voluntary and involuntary turnover. From their recent investigation of turnover in the U.S., Carver-Thomas & Darling-Hammond (2017) found that approximately 10 percent of annual teacher turnover is involuntary. Although this study does not identify whether or not teachers were reassigned, fired or their contracts not renewed, future research could investigate whether there is a difference in the experiences of teachers who are forced out compared to teachers who leave their school or their job of their own volition. Moreover, this work did not examine differences between teachers who move or left teaching during the school year versus at the end of the academic year. It is possible that the timing of a teacher's transition to another school or to another profession may differ depending on the nature of teachers' experiences.

Finally, this work focused on the experiences of first-year teachers that keep them coming back to the classroom year after year in their early careers. However, the teachers who remain are not always the most effective or the highest quality. Not all retention is "good" retention. From an organizational perspective, a certain level of employee turnover is considered normal and healthy as new employees usher in fresh experiences and perspectives that can kick start innovation amongst other employees (Perda, 2013). This raises the following question: Are the teachers who stay the ones we want to stay? A 2001 study from Hughes titled "Deciding to leave but staying: Teacher burnout, precursors and turnover" suggests that large percentages of teachers who suffer from burnout remain in their positions which may negatively affect the educational process and, ultimately, harm students and their achievement. Therefore, future research should examine which teacher experiences may be linked to increased burnout in educators who have enough resilience to stay but then suffer from low efficacy in their teaching – in other words, those who can "survive" but not "thrive."

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APPENDIX A

Wording and Response Options for Items

Table A1

Wording and Response Options for Items from SASS, TFS, and BTLS Surveys

OUTCOMES

Teaching status in 2008-2009 (Wave 2): Stayer = 0, Mover = 1, Leaver = 2
Teaching status in 2009-2010 (Wave 3): Stayer = 0, Mover = 1, Leaver = 2
Teaching status in 2010-2011 (Wave 4): Stayer = 0, Mover = 1, Leaver = 2
Teaching status in 2011-2012 (Wave 5): Stayer = 0, Mover = 1, Leaver = 2

PREDICTORS

I. Perceptions of preparedness to teach

1. In your first year of teaching, how well prepared were you to handle a full range of classroom management or discipline situations? (1 = Not at all prepared, 2 = Somewhat prepared, 3 = Well prepared, 4 = Very well prepared)
2. In your first year of teaching, how well prepared were you to use a variety of instructional methods? (1 = Not at all prepared, 2 = Somewhat prepared, 3 = Well prepared, 4 = Very well prepared)
3. In your first year of teaching, how well prepared were you to teach your subject matter? (1 = Not at all prepared, 2 = Somewhat prepared, 3 = Well prepared, 4 = Very well prepared)
4. In your first year of teaching, how well prepared were you to use computers in classroom instruction? (1 = Not at all prepared, 2 = Somewhat prepared, 3 = Well prepared, 4 = Very well prepared)
5. In your first year of teaching, how well prepared were you to assess students? (1 = Not at all prepared, 2 = Somewhat prepared, 3 = Well prepared, 4 = Very well prepared)
6. In your first year of teaching, how well prepared were you to select and adapt curriculum and instructional materials? (1 = Not at all prepared, 2 = Somewhat prepared, 3 = Well prepared, 4 = Very well prepared)

II. Perceptions of school climate

<u>A. Teacher autonomy</u>

1. How much control do you have in your classroom over selecting textbook and other instructional materials? (No control = 1, Minor control = 2, Moderate control = 3, A great deal of control = 4)

2. How much control do you have in your classroom over selecting content, topics, and skills to be taught? (No control = 1, Minor control = 2, Moderate control = 3, A great deal of control = 4)
3. How much control do you have in your classroom over selecting teaching techniques? (No control = 1, Minor control = 2, Moderate control = 3, A great deal of control = 4)
4. How much control do you have in your classroom over evaluating and grading students? (No control = 1, Minor control = 2, Moderate control = 3, A great deal of control = 4)
5. How much control do you have in your classroom over disciplining students? (No control = 1, Minor control = 2, Moderate control = 3, A great deal of control = 4)
6. How much control do you have in your classroom over determining the amount of homework to be assigned? (No control = 1, Minor control = 2, Moderate control = 3, A great deal of control = 4)

<u>B. Supports within the work environment</u>

a) Support provided by administration:

1. In your first year of teaching, did you receive regular supportive communication with your principal, other administrators, or department chair during your first year of teaching? (Yes = 0, No = 1)
2. The school administration's behavior toward staff is supportive and encouraging. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
3. My principal enforces school rules for student conduct and backs me up when I need it. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
4. The principal knows what kind of school he/she wants and has communicated it to the staff. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
5. In this school staff members are recognized for a job well done. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
6. I am given the support I need to teach students with special needs. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)

b) Support provided by colleagues:

1. Rules for student behavior are consistently enforced by teachers in this school, even for students who are not in their classes. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)

2. Most of my colleagues share my beliefs and values about what the central mission of the school should be. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
3. There is a great deal of cooperative effort among the staff members. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)

c) Support provided by parents:

1. I receive a great deal of support from parents for the work I do. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
2. To what extent is lack of parental involvement a problem in this school? (Serious problem = 1, Moderate problem = 2, Minor problem = 3, Not a problem = 4)

d) Tangible/resource supports of the work environment:

1. Necessary materials such as textbooks, supplies, and copy machines are available as needed by the staff. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
2. Routine duties and paperwork interfere with my job of teaching. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)

<u>C. Student behavior</u>

1. The level of student misbehavior in this school (such as noise, horseplay or fighting in the halls, cafeteria or student lounge) interferes with my teaching. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
2. The amount of student tardiness and class cutting in this school interferes with my teaching. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
3. To what extent is student tardiness a problem in this school? (Serious problem = 1, Moderate problem = 2, Minor problem = 3, Not a problem = 4)
4. To what extent is student absenteeism a problem in this school? (Serious problem = 1, Moderate problem = 2, Minor problem = 3, Not a problem = 4)
5. To what extent is student class cutting a problem in this school? (Serious problem = 1, Moderate problem = 2, Minor problem = 3, Not a problem = 4)
6. To what extent is students dropping out a problem in this school? (Serious problem = 1, Moderate problem = 2, Minor problem = 3, Not a problem = 4)

7. To what extent is student apathy a problem in this school? (Serious problem = 1, Moderate problem = 2, Minor problem = 3, Not a problem = 4)
8. To what extent is student coming to school unprepared to learn a problem in this school? (Serious problem = 1, Moderate problem = 2, Minor problem = 3, Not a problem = 4)

D. Standards and accountability

1. I worry about the security of my job because of the performance of my students on state and/or local tests. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
2. State or district content standards have had a positive influence on my satisfaction with teaching. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)

III. First-year teacher programs and policies

A. Induction and mentoring programs

1. In your first year of teaching, did you participate in a teacher induction program? (Yes = 0, No = 1)
2. In your first year of teaching, did you receive ongoing guidance or feedback from a master or mentor teacher? (Yes = 0, No = 1)

B. Administrative policies for first-year teachers

1. Did you receive a reduced teaching schedule or number of preparations? (Yes = 0, No = 1)
2. Did you receive common planning time with teachers in your subject? (Yes = 0, No = 1)
3. Did you receive seminars or classes for beginning teachers? (Yes = 0, No = 1)
4. Did you receive extra classroom assistance (e.g., teacher aides)? (Yes = 0, No = 1)

IV. Satisfaction with teaching

1. I am satisfied with my teaching salary. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
2. I am generally satisfied with being a teacher at this school. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
3. The stress and disappointments involved in teaching at this school aren't really worth it. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)

4. The teachers at this school like being here; I would describe us as a satisfied group. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
5. I like the way things are run at this school. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
6. If I could get a higher paying job, I'd leave teaching as soon as possible. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
7. I think about transferring to another school. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
8. I don't seem to have as much enthusiasm now as I did when I began teaching. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)
9. I think about staying home from school because I'm just too tired to go. (Strongly agree = 1, Somewhat agree = 2, Somewhat disagree = 3, Strongly disagree = 4)

V. Covariates

A. Teacher-specific

a) Demographics

1. Gender (Male = 0, Female = 1)
2. Race/ethnicity (Hispanic/Latino status and White, Black, Asian, Pacific Islander, Native American, Other; respondents were allowed to identify more than one race/ethnicity)
3. Age (numeric)

b) School assignment indicator

1. Level of students taught by the teacher (Middle = 1, High = 2, Combined = 3)

c) Education/preparation indicators

1. Highest degree earned (Associate's = 1, Bachelor's = 2, Master's = 3, Education specialist or Certificate of Advanced Graduate Studies = 4, Doctorate or Professional degree = 5)
2. Duration of practice teaching (None = 0, 4 weeks or less = 1, 5-7 weeks, = 2, 8-11 weeks = 3, 12 weeks or more = 4)
3. Completion of coursework in teaching methods – dichotomous (Yes = 0, No = 1)
4. Completion of coursework in teaching methods – categorical (None = 0, 1 or 2 courses = 1, 3 or 4 courses = 2, 5 to 9 courses = 3, 10 or more courses = 4)
5. Alternative certification program (No = 0, Yes = 1)

B. School-specific

1. Urbanicity of the school (Large or mid-size central city = 1, Urban fringe, large town, or rural area inside a CBSA = 2, Small town or rural area outside a CBSA = 3)
2. Total school enrollment (numeric)
3. Charter school status (Not a public charter = 0, Is a public charter = 1)
4. Estimated number of students per FTE teacher in the school (numeric)
5. Percentage of students in the school who are of a racial/ethnic minority (numeric)
6. Percentage of enrolled students approved for the NSLP at school (numeric)

APPENDIX B

Additional Details from Scale Development

This appendix contains additional information about the scale development decisions made for the following dimensions of first-year teaching experiences: 1) preparedness to teach, 2) teacher autonomy, 3) administrative support, 4) collegial support, 5) parental support, 6) student behavior, and 7) teacher satisfaction.

Preparedness to Teach Scale

For the purpose of data reduction and to minimize the impact of multicollinearity, the creation of a "Preparedness to Teach Scale" was explored with these six items. Together, the six items yielded a Cronbach's alpha of 0.821, well above the typical 0.7 threshold. Removing the item about preparedness to use technology and computers would have increased the scale reliability to 0.830, but this was deemed to be too minimal of an increase to warrant the loss of construct representation, and so the item was retained. Of the 15 inter-item correlations, 13 fell above the typical threshold of 0.3, indicating the majority of the items are correlated enough to reduce their dimensions to a single subscale. Corrected item-total correlations ranged from .425 to .726, falling within the acceptable range of .2 to .8 indicating good item discrimination. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis as described in Chapter 3.

The determinant was non-zero (.116), the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was above 0.8 (.838), and the significant Bartlett's Test of Sphericity ($p < .001$) all indicate the assumptions of factor analysis were met. One factor was extracted that explained 46.359% of the variance in responses to the items for preparedness to teach. Factor loadings ranged from .461 to .846, all above the minimum acceptable threshold of 0.3.

Teacher Autonomy Subscales

For the purpose of data reduction and to minimize the impact of multicollinearity, the creation of a "Teacher Autonomy Scale" was explored with these six items. Together, the six items yielded a Cronbach's alpha of 0.691, very close to the acceptable 0.7 threshold. Removal of any item from the six would have decreased the scale reliability, and so all items were retained. Of the 15 inter-item correlations, only 8 fell above the acceptable threshold of 0.3, indicating the potential to break these six items into two sub-scales rather than reduce their dimensions to one. Corrected item-total correlations ranged from .322 to .535, falling within the acceptable range of .2 to .8 indicating good item discrimination. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis as described in Chapter 3 with the understanding that more than one factor may be extracted.

The determinant was non-zero (.278), the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was close to the typical threshold of 0.8 (.753), and the significant Bartlett's Test of Sphericity ($p < .001$) all indicate the assumptions of factor analysis were generally met. Two factors were extracted that together explained 45.688% of the variance in responses to the items related to teacher autonomy (34.326% for Factor 1 and 11.362% for Factor 2). An oblimin rotation was applied to obtain the final solution. Factor 1 consisted of the items related to grading students, selecting teaching techniques, assigning homework, and disciplining students. This factor seems to capture pedagogical autonomy. Factor loadings for these four items ranged from .590 to .753, all above the minimum acceptable threshold of 0.3. Factor 2 consisted of the items related to selecting content, topics, and skills to be taught and selecting textbooks and other instructional materials. This factor seems to be related to teachers making decisions about the curriculum ("curricular autonomy"). Factor loadings for these two items were .789 and to .664, respectively, both above the minimum acceptable threshold of 0.3. The two factors extracted were moderately correlated ($r = .474$).

Administrative Support Subscale

For the purpose of data reduction and to minimize the impact of multicollinearity, the creation of an "Administrative Support Scale" was explored with these six items. Together, the six items yielded a Cronbach's alpha of 0.792, clearing the acceptable 0.7 threshold. Removing the item about receiving support to teach students with special needs would have increased the scale reliability to 0.805, but this was deemed to be too minimal of an increase to warrant the loss of construct representation, and so the item was retained. Of the 15 inter-item correlations, 11 fell above the typical threshold of 0.3, indicating the majority of the items are correlated enough to reduce their dimensions to a single subscale. Corrected item-total correlations ranged from .410 to .666, falling within the acceptable range of .2 to .8 indicating good item discrimination. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis as described in Chapter 3.

The determinant was non-zero (.160), the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was above 0.8 (.823), and the significant Bartlett's Test of Sphericity ($p < .001$) all indicate the assumptions of factor analysis were met. One factor was extracted that explained 42.460% of the variance in responses to the items related to administrative support. Factor loadings ranged from .449 to .771, all above the minimum acceptable threshold of 0.3.

Collegial Support Subscale

For the purpose of data reduction and to minimize the impact of multicollinearity, the creation of a "Collegial Support Scale" was explored with these three items. Together, the three items yielded a Cronbach's alpha of 0.730, clearing the acceptable 0.7 threshold. Removal of any item from the six would have decreased the scale reliability, and so all items were retained. Of the 3 inter-item correlations, all were above the typical threshold of 0.3, indicating the items are correlated enough to reduce their dimensions to a single subscale. Corrected item-total correlations ranged from .535 to .570, falling within the acceptable range of .2 to .8 indicating good item discrimination. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis as described in Chapter 3.

The determinant was non-zero (.527) and Bartlett's Test of Sphericity was significant ($p < .001$). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was lower than 0.8 (.684), which is not surprising given the small number of items. In spite of this, the assumptions of factor analysis were generally met. One factor was extracted that explained 48.190% of the variance in responses to the items pertaining to collegial support. Factor loadings ranged from .652 to .718, all above the minimum acceptable threshold of 0.3.

Parental Support Subscale

For the purpose of data reduction and to minimize the impact of multicollinearity, the creation of a "Parental Support Scale" was explored with these two items. Together, the two items yielded a Cronbach's alpha of 0.648, close to the acceptable 0.7 threshold. The correlation between these two items was 0.482, above the typical threshold of 0.3, indicating the items are correlated enough to reduce their dimensions to a single subscale. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis as described in Chapter 3.

The determinant was non-zero (.768) and Bartlett's Test of Sphericity was significant ($p < .001$). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was lower than 0.8 (.500), which is not surprising given the small number of items. In spite of this, the assumptions of factor analysis were generally met. One factor was extracted that explained 48.105% of the variance in responses to the items related to parental support. Factor loadings were .694, clearing the minimum acceptable threshold of 0.3.

Student Behavior Subscale

For the purpose of data reduction and to minimize the impact of multicollinearity, the creation of a "Student Behavior Scale" was explored with these eight items. Together, the items yielded a Cronbach's alpha of 0.860, far above the typical 0.7 threshold. Removing the item about student misbehavior interfering with the job of teaching would have increased the scale reliability to 0.862, but this was deemed to be too minimal of an increase to warrant the loss of construct representation, and so the item was retained. Of the 28 inter-item correlations, 27 fell above the typical threshold of 0.3, indicating the vast majority of the items are correlated enough to reduce their dimensions to a single subscale. Corrected item-total correlations ranged from .443 to .702, falling within the acceptable range of .2 to .8 indicating good item discrimination. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis as described in Chapter 3.

The determinant was non-zero (.036), the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was greater than 0.8 (.869), and Bartlett's Test of Sphericity was significant ($p < .001$) implying that the assumptions of factor analysis were met. One factor was extracted that explained 45.130% of the variance in responses to the items regarding student behavior and its effects in the workplace. Factor loadings ranged from .470 to .784, clearing the minimum acceptable threshold of 0.3.

Job Satisfaction Subscale

For the purpose of data reduction and to minimize the impact of multicollinearity, the creation of a "Satisfaction with Teaching Scale" was explored with these nine items. Together, the items yielded a Cronbach's alpha of 0.819, far above the typical 0.7 threshold. Removing the salary satisfaction item would have increased the scale reliability to 0.835, and so the item was considered for removal. Of the 36 inter-item correlations, only 20 fell above the typical threshold of 0.3, indicating the potential to break these six items into two sub-scales rather than reduce their dimensions to one. Corrected item-total correlations ranged from .255 to .692, falling within the acceptable range of .2 to .8 indicating good item discrimination in general, although it was noted that the salary satisfaction item did have the lowest item discrimination. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to remove the salary satisfaction item and conduct another reliability analysis with the remaining eight items.

With just eight items in the "Satisfaction with Teaching Scale," Cronbach's alpha increased to 0.835. Removing the item about leaving for better pay would have increased the scale reliability to 0.836, but this was deemed to be too minimal of an increase to warrant the loss of construct representation, and so the item was retained. Of the 28 inter-item correlations, 20 fell above the typical threshold of 0.3, indicating the items are correlated enough to reduce their dimensions to a single subscale. Corrected item-total correlations ranged from .405 to .707, falling within the acceptable range of .2 to .8 indicating good item discrimination. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis with these eight items as described in Chapter 3.

The determinant was non-zero (.045), the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was greater than 0.8 (.850), and Bartlett's Test of Sphericity was significant ($p < .001$) implying that the assumptions of factor analysis were met. Two factors were extracted that together explained 52.542% of the variance in responses to the items related to teacher autonomy (42.547% for Factor 1 and 9.995% for Factor 2). An oblimin rotation was applied to obtain the final solution. Factor 1 consisted of the three positively-worded items related to teachers in this school being a satisfied group, the school being well run, and the individual teacher being generally satisfied working at their school. Factor loadings for these three items ranged from .543 to .919, all above the minimum acceptable threshold of 0.3. Factor 2 consisted of the five negatively-worded items related to having less enthusiasm for teaching, being too tired to teach, feeling that teaching is not worth it, wanting to leave for better pay, and thinking about transferring to another school. Factor loadings for these five items ranged from .361 to .858, clearing the minimum acceptable threshold of 0.3. The two factors extracted were moderately correlated ($r = .594$).

The second research question for this dissertation asks about the moderating effects of job satisfaction on the relationship between first-year teachers' experiences and their turnover decisions. Thus, it was hypothesized that job satisfaction is a unidimensional construct that could be captured by a single factor score and the moderating effects of which could be explored through the use of a single interaction term in survival modeling. However, the two-factor extraction from this factor analysis spurred on a re-evaluation of the rationale for including the 9 satisfaction items in this research. Exploring the relationships among the 9 satisfaction items was a good exercise in thinking about the theory behind including them in this research in the first place. This exercise made it clear that several of the items measured experiences beyond an individual teacher's satisfaction with their job in their school and, therefore, were likely introducing noise into the analysis via construct irrelevance. For example, one of the items refers to the satisfaction levels of other teachers in the school that goes beyond the satisfaction of the individual teacher being surveyed. Of the 9 original items, I identified 4 that seemed to reflect an individual teacher's experience of satisfaction from working in their school and tried a combination of these items to create a new streamlined satisfaction scale. The four items are: 1) I am generally satisfied with being a teacher at this school, 2) I like the way things are run at this school, 3) The stress and disappointments involved in teaching at this school aren't really worth it, and 4) I don't seem to have as much enthusiasm now as I did when I began teaching.

Together, the items yielded a Cronbach's alpha of 0.781, above the typical 0.7 threshold. Removing the less enthusiasm item would have increased the scale reliability to 0.792, but this was deemed to be too minimal of an increase to warrant the loss of construct representation, and so the item was retained. Of the 6 inter-item correlations, 5 fell above the typical threshold of 0.3, indicating the four items are correlated enough to reduce their dimensions to a single subscale. Corrected item-total correlations ranged from .478 to .716, falling within the acceptable range of .2 to .8 indicating good item discrimination in general. From this review of the reliability analysis and the scale characteristics, it was deemed appropriate to move forward with a common factor analysis with these four items.

The determinant was non-zero (.264), and Bartlett's Test of Sphericity was significant ($p < .001$). Although the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy fell below 0.8 (.738), it was close enough that when combined the results of the other two assumption checks, one could say the assumptions of factor analysis were generally met. One factor was extracted that explained 50.967% of the variance in responses to the items related to teacher satisfaction. Factor loadings for these three items ranged from .547 to .854, all above the minimum acceptable threshold of 0.3.

As a means to establish concurrent validity, correlations among the original 9 items and the job satisfaction factor score were calculated and are shown in Table 114. The top four rows of this table include the satisfaction items that compose the Job Satisfaction subscale; the bottom five rows present the items that were dropped when generating the Job Satisfaction factor score due to construct irrelevance.

Table B1

Correlations Between Job Satisfaction Factor Scores and 9 Satisfaction Items

BTLS Item	Pearson Correlation with Satisfaction Factor Score
Generally satisfied	0.928
Teaching not worth it	0.854
School is well run	0.680
Less enthusiasm	0.594
Teachers satisfied	0.604
Transfer to another school	0.543
Too tired for school	0.463
Leave for better pay	0.346
Satisfied with salary	0.212

APPENDIX C

Annotated R Code for Data Conversion and Weighted Survival Models

This appendix provides annotated R code used to: 1) convert the BTLS data from wide to long format recoding the turnover outcome to reflect competing risks of Staying, Moving, and Leaving, and 2) estimate discrete-time competing risks survival models with sampling weights and replicate weights applied. Four of the survival models are presented starting with the base-time model and ending with the model that included first year programs and policies. The final section of code includes the syntax needed to build the wrapper function for multinomial logistic regression with replicate weights using data from complex surveys developed by Ganz (2018).

```
##############################################################################
#R CODE FOR DATA CONVERSION FROM WIDE TO LONG
##############################################################################

##############################################################################
#CREATE ARTIFICIAL DATA THAT MIMICS THE BTLS DATA WIDE FORMAT
AND TURNOVER OUTCOME VARIABLE
##############################################################################
###Create artificial teacherID, gender variable, and turnover status variables at Waves 2,
        3, 4, and 5 for 10 teachers.###
teacherID<-c(55,90:98)
gender<-c(1,0,1,1,0,0,0,1,1,0)
w2<-c(1,1,2,1,3,1,1,2,1,1)
w3<-c(1,1,NA,3,NA,1,1,NA,1,1)
w4<-c(1,NA,NA,NA,NA,1,2,NA,1,1)
w5<-c(1,NA,NA,NA,NA,NA,NA,NA,3,1)

###Merge variables together as data frame called "car"###
car<-as.data.frame(cbind(teacherID, gender, w2,w3,w4,w5))
car

###Censor variable is already created and called "Turnover_always_ever"###
###"Turnover_always_ever" variable coded as follows, 1: Always Stayer; 2: Ever
        Mover; 3: Ever leaver; 4: Censored Stayer###
###Last wave is the last time you see a "1" in the 2-5 time points; if one does not exist,
        then their last wave was at year one ###
```

```
car$last_wave<-c(5,3,1,2,1,4,3,1,4,5)
car$cen<-c(1,4,2,3,3,4,2,2,3,1)
car

###Make sure “cen” is a factor###
str(car$cen)
car$cen<-as.factor(car$cen)
cen.dummy<-dummy(car$cen)

###Merge dummy variable “cen” with artificial data###
car<-cbind(car, cen.dummy)
car

###Create time variable###
car$time <- 4-(apply(car[,3:6], 1, function(x) length(which(is.na(x)==TRUE)))

##########################################################################
#CONVERT ARTIFICAL DATA FROM WIDE TO LONG AND BUILD
COMPETING RISKS OUTCOME VARIABLE CALLED “NEWRESP”
##########################################################################
caroMagic<-function(data, list.of.censor.names) {
  data$time <- 4-(apply(data[,8:11], 1, function(x) length(which(is.na(x)==TRUE))))
  require(discSurv)
  output<-dataLongCompRisks (dataSet=data, timeColumn="time",
                 eventColumns=list.of.censor.names)
  rawResponseMat <- output[, c("e0", "e1", "e2", "e3")]
  NewFactor <- factor(unname(apply(rawResponseMat, 1, function(x) which(x == 1))),
                  labels = colnames(rawResponseMat))
  output <-cbind(output, NewResp=NewFactor)
  return(output)
}
yourdata<-caroMagic(car, c("cen1", "cen2", "cen3"))


##########################################################################
#R CODE FOR SURVIVAL MODELS WITH SAMPLING AND REPLICATE
WEIGHTS APPLIED
##########################################################################

##########################################################################
#DESIGNATE WEIGHTED SURVEY DESIGN WITH SAMPLING WEIGHTS AND
REPLICATE WEIGHTS
##########################################################################
```

```
BTLS <- svrepdesign(variables=COMPRISKlong[,1:173],
repweights=COMPRISKlong[,1427:1514], weights=COMPRISKlong[,1426],
combined.weights=TRUE, type="other", scale=1, rscales=1)

#########################################################################
#STEPWISE SURVIVAL MODELS BEGIN HERE USING SYVMULTINOM
#########################################################################

#STEP 0. Categorical indicators of time only, "timeInt" variable.

model_step0<- svymultinom(COMPRISKlong$NewResp ~ timeInt,
        BTLS, scale.weights=FALSE)

#STEP 1. Teacher covariates with time interval interactions.
model_step1<- svymultinom(COMPRISKlong$NewResp ~ timeInt +
     gender_dum*timeInt + black_dum*timeInt + latino_dum*timeInt +
     other_mixed_dum*timeInt + W1AGE_T*timeInt +
     level_middle*timeInt + level_combined*timeInt + education*timeInt +
     student_teach_dum*timeInt +
     methods_courses_dum*timeInt + alt_cert_dum*timeInt,
     BTLS, scale.weights=FALSE)

#STEP 2. Teacher and school covariates with time interval interactions.
model_step2<- svymultinom(COMPRISKlong$NewResp ~ timeInt +
     gender_dum*timeInt + black_dum*timeInt + latino_dum*timeInt +
     other_mixed_dum*timeInt + W1AGE_T*timeInt +
     level_middle*timeInt + level_combined*timeInt + education*timeInt +
     student_teach_dum*timeInt +
     methods_courses_dum*timeInt + alt_cert_dum*timeInt + urban_dum_1*timeInt
     + urban_dum_2*timeInt + charter_dum*timeInt + W1ENRK12UG*timeInt +
     W1STU_TCH*timeInt + W1MINENR*timeInt + W1NSLAPP_S*timeInt,
     BTLS, scale.weights=FALSE)

#STEP 3. Teacher/school covariates and first year programs & policies with time interval
interactions.
model_step3<- svymultinom(COMPRISKlong$NewResp ~ timeInt +
     gender_dum*timeInt + black_dum*timeInt + latino_dum*timeInt +
     other_mixed_dum*timeInt + W1AGE_T*timeInt +
     level_middle*timeInt + level_combined*timeInt + education*timeInt +
     student_teach_dum*timeInt +
     methods_courses_dum*timeInt + alt_cert_dum*timeInt + urban_dum_1*timeInt
     + urban_dum_2*timeInt + charter_dum*timeInt + W1ENRK12UG*timeInt +
     W1STU_TCH*timeInt + W1MINENR*timeInt + W1NSLAPP_S*timeInt
      + W1T0220*timeInt + W1T0226*timeInt + W1T0221*timeInt +
     W1T0222*timeInt + W1T0223*timeInt + W1T0224*timeInt,
     BTLS, scale.weights=FALSE)
```

```
###########################################################################
#WRAPPER FUNCTION DETAILS FOR SVYMULTINOM (Ganz, 2018)
###########################################################################

#' svrepmisc:
Miscellaneous
Functions for
Replicate
Weights
#'
#' Wrapper functions for Complex Surveys using replicate weights.
#' Takes advantage of \code{\link[survey]{withReplicates}}.
#' @import survey
#' @importFrom stats coef
#' @importFrom stats printCoefmat
#' @importFrom stats pt
#' @docType package
#' @name svrepmisc
#'
NULL

# helper function
wR <- function(FUN, formula, design, subset, ...,
scale.weights=FALSE) {
  # stolen from Lumley
  # surveyrep.R line 1311
  if (!missing(subset)) {
  subset <- substitute(subset)
  subset <- eval(subset, design$variables, parent.frame())
  if (!is.null(subset)) {
    design <- design[subset, ]
  }
  }

  est <- survey::withReplicates(design,
                     function(w, data) {
                       environment(formula) <- environment()
                       vals <-
stats::coef(FUN(formula=formula,data=data,weights=w,...))
                       if (is.matrix(vals)) {
                         vals <- mat2vec(vals)
                       }
                       return(vals)
```

```
                    }, scale.weights=scale.weights)

  attr(est, "statistic") <- "Coefficient"
  class(est) <- c("svrepstatmisc",class(est))
  # from Lumley surveyrep.R line 1404
  # This is possibly wrong
  df.residual <- degf(design)+1-length(est)
  attr(est, "df.residual") <- df.residual
  if(df.residual <= 0)
    warning(paste0(
      "The number of degrees of freedom of your replicate weights
design\n",
      "is inferior to the number of estimates in your model (",
length(est), ").\n",
      "It will not be possible to compute p-values using t
distribution.\n",
      "You should consider increasing the number of replicates."
    ))
  return(est)

}

#' Wrapper for Multinomial Logistic Regression for Replicate
Weights
#'
#' Uses \code{\link[survey]{withReplicates}} and
\code{\link[nnet]{multinom}} to generate
#' coefficients, and standards errors for multinomial logistic
regressions
#' using replicate weights
#'
#' @note Output is consistent with SAS's proc surveylogistic's
multinomial
#' survey output
#'
#' @export
#' @seealso \code{\link[survey]{withReplicates}}
\code{\link[nnet]{multinom}}
#' @param formula Model formula
#' @param design Survey design from
\code{\link[survey]{svrepdesign}}
#' @param subset Expression to select a subpopulation
```

```
#' @param ... Other arugments passed to
\code{\link[nnet]{multinom}}
#' @param scale.weights Indicate whether to rescale weights
(defaults to false)
#' @importFrom nnet multinom
#' @references Lumley, Thomas. Complex Surveys: A Guide to
Analisys Using R.
#'  Hoboken, NJ: Wiley, 2010. Print.


svymultinom <- function(formula, design, subset, ...,
scale.weights=FALSE) {
  wR(nnet::multinom,formula,design,subset,...,
scale.weights=scale.weights)

}
```

APPENDIX D

Collinearity Statistics

Table D1

Collinearity Statistics for First-year Experience Predictors and Covariates

	Collinearity Statistics	
Predictor/Covariate	Tolerance	VIF
Induction	0.706	1.416
Mentoring	0.789	1.268
Reduced Schedule	0.914	1.094
Common Planning	0.815	1.226
Seminars	0.694	1.442
Extra Help	0.943	1.061
Preparedness Factor Score	0.843	1.186
Pedagogical Autonomy Factor Score	0.565	1.771
Curricular Autonomy Factor Score	0.535	1.868
Administrative Support Factor Score	0.538	1.860
Collegial Support Factor Score	0.581	1.721
Parental Support Factor Score	0.592	1.690
Availability of Materials	0.723	1.383
Paperwork and Duties Interference	0.841	1.188
Job Security and Satisfaction	0.855	1.170
Content Standards and Satisfaction	0.865	1.156
Student Behavior Factor Score	0.504	1.984
gender_dum	0.952	1.051
black_dum	0.865	1.156
latino_dum	0.939	1.065
other_mixed_dum	0.922	1.085
level_middle	0.731	1.367
level_combined	0.702	1.425
education	0.904	1.106
student_teach_dum	0.554	1.805
methods_courses_dum	0.819	1.221
alternative_certification_dum	0.640	1.562
age	0.845	1.184
urban_dum_1	0.754	1.326
urban_dum_2	0.661	1.514
charter_dum	0.850	1.177
enrollment	0.480	2.083
student_teacher_ratio	0.674	1.484
%_minority	0.544	1.837
%_free_reduced_lunch	0.517	1.934

APPENDIX E

Survival Model Estimates

Table E1

Model for Moving Conditioned on Time and Teacher Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-2.511	0.058	-43.042	<.001	10.137	-0.248	NA
time 3	0.563	0.095	5.896	<.001	16.836	0.033	NA
time 4	-1.067	0.125	-8.514	<.001	24.787	-0.043	NA
time 5	-0.969	0.281	-3.452	<.001	115.852	-0.008	NA
gender_dum	-0.42	0.027	-15.783	<.001	3.427	-0.123	NA
black_dum	-0.756	0.048	-15.622	<.001	6.007	-0.126	NA
latino_dum	-1.357	0.066	-20.508	<.001	8.832	-0.154	NA
other_mixed_dum	0.861	0.065	13.198	<.001	6.923	0.124	NA
age	0.019	0.001	14.703	<.001	0.232	0.082	NA
level_middle	-0.018	0.025	-0.716	0.475	4.117	-0.004	NA
level_combined	-0.197	0.047	-4.207	<.001	4.92	-0.04	NA
education	-0.139	0.028	-4.91	<.001	4.122	-0.034	NA
student_teach_dum	-0.355	0.03	-11.901	<.001	3.922	-0.091	NA
methods_courses_dum	0.649	0.036	17.981	<.001	4.308	0.151	NA
alt_cert_dum	0.571	0.028	20.579	<.001	3.49	0.164	NA
time3*gender_dum	0.874	0.04	21.882	<.001	5.447	0.16	NA
time3*black_dum	1.717	0.061	27.955	<.001	9.66	0.178	NA
time3*latino_dum	-6.095	1.548	-3.938	<.001	128.877	-0.047	NA
time3*other_mixed_dum	-1.446	0.132	-10.983	<.001	78.936	-0.018	NA
time3*age	-0.043	0.002	-18.498	<.001	0.405	-0.106	NA
time3*level_middle	0.069	0.04	1.729	0.084	8.781	0.008	NA

Table E1 (continued)

Model for Moving Conditioned on Time and Teacher Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time3*level_combined	0.74	0.065	11.305	<.001	7.739	0.096	NA
time3*education	0.593	0.043	13.822	<.001	7.608	0.078	NA
time3*student_teach_dum	0.152	0.048	3.157	<.001	6.947	0.022	NA
time3*methods_courses_dum	-0.416	0.056	-7.462	<.001	7.847	-0.053	NA
time3*alt_cert_dum	0.132	0.044	2.965	<.001	7.684	0.017	NA
time4*gender_dum	0.166	0.052	3.19	<.001	6.544	0.025	NA
time4*black_dum	0.437	0.093	4.716	<.001	36.203	0.012	NA
time4*latino_dum	1.468	0.093	15.846	<.001	45.767	0.032	NA
time4*other_mixed_dum	-0.228	0.138	-1.653	0.099	160.184	-0.001	NA
time4*age	0.017	0.003	6.324	<.001	0.34	0.05	NA
time4*level_middle	-0.733	0.057	-12.853	<.001	24.669	-0.03	NA
time4*level_combined	0.129	0.082	1.57	0.117	8.632	0.015	NA
time4*education	-0.806	0.069	-11.667	<.001	33.874	-0.024	NA
time4*student_teach_dum	1.134	0.07	16.178	<.001	19.282	0.059	NA
time4*methods_courses_dum	-1.04	0.07	-14.954	<.001	9.893	-0.105	NA
time4*alt_cert_dum	-0.348	0.059	-5.942	<.001	11.181	-0.031	NA
time5*gender_dum	0.707	0.06	11.753	<.001	10.694	0.066	NA
time5*black_dum	2.272	0.081	28.065	<.001	285.101	0.008	NA
time5*latino_dum	0.165	0.16	1.032	0.302	243.4	0.001	NA
time5*other_mixed_dum	0.145	0.136	1.068	0.286	129.572	0.001	NA
time5*age	-0.082	0.005	-15.01	<.001	0.837	-0.098	NA
time5*level_middle	-1.234	0.074	-16.664	<.001	90.715	-0.014	NA
time5*level_combined	-3.187	0.284	-11.223	<.001	38.031	-0.084	NA
time5*education	-0.607	0.083	-7.35	<.001	43.283	-0.014	NA
time5*student_teach_dum	0.041	0.079	0.516	0.606	53.143	0.001	NA

Table E1 (continued)

Model for Moving Conditioned on Time and Teacher Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time5*methods_courses_dum	2.219	0.229	9.706	<.001	109.041	0.02	NA
time5*alt_cert_dum	-0.304	0.074	-4.114	<.001	44.792	-0.007	NA

Table E2

Model for Leaving Conditioned on Time and Teacher Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.732	0.072	-51.883	<.001	8.506	-0.439	NA
time 3	-2.059	0.149	-13.856	<.001	21.888	-0.094	NA
time 4	3.872	0.14	27.681	<.001	27.053	0.143	NA
time 5	-2.009	0.148	-13.547	<.001	37.219	-0.054	NA
gender_dum	0.757	0.03	25.481	<.001	3.894	0.195	NA
black_dum	0.261	0.047	5.544	<.001	5.974	0.044	NA
latino_dum	-0.961	0.076	-12.637	<.001	52.32	-0.018	NA
other_mixed_dum	2.107	0.058	36.093	<.001	6.962	0.303	NA
age	0.02	0.002	12.258	<.001	0.206	0.095	NA
level_middle	0.393	0.033	12.063	<.001	4.152	0.095	NA
level_combined	1.397	0.04	34.865	<.001	5.541	0.252	NA
education	0.136	0.034	4.009	<.001	4.719	0.029	NA
student_teach_dum	0.386	0.04	9.662	<.001	4.5	0.086	NA
methods_courses_dum	-0.361	0.037	-9.636	<.001	4.215	-0.086	NA
alt_cert_dum	0.575	0.035	16.391	<.001	4.475	0.128	NA
time3*gender_dum	-0.895	0.061	-14.634	<.001	5.845	-0.153	NA
time3*black_dum	-66.908	NA	NA	NA	329.283	-0.203	NA
time3*latino_dum	0.42	0.115	3.657	<.001	253.149	0.002	NA
time3*other_mixed_dum	-3.516	0.321	-10.939	<.001	112.816	-0.031	NA
time3*age	0.056	0.003	20.198	<.001	0.411	0.137	NA
time3*level_middle	-0.566	0.063	-9.034	<.001	7.814	-0.072	NA
time3*level_combined	-1.27	0.089	-14.285	<.001	10.157	-0.125	NA
time3*education	-1.391	0.087	-15.962	<.001	8.237	-0.169	NA
time3*student_teach_dum	-0.002	0.081	-0.019	0.986	10.349	0	NA

Table E2 (continued)

Model for Leaving Conditioned on Time and Teacher Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time3*methods_courses_dum	1.04	0.089	11.634	<.001	16.395	0.064	NA
time3*alt_cert_dum	-0.945	0.075	-12.653	<.001	7.925	-0.119	NA
time4*gender_dum	-0.534	0.053	-10.134	<.001	7.886	-0.068	NA
time4*black_dum	-0.087	0.084	-1.037	0.3	88.018	-0.001	NA
time4*latino_dum	1.455	0.093	15.677	<.001	162.883	0.009	NA
time4*other_mixed_dum	-1.421	0.13	-10.899	<.001	34.689	-0.041	NA
time4*age	-0.11	0.004	-26.705	<.001	0.676	-0.162	NA
time4*level_middle	-0.224	0.054	-4.164	<.001	11.259	-0.02	NA
time4*level_combined	-2.369	0.133	-17.806	<.001	80.004	-0.03	NA
time4*education	-0.61	0.071	-8.548	<.001	9.543	-0.064	NA
time4*student_teach_dum	-0.573	0.064	-8.902	<.001	11.41	-0.05	NA
time4*methods_courses_dum	-0.516	0.061	-8.44	<.001	10.951	-0.047	NA
time4*alt_cert_dum	0.753	0.059	12.688	<.001	10.216	0.074	NA
time5*gender_dum	-0.649	0.055	-11.704	<.001	8.146	-0.08	NA
time5*black_dum	-1.322	0.129	-10.276	<.001	34.687	-0.038	NA
time5*latino_dum	1.068	0.101	10.536	<.001	64.454	0.017	NA
time5*other_mixed_dum	-41.856	<.001	1.83E+15	<.001	113.965	-0.367	NA
time5*age	0.074	0.003	24.912	<.001	0.55	0.134	NA
time5*level_middle	0.087	0.056	1.566	0.118	34.227	0.003	NA
time5*level_combined	-2.461	0.127	-19.315	<.001	29.119	-0.085	NA
time5*education	-2.244	0.098	-22.87	<.001	47.015	-0.048	NA
time5*student_teach_dum	-0.277	0.066	-4.163	<.001	12.144	-0.023	NA
time5*methods_courses_dum	1.046	0.081	12.95	<.001	35.146	0.03	NA
time5*alt_cert_dum	-1.261	0.067	-18.744	<.001	19.314	-0.065	NA

Table E3

Model for Moving Conditioned on Time, Teacher Covariates, and School Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-2.364	0.005	-431.773	<.001	11.232	-0.211	NA
time 3	0.939	0.007	134.753	<.001	18.637	0.05	NA
time 4	-1.9	0.006	-327.71	<.001	17.472	-0.109	NA
time 5	-0.186	0.003	-63.975	<.001	27.059	-0.007	NA
urban_dum_1	0.194	0.019	10.437	<.001	4.208	0.046	NA
urban_dum_2	0.074	0.021	3.559	<.001	3.867	0.019	NA
charter_dum	1.039	0.031	33.581	<.001	7.017	0.148	NA
enrollment	0	0	-12.747	<.001	0.003	-0.091	NA
student_teacher_ratio	0.002	0.003	0.766	0.444	0.508	0.004	NA
%_minority_students	-0.001	0.001	-2.816	0.005	0.052	-0.025	NA
%_free_reduced_lunch	0.007	0.001	13.196	<.001	0.072	0.099	NA
time3*urban_dum_1	-0.885	0.024	-37.038	<.001	8.03	-0.11	NA
time3*urban_dum_2	-0.392	0.019	-20.133	<.001	5.96	-0.066	NA
time3*charter_dum	-0.049	0.013	-3.684	<.001	15.392	-0.003	NA
time3*enrollment	0	0	-0.199	0.843	0.005	-0.001	NA
time3*student_teacher_ratio	0.016	0.004	3.807	<.001	0.682	0.024	NA
time3*%_minority_students	0.005	0.001	7.682	<.001	0.085	0.062	NA
time3*%_free_reduced_lunch	-0.002	0.001	-2.143	0.033	0.117	-0.016	NA
time4*urban_dum_1	-0.682	0.012	-58.354	<.001	10.602	-0.064	NA
time4*urban_dum_2	0.313	0.012	26.838	<.001	7.675	0.041	NA
time4*charter_dum	-2.78	0	-9147.18	<.001	22.342	-0.124	NA
time4*enrollment	0.001	0	32.965	<.001	0.006	0.189	NA
time4*student_teacher_ratio	0.001	0.005	0.189	0.85	0.925	0.001	NA
time4*%_minority_students	0.005	0.001	5.255	<.001	0.102	0.047	NA
time4*%_free_reduced_lunch	0.005	0.001	4.88	<.001	0.157	0.034	NA

Table E3 (continued)

Model for Moving Conditioned on Time, Teacher Covariates, and School Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time5*urban_dum_1	-0.025	0.008	-3.133	0.002	9.715	-0.003	NA
time5*urban_dum_2	-0.931	0.004	-233.635	<.001	7.68	-0.121	NA
time5*charter_dum	-4.715	0	-182320.8	<.001	22.778	-0.207	NA
time5*enrollment	0.001	0	22.908	<.001	0.006	0.14	NA
time5*student_teacher_ratio	-0.098	0.007	-14.619	<.001	1.014	-0.097	NA
time5*%_minority_students	-0.002	0.001	-1.588	0.113	0.147	-0.012	NA
time5*%_free_reduced_lunch	0.005	0.001	3.833	<.001	0.163	0.031	NA

Note. Only estimates for time indicators and those predictors entered in Step 1b are displayed here. However, all predictors from Step 1a were also included in this model.

Table E4

Model for Leaving Conditioned on Time, Teacher Covariates, and School Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.465	0.007	-481.043	<.001	12.865	-0.269	NA
time 3	-2.277	0.005	-503.86	<.001	22.751	-0.1	NA
time 4	2.137	0.003	724.689	<.001	28.594	0.075	NA
time 5	-3.919	0.005	-806.746	<.001	26.096	-0.15	NA
urban_dum_1	-0.869	0.022	-39.019	<.001	6.049	-0.144	NA
urban_dum_2	-0.513	0.024	-21.376	<.001	4.935	-0.104	NA
charter_dum	1.144	0.016	71.644	<.001	7.832	0.146	NA
enrollment	0	0	-6.751	<.001	0.003	-0.052	NA
student_teacher_ratio	0.04	0.003	13.516	<.001	0.313	0.129	NA
%_minority_students	0.005	0.001	11.004	<.001	0.064	0.082	NA
%_free_reduced_lunch	-0.005	0.001	-7.544	<.001	0.105	-0.046	NA
time3*urban_dum_1	0.136	0.006	23.909	<.001	9.11	0.015	NA
time3*urban_dum_2	1.301	0.011	115.962	<.001	8.003	0.163	NA
time3*charter_dum	-2.569	0	-10338.6	<.001	23.128	-0.111	NA
time3*enrollment	0	0	11.425	<.001	0.006	0.083	NA
time3*student_teacher_ratio	-0.051	0.006	-9.183	<.001	0.657	-0.078	NA
time3*%_minority_students	-0.008	0.001	-8.389	<.001	0.1	-0.082	NA
time3*%_free_reduced_lunch	0.014	0.001	11.56	<.001	0.137	0.103	NA
time4*urban_dum_1	1.079	0.012	93.543	<.001	10.502	0.103	NA
time4*urban_dum_2	0.945	0.01	97.075	<.001	8.453	0.112	NA
time4*charter_dum	-1.103	0.002	-567.854	<.001	26.219	-0.042	NA
time4*enrollment	0	0	9.549	<.001	0.005	0.07	NA
time4*student_teacher_ratio	-0.044	0.006	-8.005	<.001	0.775	-0.057	NA
time4*%_minority_students	-0.001	0.001	-1.184	0.237	0.135	-0.008	NA
time4*%_free_reduced_lunch	0.007	0.001	6.123	<.001	0.215	0.031	NA

Table E4 (continued)

Model for Leaving Conditioned on Time, Teacher Covariates, and School Covariates

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time5*urban_dum_1	1.628	0.007	226.209	<.001	12.036	0.135	NA
time5*urban_dum_2	-2.249	0.001	-1731.64	<.001	9.715	-0.232	NA
time5*charter_dum	-3.138	0.003	-1066.63	<.001	22.612	-0.139	NA
time5*enrollment	-0.002	0	-33.848	<.001	0.011	-0.174	NA
time5*student_teacher_ratio	0.003	0.006	0.541	0.589	0.857	0.004	NA
time5*%_minority_students	0.021	0.001	22.123	<.001	0.17	0.123	NA
time5*%_free_reduced_lunch	0.019	0.001	17.791	<.001	0.188	0.103	NA

Note. Only estimates for time indicators and those predictors entered in Step 1b are displayed here. However, all predictors from Step 1a were also included in this model.

Table E5

Model for Moving Conditioned on Time, Teacher/School Covariates, and First-year Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.158	0.007	-428.413	<.001	14.541	-0.217	NA
time 3	1.807	0.008	228.972	<.001	22.537	0.08	NA
time 4	0.228	0.007	34.902	<.001	23.324	0.01	NA
time 5	2.41	0.005	473.959	<.001	30.315	0.08	NA
Induction	-0.312	0.021	-14.912	<.001	3.7	-0.084	NA
Mentoring	-0.016	0.02	-0.81	0.418	3.622	-0.005	NA
Reduced Schedule	-0.247	0.019	-13.112	<.001	3.993	-0.062	NA
Common Planning	0.298	0.016	18.395	<.001	3.3	0.09	NA
Seminars	0.689	0.02	34.37	<.001	4.224	0.163	NA
Extra Help	-0.192	0.017	-11.305	<.001	4.369	-0.044	NA
time 3*Induction	0.125	0.019	6.483	<.001	5.594	0.022	NA
time 3*Mentoring	-0.246	0.017	-14.798	<.001	6.602	-0.037	NA
time 3*Reduced Schedule	0.724	0.022	33.197	<.001	6.917	0.105	NA
time 3*Common Planning	-0.035	0.027	-1.311	0.19	5.42	-0.007	NA
time 3*Seminars	-0.966	0.024	-40.574	<.001	6.791	-0.142	NA
time 3*Extra Help	0.179	0.027	6.657	<.001	7.673	0.023	NA
time 4*Induction	0.599	0.018	32.782	<.001	6.991	0.086	NA
time 4*Mentoring	-1.394	0.018	-76.225	<.001	8.49	-0.164	NA
time 4*Reduced Schedule	0.781	0.018	42.335	<.001	7.403	0.106	NA
time 4*Common Planning	0.343	0.026	12.935	<.001	5.46	0.063	NA
time 4*Seminars	-1.025	0.018	-56.155	<.001	6.788	-0.151	NA
time 4*Extra Help	1.194	0.023	51.181	<.001	6.709	0.178	NA

Table E5 (continued)

Model for Moving Conditioned on Time, Teacher/School Covariates, and First-year Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 5*Induction	0.711	0.014	52.464	<.001	8.068	0.088	NA
time 5*Mentoring	-1.574	0.014	-113.476	<.001	9.382	-0.168	NA
time 5*Reduced Schedule	0.071	0.009	8.18	<.001	7.969	0.009	NA
time 5*Common Planning	-0.975	0.027	-35.64	<.001	7.064	-0.138	NA
time 5*Seminars	-0.76	0.013	-57.155	<.001	8.963	-0.085	NA
time 5*Extra Help	-0.481	0.006	-76.604	<.001	6.413	-0.075	NA

Note. Only estimates for time indicators and those predictors entered in Step 2 are displayed here. However, all predictors from Steps 1a and 1b were also included in this model.

Table E6

Model for Leaving Conditioned on Time, Teacher/School Covariates, and First-year Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.322	0.007	-462.919	<.001	13.784	-0.241	NA
time 3	-1.062	0.005	-215.108	<.001	22.662	-0.047	NA
time 4	2.681	0.005	551.652	<.001	30.716	0.087	NA
time 5	-4.686	0.004	-1070.496	<.001	32.873	-0.143	NA
Induction	-0.395	0.024	-16.518	<.001	4.819	-0.082	NA
Mentoring	-0.729	0.026	-28.135	<.001	4.296	-0.17	NA
Reduced Schedule	-0.657	0.026	-24.914	<.001	4.959	-0.133	NA
Common Planning	0.749	0.018	40.976	<.001	3.729	0.201	NA
Seminars	-0.576	0.021	-27.034	<.001	5.228	-0.11	NA
Extra Help	-0.5	0.022	-23.246	<.001	4.072	-0.123	NA
time 3*Induction	-0.09	0.02	-4.501	<.001	9.157	-0.01	NA
time 3*Mentoring	0.372	0.013	29.314	<.001	9.06	0.041	NA
time 3*Reduced Schedule	0.692	0.011	64.748	<.001	9.343	0.074	NA
time 3*Common Planning	-0.615	0.027	-22.59	<.001	5.817	-0.106	NA
time 3*Seminars	-0.306	0.019	-15.826	<.001	8.972	-0.034	NA
time 3*Extra Help	0.016	0.009	1.859	0.064	5.653	0.003	NA
time 4*Induction	1.342	0.014	93.874	<.001	8.019	0.167	NA
time 4*Mentoring	1.011	0.01	103.65	<.001	8.387	0.121	NA
time 4*Reduced Schedule	-0.208	0.007	-28.56	<.001	9.774	-0.021	NA
time 4*Common Planning	-1.183	0.029	-40.346	<.001	6.656	-0.178	NA
time 4*Seminars	-0.161	0.016	-9.828	<.001	7.857	-0.021	NA
time 4*Extra Help	0.404	0.007	56.578	<.001	7.202	0.056	NA

Table E6 (continued)

Model for Leaving Conditioned on Time, Teacher/School Covariates, and First-year Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 5*Induction	-0.718	0.013	-55.989	<.001	10.257	-0.07	NA
time 5*Mentoring	1.67	0.011	154.86	<.001	13.565	0.123	NA
time 5*Reduced Schedule	1.385	0.012	113.07	<.001	13.191	0.105	NA
time 5*Common Planning	-1.745	0.024	-72.359	<.001	11.078	-0.158	NA
time 5*Seminars	0.358	0.012	29.189	<.001	10.733	0.033	NA
time 5*Extra Help	0.59	0.007	82.795	<.001	9.961	0.059	NA

Note. Only estimates for time indicators and those predictors entered in Step 2 are displayed here. However, all predictors from Steps 1a and 1b were also included in this model.

Table E7

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, and Preparedness

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-2.723	0.007	-409.495	<.001	15.617	-0.174	NA
time 3	1.067	0.006	167.588	<.001	21.037	0.051	NA
time 4	-0.654	0.006	-106.025	<.001	22.929	-0.029	NA
time 5	0.996	0.005	200.937	<.001	32.223	0.031	NA
Preparedness	0.199	0.013	15.671	<.001	1.848	0.108	NA
time 3*Preparedness	-0.249	0.02	-12.576	<.001	2.912	-0.086	NA
time 4*Preparedness	-0.686	0.026	-26.886	<.001	3.142	-0.218	NA
time 5*Preparedness	-0.729	0.027	-26.924	<.001	3.299	-0.221	NA

Note. Only estimates for time indicators and those predictors entered in Step 3 are displayed here. However, all predictors from Steps 1a,1b, and 2 were also included in this model.

Table E8

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, and Preparedness

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.164	0.006	-507.705	<.001	15.133	-0.209	NA
time 3	-0.468	0.006	-78.468	<.001	24.291	-0.019	NA
time 4	2.703	0.006	491.237	<.001	30.458	0.089	NA
time 5	-4.028	0.005	-761.48	<.001	36.187	-0.111	NA
Preparedness	0.242	0.015	16.086	<.001	2.323	0.104	NA
time 3*Preparedness	-0.484	0.026	-18.521	<.001	3.857	-0.125	NA
time 4*Preparedness	-0.923	0.025	-36.324	<.001	4.679	-0.197	NA
time 5*Preparedness	-0.767	0.026	-29.258	<.001	5.955	-0.129	NA

Note. Only estimates for time indicators and those predictors entered in Step 3 are displayed here. However, all predictors from Steps 1a,1b, and 2 were also included in this model.

Table E9

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-4.293	0.005	-885.44	<.001	37.298	-0.115	NA
time 3	3.836	0.004	1022.8	<.001	46.008	0.083	NA
time 4	2.345	0.003	798.669	<.001	65.565	0.036	NA
time 5	-4.079	0.004	-979.17	<.001	78.505	-0.052	NA
Pedagogical Autonomy	-0.163	0.013	-12.765	<.001	2.392	-0.068	NA
Curricular Autonomy	-0.112	0.014	-8.162	<.001	2.352	-0.048	NA
Administrative Support	-0.75	0.014	-52.151	<.001	2.562	-0.293	NA
Collegial Support	0.46	0.014	33.079	<.001	2.144	0.215	NA
Parental Support	-0.002	0.015	-0.146	0.885	2.597	-0.001	NA
Materials Available	0.097	0.014	6.958	<.001	2.66	0.037	NA
Paperwork Doesn't Interfere	0.311	0.014	21.806	<.001	2.107	0.147	NA
Better Student Behavior	-0.368	0.015	-24.72	<.001	2.397	-0.154	NA
Positive Job Security	0.08	0.014	5.806	<.001	2.212	0.036	NA
Positive Content Standards	-0.112	0.015	-7.649	<.001	2.557	-0.044	NA
time 3*Pedagogical Autonomy	-0.027	0.024	-1.139	0.255	3.471	-0.008	NA
time 3*Curricular Autonomy	0.196	0.023	8.505	<.001	4.492	0.044	NA
time 3*Administrative Support	0.963	0.026	37.218	<.001	4.774	0.202	NA
time 3*Collegial Support	-0.218	0.024	-8.98	<.001	4.394	-0.05	NA
time 3*Parental Support	-0.09	0.024	-3.711	<.001	4.579	-0.02	NA
time 3*Materials Available	0.259	0.022	12.004	<.001	4.367	0.059	NA
time 3*Paperwork Doesn't Interfere	-0.458	0.022	-21.026	<.001	3.583	-0.128	NA
time 3*Better Student Behavior	0.488	0.023	21.006	<.001	3.592	0.136	NA
time 3*Positive Job Security	-0.243	0.021	-11.663	<.001	3.042	-0.08	NA

Table E9 (continued)

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 3*Positive Content Standards	0.759	0.025	30.541	<.001	4.059	0.187	NA
time 4*Pedagogical Autonomy	-0.236	0.025	-9.461	<.001	4.096	-0.058	NA
time 4*Curricular Autonomy	0.205	0.025	8.123	<.001	4.503	0.046	NA
time 4*Administrative Support	-0.165	0.024	-6.895	<.001	5.513	-0.03	NA
time 4*Collegial Support	-0.705	0.027	-26.436	<.001	4.277	-0.165	NA
time 4*Parental Support	0.031	0.025	1.23	0.219	4.626	0.007	NA
time 4*Materials Available	-0.143	0.024	-5.884	<.001	5.093	-0.028	NA
time 4*Paperwork Doesn't Interfere	-0.484	0.026	-18.437	<.001	3.889	-0.124	NA
time 4*Better Student Behavior	0.743	0.026	28.806	<.001	4.165	0.179	NA
time 4*Positive Job Security	0.238	0.025	9.496	<.001	4.05	0.059	NA
time 4*Positive Content Standards	-0.462	0.027	-17.362	<.001	4.389	-0.105	NA
time 5*Pedagogical Autonomy	0.37	0.024	15.526	<.001	4.415	0.084	NA
time 5*Curricular Autonomy	-0.364	0.024	-15.209	<.001	4.159	-0.088	NA
time 5*Administrative Support	-0.414	0.025	-16.66	<.001	6.481	-0.064	NA
time 5*Collegial Support	-0.586	0.024	-24.519	<.001	5.399	-0.109	NA
time 5*Parental Support	0.622	0.023	27.621	<.001	4.635	0.134	NA
time 5*Materials Available	0.415	0.026	15.987	<.001	6.531	0.064	NA
time 5*Paperwork Doesn't Interfere	0.233	0.027	8.482	<.001	4.209	0.055	NA
time 5*Better Student Behavior	0.556	0.026	21.039	<.001	4.261	0.131	NA
time 5*Positive Job Security	0.099	0.026	3.856	<.001	3.841	0.026	NA
time 5*Positive Content Standards	0.259	0.028	9.301	<.001	5.447	0.048	NA

Note. Only estimates for time indicators and those predictors entered in Step 4 are displayed here. However, all predictors from Steps 1a,1b, 2, and 3 were also included in this model.

Table E10

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-4.563	0.004	-1047.9	<.001	41.918	-0.109	NA
time 3	0.693	0.003	237.307	<.001	72.887	0.01	NA
time 4	4.977	0.004	1253.8	<.001	70.662	0.07	NA
time 5	-6.131	0.004	-1654.4	<.001	84.114	-0.073	NA
Pedagogical Autonomy	0.215	0.017	12.827	<.001	2.828	0.076	NA
Curricular Autonomy	-0.384	0.016	-23.315	<.001	3.142	-0.122	NA
Administrative Support	-0.776	0.016	-48.456	<.001	3.092	-0.251	NA
Collegial Support	-0.055	0.016	-3.486	0.001	2.951	-0.019	NA
Parental Support	0.269	0.016	16.912	<.001	2.722	0.099	NA
Materials Available	0.126	0.014	8.769	<.001	3.041	0.042	NA
Paperwork Doesn't Interfere	0.25	0.014	18.345	<.001	2.944	0.085	NA
Better Student Behavior	-0.215	0.016	-13.593	<.001	2.607	-0.083	NA
Positive Job Security	0.36	0.013	26.931	<.001	2.14	0.168	NA
Positive Content Standards	0.181	0.013	13.415	<.001	2.846	0.064	NA
time 3*Pedagogical Autonomy	-0.596	0.024	-24.931	<.001	4.878	-0.122	NA
time 3*Curricular Autonomy	0.417	0.025	16.843	<.001	5.032	0.083	NA
time 3*Administrative Support	0.404	0.025	16.361	<.001	5.272	0.077	NA
time 3*Collegial Support	0.316	0.026	12.274	<.001	3.725	0.085	NA
time 3*Parental Support	-0.53	0.029	-18.207	<.001	3.532	-0.15	NA
time 3*Materials Available	-0.319	0.024	-13.228	<.001	5.45	-0.059	NA
time 3*Paperwork Doesn't Interfere	-0.314	0.025	-12.785	<.001	4.322	-0.073	NA
time 3*Better Student Behavior	-0.065	0.027	-2.398	0.017	4.391	-0.015	NA
time 3*Positive Job Security	-0.205	0.025	-8.066	<.001	2.825	-0.073	NA

Table E10 (continued)

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 3*Positive Content Standards	0.147	0.025	5.895	<.001	4.112	0.036	NA
time 4*Pedagogical Autonomy	0.272	0.024	11.22	<.001	4.666	0.058	NA
time 4*Curricular Autonomy	0.397	0.023	17.499	<.001	5.461	0.073	NA
time 4*Administrative Support	0.923	0.026	36.202	<.001	4.825	0.191	NA
time 4*Collegial Support	0.542	0.023	23.531	<.001	4.391	0.124	NA
time 4*Parental Support	-0.607	0.026	-23.649	<.001	4.706	-0.129	NA
time 4*Materials Available	-1.216	0.023	-52.927	<.001	4.832	-0.252	NA
time 4*Paperwork Doesn't Interfere	-0.57	0.025	-22.825	<.001	4.857	-0.117	NA
time 4*Better Student Behavior	0.752	0.024	31.449	<.001	4.544	0.166	NA
time 4*Positive Job Security	-0.038	0.025	-1.526	0.128	3.859	-0.01	NA
time 4*Positive Content Standards	-0.627	0.025	-25.19	<.001	4.515	-0.139	NA
time 5*Pedagogical Autonomy	-0.146	0.024	-6.197	<.001	6.045	-0.024	NA
time 5*Curricular Autonomy	-0.232	0.02	-11.579	<.001	6.621	-0.035	NA
time 5*Administrative Support	1.613	0.016	103.671	<.001	6.467	0.249	NA
time 5*Collegial Support	-0.547	0.024	-22.719	<.001	5.93	-0.092	NA
time 5*Parental Support	-1.119	0.025	-45.343	<.001	6.301	-0.178	NA
time 5*Materials Available	0.858	0.025	34.233	<.001	7.86	0.109	NA
time 5*Paperwork Doesn't Interfere	-0.339	0.024	-13.998	<.001	4.943	-0.069	NA
time 5*Better Student Behavior	0.952	0.024	40.268	<.001	5.179	0.184	NA
time 5*Positive Job Security	0.322	0.023	13.78	<.001	5.316	0.061	NA
time 5*Positive Content Standards	-0.064	0.025	-2.575	0.011	5.051	-0.013	NA

Note. Only estimates for time indicators and those predictors entered in Step 4 are displayed here. However, all predictors from Steps 1a,1b, 2, and 3 were also included in this model.

Table E11

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, and Satisfaction

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-5.58	0.004	-1243.3	<.001	36.68	-0.15	NA
time 3	0.5	0.003	156.09	<.001	48.59	0.01	NA
time 4	4.4	0.003	1406.8	<.001	64.42	0.07	NA
time 5	2.34	0.004	589.465	<.001	74.89	0.03	NA
Job Satisfaction	-1.07	0.014	-75.3	<.001	3.07	-0.35	NA
time 3*Job Satisfaction	0.97	0.026	37.412	<.001	4.05	0.24	NA
time 4*Job Satisfaction	0.32	0.025	12.853	<.001	4.44	0.07	NA
time 5*Job Satisfaction	0.86	0.027	32.331	<.001	5.14	0.17	NA

Note. Only estimates for time indicators and those predictors entered in Step 5 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, and 4 were also included in this model.

Table E12

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, and Satisfaction

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-6.73	0.004	-1826.9	<.001	34.88	-0.19	NA
time 3	0.53	0.003	188.795	<.001	62.55	0.01	NA
time 4	10.54	0.004	2686.4	<.001	57.44	0.18	NA
time 5	1.25	0.004	343.502	<.001	75.12	0.02	NA
Job Satisfaction	-1.25	0.015	-82.635	<.001	3.15	-0.4	NA
time 3*Job Satisfaction	0.37	0.023	16.446	<.001	5.05	0.07	NA
time 4*Job Satisfaction	0.87	0.024	35.953	<.001	4.98	0.17	NA
time 5*Job Satisfaction	1.35	0.027	49.29	<.001	6.89	0.2	NA

Note. Only estimates for time indicators and those predictors entered in Step 5 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, and 4 were also included in this model.

Table E13

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.861	0.005	-711.7	<.001	31.526	-0.123	NA
time 3	-0.118	0.004	-33.429	<.001	44.636	-0.003	NA
time 4	3.243	0.003	1098.637	<.001	60.456	0.054	NA
time 5	0.769	0.004	187.772	<.001	59.552	0.013	NA
Induction	0.171	0.022	7.798	<.001	4.592	0.037	NA
Mentoring	0.02	0.024	0.857	0.392	5.605	0.004	NA
Reduced Schedule	-0.527	0.021	-24.573	<.001	4.283	-0.123	NA
Common Planning	0.159	0.017	9.397	<.001	3.624	0.044	NA
Seminars	-0.08	0.021	-3.881	<.001	4.679	-0.017	NA
Extra Help	0.02	0.017	1.133	0.258	4.493	0.004	NA
Satisfaction	-0.417	0.025	-16.467	<.001	7.638	-0.055	NA
time 3*Induction	-0.224	0.019	-11.864	<.001	7.279	-0.031	NA
time 3*Mentoring	-1.285	0.014	-90.635	<.001	8.147	-0.158	NA
time 3*Reduced Schedule	1	0.02	50.088	<.001	6.39	0.157	NA
time 3*Common Planning	-0.162	0.026	-6.312	<.001	5.317	-0.031	NA
time 3*Seminars	-0.521	0.021	-24.484	<.001	7.605	-0.069	NA
time 3*Extra Help	-0.304	0.027	-11.381	<.001	6.947	-0.044	NA
time 3*Satisfaction	0.113	0.013	8.605	<.001	11.708	0.01	NA
time 4*Induction	0.389	0.014	28.187	<.001	8.971	0.043	NA
time 4*Mentoring	-0.738	0.013	-57.239	<.001	9.557	-0.077	NA
time 4*Reduced Schedule	0.405	0.014	29.467	<.001	8.969	0.045	NA
time 4*Common Planning	0.284	0.026	10.988	<.001	5.837	0.049	NA
time 4*Seminars	-0.351	0.015	-23.666	<.001	6.895	-0.051	NA

Table E13 (continued)

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 4*Extra Help	1.03	0.025	41.087	<.001	6.768	0.152	NA
time 4*Satisfaction	-0.279	0.011	-26.016	<.001	11.581	-0.024	NA
time 5*Induction	-0.133	0.012	-10.697	<.001	13.401	-0.01	NA
time 5*Mentoring	-1.073	0.011	-102.013	<.001	12.901	-0.083	NA
time 5*Reduced Schedule	0.105	0.017	6.297	<.001	10.644	0.01	NA
time 5*Common Planning	-0.688	0.023	-29.633	<.001	7.434	-0.093	NA
time 5*Seminars	0.943	0.011	82.631	<.001	11.12	0.085	NA
time 5*Extra Help	-0.301	0.014	-21.004	<.001	7.215	-0.042	NA
time 5*Satisfaction	-0.94	0.013	-73.499	<.001	26.953	-0.035	NA
Satisfaction*Induction	0.11	0.023	4.767	<.001	6.04	0.018	NA
Satisfaction*Mentoring	-0.526	0.023	-23.078	<.001	6.646	-0.079	NA
Satisfaction*Reduced Schedule	-0.464	0.028	-16.638	<.001	4.866	-0.095	NA
Satisfaction*Common Planning	0.506	0.02	25.894	<.001	3.83	0.132	NA
Satisfaction*Seminars	-0.523	0.024	-21.406	<.001	4.885	-0.107	NA
time3*Satisfaction*Induction	0.266	0.012	22.259	<.001	8.423	0.032	NA
time3*Satisfaction*Mentoring	0.53	0.014	37.682	<.001	10.651	0.05	NA
time3*Satisfaction*Reduced Schedule	1.011	0.013	79.568	<.001	11.326	0.089	NA
time3*Satisfaction*Common Planning	-0.43	0.014	-29.897	<.001	7.023	-0.061	NA
time3*Satisfaction*Seminars	0.51	0.013	39.658	<.001	8.079	0.063	NA
time4*Satisfaction*Induction	-0.922	0.01	-92.99	<.001	11.301	-0.082	NA
time4*Satisfaction*Mentoring	0.683	0.017	39.397	<.001	12.417	0.055	NA
time4*Satisfaction*Reduced Schedule	0.864	0.008	111.246	<.001	10.855	0.08	NA
time4*Satisfaction*Common Planning	-1.599	0.014	-113.888	<.001	8.28	-0.193	NA
time4*Satisfaction*Seminars	1.85	0.01	180.861	<.001	10.087	0.183	NA
time5*Satisfaction*Induction	1.243	0.011	116.746	<.001	21.323	0.058	NA

Table E13 (continued)

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time5*Satisfaction*Mentoring	2.297	0.012	197.69	<.001	26.018	0.088	NA
time5*Satisfaction*Reduced Schedule	1.004	0.01	99.04	<.001	13.662	0.074	NA
time5*Satisfaction*Common Planning	-0.292	0.013	-22.631	<.001	8.595	-0.034	NA
time5*Satisfaction*Seminars	-1.157	0.012	-93.182	<.001	15.017	-0.077	NA

Note. Only estimates for time indicators and those predictors entered in Step 6 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, 4, and 5were also included in this model.

Table E14

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-7.617	0.004	-1847.005	<.001	32.182	-0.237	NA
time 3	1.97	0.002	801.247	<.001	52.558	0.038	NA
time 4	12	0.004	3223.586	<.001	57.259	0.21	NA
time 5	2.684	0.004	761.302	<.001	66.537	0.04	NA
Induction	0.05	0.024	2.106	0.036	5.658	0.009	NA
Mentoring	-0.024	0.026	-0.931	0.352	5.654	-0.004	NA
Reduced Schedule	-0.948	0.026	-36.711	<.001	5.137	-0.185	NA
Common Planning	0.794	0.019	42.495	<.001	3.917	0.203	NA
Seminars	-0.666	0.022	-29.658	<.001	4.81	-0.138	NA
Extra Help	-0.237	0.021	-11.535	<.001	5.269	-0.045	NA
Satisfaction	-1.507	0.025	-61.18	<.001	7.45	-0.202	NA
time 3*Induction	0.57	0.013	45.279	<.001	8.613	0.066	NA
time 3*Mentoring	-0.628	0.011	-59.745	<.001	9.66	-0.065	NA
time 3*Reduced Schedule	1.133	0.012	97.796	<.001	8.695	0.13	NA
time 3*Common Planning	-0.849	0.018	-47.494	<.001	5.752	-0.148	NA
time 3*Seminars	0.066	0.013	5.11	<.001	7.769	0.008	NA
time 3*Extra Help	0.356	0.011	32.77	<.001	7.246	0.049	NA
time 3*Satisfaction	0.845	0.009	89.256	<.001	10.459	0.081	NA
time 4*Induction	0.782	0.013	58.127	<.001	9.538	0.082	NA
time 4*Mentoring	0.473	0.009	51.731	<.001	9.137	0.052	NA
time 4*Reduced Schedule	0.055	0.01	5.306	<.001	15.564	0.004	NA
time 4*Common Planning	-1.159	0.019	-60.257	<.001	7.335	-0.158	NA
time 4*Seminars	0.265	0.015	17.93	<.001	8.006	0.033	NA

Table E14 (continued)

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 4*Extra Help	-0.01	0.01	-1.006	0.315	8.049	-0.001	NA
time 4*Satisfaction	0.283	0.01	27.148	<.001	14.145	0.02	NA
time 5*Induction	-0.274	0.018	-15.26	<.001	16.4	-0.017	NA
time 5*Mentoring	-0.547	0.012	-44.623	<.001	16.492	-0.033	NA
time 5*Reduced Schedule	1.369	0.014	99.853	<.001	19.031	0.072	NA
time 5*Common Planning	-0.985	0.02	-48.498	<.001	9.19	-0.107	NA
time 5*Seminars	0.521	0.017	30.3	<.001	12.245	0.043	NA
time 5*Extra Help	-0.468	0.015	-31.314	<.001	11.366	-0.041	NA
time 5*Satisfaction	3.318	0.012	280.198	<.001	38.64	0.086	NA
Satisfaction*Induction	0.439	0.024	18.425	<.001	5.822	0.075	NA
Satisfaction*Mentoring	-0.104	0.024	-4.374	<.001	6.512	-0.016	NA
Satisfaction*Reduced Schedule	0.261	0.029	9.04	<.001	7.804	0.034	NA
Satisfaction*Common Planning	0.547	0.021	26.107	<.001	4.958	0.11	NA
Satisfaction*Seminars	-0.461	0.026	-17.776	<.001	4.768	-0.097	NA
time3*Satisfaction*Induction	-0.32	0.01	-32.398	<.001	9.866	-0.032	NA
time3*Satisfaction*Mentoring	0.496	0.015	32.768	<.001	10.125	0.049	NA
time3*Satisfaction*Reduced Schedule	-0.921	0.009	-100.017	<.001	12.867	-0.072	NA
time3*Satisfaction*Common Planning	-1.269	0.014	-91.826	<.001	8.239	-0.154	NA
time3*Satisfaction*Seminars	0.24	0.01	23.996	<.001	8.805	0.027	NA
time4*Satisfaction*Induction	-0.41	0.01	-39.764	<.001	10.507	-0.039	NA
time4*Satisfaction*Mentoring	0.012	0.013	0.905	0.366	14.367	0.001	NA
time4*Satisfaction*Reduced Schedule	-0.457	0.003	-130.835	<.001	23.262	-0.02	NA
time4*Satisfaction*Common Planning	-1.036	0.016	-64.85	<.001	10.146	-0.102	NA
time4*Satisfaction*Seminars	1.452	0.01	144.1	<.001	11.252	0.129	NA
time5*Satisfaction*Induction	-1.957	0.012	-169.565	<.001	21.551	-0.091	NA

Table E14 (continued)

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time5*Satisfaction*Mentoring	0.024	0.011	2.093	0.037	30.909	0.001	NA
time5*Satisfaction*Reduced Schedule	0.886	0.01	93.17	<.001	28.567	0.031	NA
time5*Satisfaction*Common Planning	-1.593	0.011	-148.944	<.001	10.861	-0.147	NA
time5*Satisfaction*Seminars	0.002	0.011	0.156	0.877	16.413	0	NA

Note. Only estimates for time indicators and those predictors entered in Step 6 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, 4, and 5were also included in this model.

Table E15

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies and Preparedness

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.932	0.005	-748.855	<.001	27.363	-0.144	NA
time 3	-0.126	0.004	-35.948	<.001	41.595	-0.003	NA
time 4	3.029	0.003	973.22	<.001	53.967	0.056	NA
time 5	0.796	0.004	187.82	<.001	49.812	0.016	NA
Preparedness	0.13	0.015	8.577	<.001	1.964	0.066	NA
Satisfaction	-0.103	0.022	-4.739	<.001	8.089	-0.013	NA
Preparedness*Satisfaction	-0.153	0.014	-11.213	<.001	2.381	-0.064	NA
time 3*Preparedness	-0.185	0.024	-7.655	<.001	2.68	-0.069	NA
time 4*Preparedness	-0.528	0.026	-20.084	<.001	3.485	-0.152	NA
time 5*Preparedness	-0.439	0.027	-16.481	<.001	4.017	-0.109	NA
time 3*Satisfaction	-0.073	0.012	-5.978	<.001	12.11	-0.006	NA
time 4*Satisfaction	-0.065	0.011	-6.023	<.001	13.745	-0.005	NA
time 5*Satisfaction	-0.89	0.012	-71.988	<.001	26.748	-0.033	NA
time 3*Satisfaction*Preparedness	-0.19	0.027	-6.98	<.001	4.113	-0.046	NA
time 4*Satisfaction*Preparedness	0.455	0.027	16.693	<.001	4.378	0.104	NA
time 5*Satisfaction*Preparedness	-0.034	0.023	-1.499	0.134	5.374	-0.006	NA

Note. Only estimates for time indicators and those predictors entered in Step 7 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, 4, 5, and 6 were also included in this model.

Table E16

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies and Preparedness

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-7.512	0.004	-1796.744	<.001	29.813	-0.252	NA
time 3	1.375	0.003	495.173	<.001	46.516	0.03	NA
time 4	13.064	0.004	3388.991	<.001	51.532	0.254	NA
time 5	2.126	0.004	598.835	<.001	58.969	0.036	NA
Preparedness	0.163	0.015	10.616	<.001	2.148	0.076	NA
Satisfaction	-1.643	0.024	-68.835	<.001	7.439	-0.221	NA
Preparedness*Satisfaction	-0.039	0.014	-2.757	0.006	2.438	-0.016	NA
time 3*Preparedness	-0.218	0.028	-7.755	<.001	3.028	-0.072	NA
time 4*Preparedness	-0.496	0.027	-18.386	<.001	3.875	-0.128	NA
time 5*Preparedness	-0.385	0.026	-14.879	<.001	5.568	-0.069	NA
time 3*Satisfaction	0.725	0.01	73.209	<.001	10.714	0.068	NA
time 4*Satisfaction	0.251	0.011	23.765	<.001	13.318	0.019	NA
time 5*Satisfaction	2.405	0.012	200.192	<.001	33.917	0.071	NA
time 3*Satisfaction*Preparedness	0.022	0.029	0.749	0.454	3.897	0.006	NA
time 4*Satisfaction*Preparedness	0.39	0.031	12.601	<.001	4.543	0.086	NA
time 5*Satisfaction*Preparedness	-0.164	0.029	-5.665	<.001	7.117	-0.023	NA

Note. Only estimates for time indicators and those predictors entered in Step 7 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, 4, 5, and 6 were also included in this model.

Table E17

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-3.082	0.006	-551.676	<.001	18.045	-0.171	NA
time 3	-1.223	0.004	-342.611	<.001	36.188	-0.034	NA
time 4	1.486	0.003	487.184	<.001	43.07	0.035	NA
time 5	0.096	0.004	23.148	<.001	35.223	0.003	NA
Pedagogical Autonomy	-0.093	0.014	-6.724	<.001	2.835	-0.033	NA
Curricular Autonomy	-0.107	0.015	-7.346	<.001	1.898	-0.056	NA
Administrative Support	-0.337	0.015	-21.847	<.001	2.649	-0.127	NA
Collegial Support	0.403	0.015	26.554	<.001	2.008	0.201	NA
Parental Support	-0.158	0.015	-10.786	<.001	2.058	-0.077	NA
Materials Available	-0.045	0.013	-3.37	0.001	2.252	-0.02	NA
Paperwork Doesn't Interfere	0.252	0.014	17.545	<.001	1.727	0.146	NA
Better Student Behavior	-0.213	0.015	-14.357	<.001	1.816	-0.117	NA
Positive Job Security	0.053	0.014	3.694	<.001	2.048	0.026	NA
Positive Content Standards	-0.104	0.014	-7.36	<.001	2.08	-0.05	NA
Satisfaction	1.54	0.013	114.77	<.001	13.948	0.11	NA
Satisfaction*Pedagogical Autonomy	0.228	0.012	18.661	<.001	2.255	0.101	NA
Satisfaction*Collegial Support	0.028	0.015	1.855	0.064	2.197	0.013	NA
Satisfaction*Materials Available	-0.148	0.011	-12.982	<.001	2.107	-0.07	NA
Satisfaction*Better Student Behavior	-0.062	0.015	-4.117	<.001	2.4	-0.026	NA
Satisfaction*Positive Content Standards	-0.465	0.012	-38.221	<.001	2.506	-0.186	NA
time 3*Pedagogical Autonomy	-0.214	0.024	-8.839	<.001	3.811	-0.056	NA
time 3*Curricular Autonomy	0.342	0.023	14.734	<.001	3.854	0.089	NA
time 3*Administrative Support	0.678	0.028	24.56	<.001	5.432	0.125	NA

Table E17 (continued)

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 3*Collegial Support	-0.506	0.024	-21.297	<.001	4.444	-0.114	NA
time 3*Parental Support	-0.147	0.024	-6.192	<.001	3.889	-0.038	NA
time 3*Materials Available	0.855	0.021	40.488	<.001	3.886	0.22	NA
time 3*Paperwork Doesn't Interfere	-0.461	0.022	-20.973	<.001	3.15	-0.146	NA
time 3*Better Student Behavior	0.338	0.023	14.399	<.001	3.177	0.107	NA
time 3*Positive Job Security	-0.13	0.021	-6.147	<.001	2.893	-0.045	NA
time 3*Positive Content Standards	0.669	0.023	28.895	<.001	3.806	0.176	NA
time3*Satisfaction	-1.406	0.005	-259.932	<.001	31.683	-0.044	NA
time 4*Pedagogical Autonomy	-0.118	0.024	-4.935	<.001	4.628	-0.026	NA
time 4*Curricular Autonomy	0.18	0.026	7.034	<.001	4.086	0.044	NA
time 4*Administrative Support	0.126	0.025	4.939	<.001	4.105	0.031	NA
time 4*Collegial Support	-0.542	0.025	-21.93	<.001	3.957	-0.137	NA
time 4*Parental Support	0.081	0.026	3.175	0.002	3.918	0.021	NA
time 4*Materials Available	-0.017	0.022	-0.776	0.438	4.235	-0.004	NA
time 4*Paperwork Doesn't Interfere	-0.124	0.025	-5.029	<.001	3.239	-0.038	NA
time 4*Better Student Behavior	0.341	0.025	13.443	<.001	3.723	0.092	NA
time 4*Positive Job Security	0.027	0.024	1.157	0.248	3.329	0.008	NA
time 4*Positive Content Standards	-0.465	0.024	-19.207	<.001	4.084	-0.114	NA
time 4*Satisfaction	-4.11	0.005	-790.587	<.001	35.305	-0.116	NA
time 5*Pedagogical Autonomy	0.198	0.024	8.359	<.001	4.609	0.043	NA
time 5*Curricular Autonomy	0.137	0.024	5.653	<.001	4.641	0.03	NA
time 5*Administrative Support	-0.288	0.025	-11.354	<.001	5.909	-0.049	NA
time 5*Collegial Support	-0.551	0.023	-23.828	<.001	6.125	-0.09	NA

Table E17 (continued)

Model for Moving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 5*Parental Support	0.288	0.025	11.399	<.001	4.481	0.064	NA
time 5*Materials Available	-0.038	0.023	-1.655	0.098	4.924	-0.008	NA
time 5*Paperwork Doesn't Interfere	-0.009	0.024	-0.36	0.719	3.496	-0.003	NA
time 5*Better Student Behavior	0.391	0.026	14.945	<.001	3.905	0.1	NA
time 5*Positive Job Security	0.126	0.023	5.411	<.001	3.171	0.04	NA
time 5*Positive Content Standards	0.097	0.024	3.996	<.001	4.75	0.02	NA
time 5*Satisfaction	-4.33	0.005	-795.32	<.001	31.683	-0.137	NA
time 3*Pedagogical Autonomy*Satisfaction	-0.562	0.027	-20.841	<.001	4.039	-0.139	NA
time 3*Collegial Support*Satisfaction	0.232	0.024	9.555	<.001	4.755	0.049	NA
time 3*Materials Available*Satisfaction	0.233	0.018	12.665	<.001	4.653	0.05	NA
time 3*Better Student Behavior*Satisfaction	0.566	0.023	25.119	<.001	3.817	0.148	NA
time 3*Positive Content Standards*Satisfaction	0.325	0.022	14.479	<.001	4.731	0.069	NA
time 4*Pedagogical Autonomy*Satisfaction	-0.618	0.028	-22.254	<.001	4.132	-0.15	NA
time 4*Collegial Support*Satisfaction	0.041	0.023	1.826	0.068	6.626	0.006	NA
time 4*Materials Available*Satisfaction	0.273	0.019	14.562	<.001	5.546	0.049	NA
time 4*Better Student Behavior*Satisfaction	-0.062	0.024	-2.548	0.011	4.082	-0.015	NA
time 4*Positive Content Standards*Satisfaction	0.879	0.022	39.078	<.001	5.76	0.153	NA
time 5*Pedagogical Autonomy*Satisfaction	-0.603	0.028	-21.674	<.001	4.259	-0.142	NA
time 5*Collegial Support*Satisfaction	0.185	0.02	9.487	<.001	6.217	0.03	NA
time 5*Materials Available*Satisfaction	0.5	0.018	27.902	<.001	6.826	0.073	NA
time 5*Better Student Behavior*Satisfaction	-0.205	0.023	-8.755	<.001	5.175	-0.04	NA
time 5*Positive Content Standards*Satisfaction	0.78	0.022	34.843	<.001	4.797	0.163	NA

Note. Only estimates for time indicators and those predictors entered in Step 8 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, 4, 5, 6, and 7 were also included in this model.

Table E18

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
(Intercept)	-5.955	0.004	-1332.255	<.001	18.058	-0.33	NA
time 3	-1.289	0.003	-467.236	<.001	29.508	-0.044	NA
time 4	11.348	0.004	2661.447	<.001	40.423	0.281	NA
time 5	-1.054	0.004	-255.386	<.001	36.752	-0.029	NA
Pedagogical Autonomy	0.053	0.016	3.279	0.002	2.613	0.02	NA
Curricular Autonomy	-0.401	0.016	-25.605	<.001	3.173	-0.126	NA
Administrative Support	0.009	0.019	0.466	0.642	2.794	0.003	NA
Collegial Support	-0.021	0.017	-1.242	0.215	2.936	-0.007	NA
Parental Support	0.135	0.016	8.69	<.001	2.405	0.056	NA
Materials Available	0.237	0.013	17.73	<.001	2.256	0.105	NA
Paperwork Doesn't Interfere	0.201	0.013	15.147	<.001	2.364	0.085	NA
Better Student Behavior	0.225	0.015	14.708	<.001	2.515	0.089	NA
Positive Job Security	0.332	0.013	25.007	<.001	2.1	0.158	NA
Positive Content Standards	0.314	0.013	23.439	<.001	2.041	0.154	NA
Satisfaction	-1.242	0.013	-98.34	<.001	12.847	-0.097	NA
Satisfaction*Pedagogical Autonomy	-0.082	0.013	-6.101	<.001	2.683	-0.031	NA
Satisfaction*Collegial Support	0.061	0.016	3.834	<.001	2.955	0.021	NA
Satisfaction*Materials Available	0.114	0.012	9.909	<.001	2.427	0.047	NA
Satisfaction*Better Student Behavior	-0.097	0.015	-6.371	<.001	2.912	-0.034	NA
Satisfaction*Positive Content Standards	-0.224	0.013	-17.411	<.001	2.736	-0.082	NA
time 3*Pedagogical Autonomy	-0.449	0.023	-19.872	<.001	3.918	-0.115	NA
time 3*Curricular Autonomy	0.834	0.022	37.356	<.001	4.294	0.194	NA
time 3*Administrative Support	0.336	0.016	20.57	<.001	4.551	0.074	NA

Table E18 (continued)

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 3*Collegial Support	-0.004	0.023	-0.176	0.861	4.005	-0.001	NA
time 3*Parental Support	-0.391	0.025	-15.532	<.001	3.564	-0.11	NA
time 3*Materials Available	-0.32	0.022	-14.329	<.001	3.237	-0.099	NA
time 3*Paperwork Doesn't Interfere	0.094	0.025	3.827	<.001	3.414	0.028	NA
time 3*Better Student Behavior	-0.737	0.024	-30.351	<.001	3.628	-0.203	NA
time 3*Positive Job Security	0.07	0.024	2.905	0.004	2.714	0.026	NA
time 3*Positive Content Standards	0.198	0.024	8.263	<.001	3.338	0.059	NA
time3*Satisfaction	4.815	0.003	1729.943	<.001	23.931	0.201	NA
time 4*Pedagogical Autonomy	0.225	0.025	8.901	<.001	4.109	0.055	NA
time 4*Curricular Autonomy	0.384	0.023	16.781	<.001	4.99	0.077	NA
time 4*Administrative Support	0.656	0.021	30.74	<.001	4.71	0.139	NA
time 4*Collegial Support	0.253	0.023	11.154	<.001	5.032	0.05	NA
time 4*Parental Support	-0.378	0.026	-14.432	<.001	4.346	-0.087	NA
time 4*Materials Available	-1.218	0.023	-53.91	<.001	3.935	-0.31	NA
time 4*Paperwork Doesn't Interfere	-0.743	0.024	-30.775	<.001	4.133	-0.18	NA
time 4*Better Student Behavior	0.268	0.024	11.146	<.001	3.756	0.071	NA
time 4*Positive Job Security	-0.26	0.023	-11.204	<.001	3.286	-0.079	NA
time 4*Positive Content Standards	-1.262	0.023	-54.42	<.001	3.869	-0.326	NA
time 4*Satisfaction	-2.897	0.005	-571.229	<.001	32.251	-0.09	NA
time 5*Pedagogical Autonomy	0.071	0.024	2.955	0.004	5.611	0.013	NA
time 5*Curricular Autonomy	0.195	0.024	8.163	<.001	5.291	0.037	NA
time 5*Administrative Support	0.426	0.02	20.944	<.001	5.445	0.078	NA
time 5*Collegial Support	-0.56	0.021	-26.07	<.001	6.048	-0.093	NA

Table E18 (continued)

Model for Leaving Conditioned on Time, Teacher/School Covariates, First-year Programs and Policies, Preparedness, Environmental Teaching Conditions, Satisfaction, and the Interaction of Satisfaction with Programs and Policies, Preparedness, and Environmental Teaching Conditions

		No Replicates			With Replicates		
	Coefficient	SE	t	p	SE	t	p
time 5*Parental Support	-1.039	0.024	-43.262	<.001	5.298	-0.196	NA
time 5*Materials Available	0.134	0.021	6.382	<.001	5.413	0.025	NA
time 5*Paperwork Doesn't Interfere	0.117	0.022	5.341	<.001	4.546	0.026	NA
time 5*Better Student Behavior	0.463	0.025	18.764	<.001	5.523	0.084	NA
time 5*Positive Job Security	0.262	0.021	12.317	<.001	4.906	0.054	NA
time 5*Positive Content Standards	-0.437	0.021	-20.563	<.001	4.601	-0.095	NA
time 5*Satisfaction	3.536	0.004	997.144	<.001	33.803	0.105	NA
time 3*Pedagogical Autonomy*Satisfaction	0.266	0.026	10.368	<.001	5.399	0.049	NA
time 3*Collegial Support*Satisfaction	0.428	0.02	20.987	<.001	4.466	0.096	NA
time 3*Materials Available*Satisfaction	-0.877	0.018	-47.922	<.001	4.407	-0.199	NA
time 3*Better Student Behavior*Satisfaction	0.635	0.02	31.257	<.001	4.187	0.152	NA
time 3*Positive Content Standards*Satisfaction	-0.237	0.016	-14.869	<.001	3.807	-0.062	NA
time 4*Pedagogical Autonomy*Satisfaction	-0.118	0.028	-4.244	<.001	4.884	-0.024	NA
time 4*Collegial Support*Satisfaction	0.587	0.023	26.021	<.001	6.41	0.092	NA
time 4*Materials Available*Satisfaction	0.795	0.018	43.331	<.001	5.169	0.154	NA
time 4*Better Student Behavior*Satisfaction	-0.253	0.023	-10.91	<.001	5.586	-0.045	NA
time 4*Positive Content Standards*Satisfaction	0.149	0.019	7.625	<.001	5.29	0.028	NA
time 5*Pedagogical Autonomy*Satisfaction	-0.36	0.027	-13.369	<.001	5.372	-0.067	NA
time 5*Collegial Support*Satisfaction	0.613	0.019	32.032	<.001	8.205	0.075	NA
time 5*Materials Available*Satisfaction	-0.733	0.012	-59.062	<.001	7.192	-0.102	NA
time 5*Better Student Behavior*Satisfaction	-0.407	0.024	-17.024	<.001	6.67	-0.061	NA
time 5*Positive Content Standards*Satisfaction	0.547	0.016	34.773	<.001	6.553	0.084	NA

Note. Only estimates for time indicators and those predictors entered in Step 8 are displayed here. However, all predictors from Steps 1a,1b, 2, 3, 4, 5, 6, and 7 were also included in this mode