

9-12-2014

MODELING EARLY-CAREER TEACHER RETENTION IN NEW MEXICO USING LOGISTIC REGRESSION

Rachel Mercer-Smith

Follow this and additional works at: https://digitalrepository.unm.edu/padm_etds

Recommended Citation

Mercer-Smith, Rachel. "MODELING EARLY-CAREER TEACHER RETENTION IN NEW MEXICO USING LOGISTIC REGRESSION." (2014). https://digitalrepository.unm.edu/padm_etds/5

This Thesis is brought to you for free and open access by the Electronic Theses and Dissertations at UNM Digital Repository. It has been accepted for inclusion in Public Administration ETDs by an authorized administrator of UNM Digital Repository. For more information, please contact disc@unm.edu.

Rachel Mercer-Smith

Candidate

Public Administration

Department

This thesis is approved and is acceptable in quality and form for publication.

Approved by the dissertation committee:

Uday Desai- Chairperson

Cheryl Torrez

Jon Courtney

MODELING EARLY-CAREER TEACHER RETENTION IN NEW MEXICO
USING LOGISTIC REGRESSION

By

Rachel Mercer-Smith

B.A. Political Science and Psychology, Rice University, 2010

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Public Administration

The University of New Mexico
Albuquerque, New Mexico

July, 2014

MODELING EARLY-CAREER TEACHER RETENTION IN NEW MEXICO
USING LOGISTIC REGRESSION

By

Rachel Mercer-Smith

B.A. Political Science and Psychology, Rice University, 2010

MPA, University of New Mexico, 2014

ABSTRACT

Teachers are the single-greatest predictor of student achievement, and teacher effectiveness tends to improve with experience. Yet, roughly half of all new teachers leave the profession within five years of beginning their careers, leading to school instability, affecting student achievement, and wasting the public investment made in their professional development. This student examined a cohort of New Mexico public school teachers who began their careers in 2008 and analyzed the individual, school, and community factors that predicted their retention within the state's teacher workforce in 2013 using logistic regression analysis. The study found that holding an alternative license consistently makes a teacher less likely to remain in the workforce, while a being Hispanic, having a new principal in 2008, and teaching in a community with higher median wages is associated with increased likelihood of teacher retention. The study did not find that teacher compensation was related to retention and concludes that New Mexico policymakers should consider investing in programs to support teachers, including induction and mentoring, to improve teacher retention within the state.

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION.....	1
CHAPTER 2 LITERATURE REVIEW.....	7
CHAPTER 3 METHODS.....	14
CHAPTER 4 RESULTS.....	21
CHAPTER 5 DISCUSSION.....	32
CHAPTER 6 CONCLUSION.....	41
APPENDICES.....	44
REFERENCES.....	51

Chapter I

Introduction

Nationally, roughly 160 thousand teachers leave the field of teaching annually, and more than 230 thousand others change schools. Together, these movers and leavers make up an estimated 12 percent of the total teacher workforce (Alliance for Excellent Education, 2008). During the first few years of teaching, attrition rates are particularly high; over 30 percent of teachers leave the profession within the first five years (Darling-Hammond, 2010).

Significant attrition within the profession poses challenges for schools nationwide and in New Mexico. Research dating back to the 1960s suggests teachers have a larger impact on student achievement than any other school-based factor, and teacher turnover has a negative and significant impact on student achievement in both math and English language arts (Hanushek & Rivkin, 2010; Ronfeldt, 2010). Attrition also disproportionately affects high-poverty and lower-achieving schools, and low-income and high-minority schools may struggle to fill vacant positions, compounding the negative effects of high turnover in schools already struggling (Hanushek et al, 2002). Frequently losing effective teachers is a detriment not only for school culture but also for student learning, particularly in low-income or struggling schools. The National Commission on Teaching and America's Future asserts low-performing schools rarely close the student achievement gap because they never close the teacher quality gap—they are constantly rebuilding their staff (Barnes et al, 2007). Additionally, teacher turnover is costly; when teachers leave the profession, they take with them their

knowledge of instructional techniques and the professional development training they have received (Synar & Maiden, 2012).

Both the financial and student learning costs associated with teacher turnover should be of concern to policymakers and school leaders in New Mexico. As baby boomer generation teachers become eligible to retire, retaining early-career teachers will become increasingly critical for schools and districts nationally and in the state of New Mexico. Research conducted by the New Mexico Legislative Finance Committee suggests 43 of percent teachers who entered the profession in 2009 left teaching within three years (Weinberg & Mercer-Smith, 2012). New Mexico's early-career teacher attrition rate is slightly higher than the national average during teachers' first three professional years. Retention is a particular challenge in hard-to-staff regions of the state, particularly schools in rural communities, high-poverty schools, and certain subject areas (Weinberg & Mercer-Smith, 2012).

Understanding teacher turnover is essential for both effective education administration and student achievement. While national analyses related to teacher attrition may be representative of the experiences of New Mexico teachers, analysis of teacher attrition in the state may capture unique conditions that enable targeted policies to improve retention. The body of literature associated with teacher movement and attrition consistently supports the notion that attrition disproportionately affects high-poverty and lower-achieving schools (Hanushek et al, 2002). Presumably, New Mexico's schools are particularly prone to teacher attrition, as roughly 70 percent of the state's students qualify for

free or reduced-price lunch (FRL), the New Mexico Public Education Department's standard measure of poverty.

Research consistently affirms that poverty is strongly and consistently associated with student achievement and influences the educational experience of students in several ways (Lee & Burkham, 2002; Milner, 2012). Early childhood experiences, parental involvement, environmental mobility and instability, and nutrition are directly linked with poverty and may affect child development and educational attainment. Additionally, school factors, including curriculum rigor, teacher experience level and absences, class size, and resource availability differ among low-income and more affluent student populations and are associated with lower academic achievement recorded among low-income students (Educational Testing Services, 2009).

The achievement gap among low-income students and their more affluent peers is evident in New Mexico and may explain, at least in part, the state's overall persistently low student achievement. Nationally, New Mexico has the second highest percentage of students who qualify for free or reduced-price lunch (FRL) based on their family's income, 72 percent (Weinberg & Pahl, 2012). In 2012, 52 percent of the state's third-graders were proficient in reading and 53 percent were proficient in math; 45 percent of the state's eleventh-graders were proficient in reading, while 39 percent of the state's eleventh-graders were proficient in math, as measured by the state's standardized test, (New Mexico Public Education Department, 2012). However, the gap between FRL students and non-FRL students within this category consistently ranges between 20 and 30

percent and has not changed significantly since the state began disaggregating FRL and non-FRL student proficiency rates (Pahl & Courtney, 2012).

New Mexico policymakers frequently discuss the need to address teacher recruitment and retention challenges, though little quantitative information about teacher attrition patterns in the state exists (New Mexico Effective Teaching Task Force, 2011; Peters, 2014; KOAT, 2013). The New Mexico Effective Teacher Task Force, Secretary of Education, Governor, and advocacy groups frequently assert that the state must attract and retain highly effective teachers to the New Mexico's neediest classrooms. The state has made attempts to retain teachers through mandatory salary increases and bonuses for teachers who choose to teach in low-performing schools. In 2003, New Mexico introduced a three-tiered licensure system to recruit and retain high quality teachers. The system created a three-level career ladder for teachers to ascend based on experience, leadership, and skills. Movement up a level results in annual pay increases of \$10 thousand. To retain early-career teachers, the system requires school districts to provide teachers with a \$ 10 thousand salary increase after three years of experience if the teacher can demonstrate their mastery of effective teaching through a dossier. Evaluations of the three-tiered system suggest the policy has reduced widespread teacher shortages and improved teacher pay (Pahl & Courtney, 2012). However, evaluations have not examined the influence of the three-tiered system on early-career teacher retention, nor has the state examined the role that salary plays in retaining teachers early in their careers.

Training a teacher in New Mexico involves considerable public investment, and teacher attrition negates the return on this investment. In 2005, the Alliance for Excellent Education estimated that teacher attrition in the United States costs over \$4.9 billion annually, when including teacher transfer (Weinberg & Mercer-Smith, 2012). The costs of teacher attrition, or turnover, can vary widely by district and may include signing bonuses, subject matter stipends, and other recruiting costs specific to hard-to-staff schools. In 2008, the Alliance for Excellence in Education estimated the costs associated with teacher attrition, both for the school and for the district's central office, and found that a non-urban school district spends roughly \$39 thousand to hire, recruit, and train a replacement teacher when an educator leaves a school district. (Alliance for Excellence in Education, 2008).

What is more, teacher quality significantly impacts student learning, and frequent turnover negatively affects school culture and stability. A comprehensive analysis of the variables associated with teacher attrition in New Mexico may thus help policy leaders implement strategies to retain educators in hard-to-staff regions in the state. The results of this study are important because they highlight the characteristics that serve as risk factors, making teachers more vulnerable to attrition, and protective factors, which are associated with greater likelihood of teacher attrition. Given the need to retain early-career teachers, research is needed to identify the variables associated with teacher persistence in New Mexico. For the purpose of this study, “early career” was defined as the first five years of a teacher's professional career. “Persistence” was defined as teachers

who remain employed as teachers in New Mexico. Throughout the study, teachers reported within the “attrition” category simply left the New Mexico public school system and may continue to be employed as teachers in other states or in the private school system. Finally, though the study included many variables associated with teacher, school, and community characteristics, this research did not include programmatic variables, including mentorship, teacher induction, and professional development, that likely impact teacher retention.

Chapter 2

Literature Review

Teachers have a larger impact on student achievement than any other school-based factor (Hanushek & Rivkin, 2010). Thus, frequently losing effective teachers is a detriment not only for school culture but also for student learning. National teacher attrition studies have generally addressed five themes: teacher characteristics, personal factors, teacher qualifications, work environments, and teacher's affective reactions to work (Billingsley, 2003). However, existing teacher attrition and retention studies often rely upon survey or self-reported information to draw conclusions or have been conducted in urban settings. This thesis project focused on teacher characteristics, school characteristics, and community factors related to teacher attrition in New Mexico, which may provide new insight into the factors that influence teacher movement in this state. New Mexico is ethnically diverse state, has high rates of poverty, and possesses a large rural population. In 2011, 60 percent of the state's third-graders identified as Hispanic, and 9 percent of the state's third-graders identified as Native American (Weinberg & Pahl, 2012). During the same year, roughly 70 percent of the state's students qualified for free or reduced-price lunch, compared to the national average of roughly 50 percent, and about percent of New Mexico's population lived in a location defined as "rural" by the U.S. Department of Agriculture (Southern Education Foundation, 2013; USDA, 2014).

Given such a diverse student population, understanding interactions between teacher characteristics, school characteristics, and attrition should be important to policymakers for the purpose of identifying factors that may increase teachers' decisions to remain in high-poverty, high-minority schools. Loeb, Darling-Hammond & Luczak (2005) note disentangling the confluence of negative schooling conditions in schools serving low-income and minority students should be a critical issue for policymakers, and such work will provide information about factors that may be amenable to policy influences.

Teacher Characteristics

This research examined the personal characteristics, including ethnicity, gender, age, professional qualifications, and academic aptitude associated with teacher attrition patterns. Descriptive analyses of the type of teachers who leave the profession suggest math, science, and special education teachers tend to leave the profession at higher rates than teachers of other subjects, but personal teacher characteristics may interact differently to influence attrition patterns (Borman & Dowling, 2008).

Nationally, turnover among minority teachers tends to be higher than among Caucasian teachers, and school demographic characteristics tend to be very important to minority teachers' initial decisions to begin teaching (Ingersoll & May, 2011). Though more research is needed in this area, Kane and Orsini (1999) suggest minority teachers may be leaving the profession at higher rates than Caucasian teachers, reporting a lack of diversity among teacher and student populations as a top reason for leaving the profession. However, over the last two

decades the recruitment of minority teachers has almost doubled, outpacing growth among Caucasian teachers, and minority teachers are more likely to be employed in public schools serving high-poverty, high-minority communities (Ingersoll & May, 2011). According to the “cultural synchronicity perspective, minority teacher decisions to work in schools serving high-minority populations matter. This perspective asserts minority students benefit from being taught by minority teachers because they are likely to have “insider knowledge” due to similar life experiences and cultural backgrounds, and this knowledge is useful in teaching and learning (Ingersoll & May, 2011).

Typically, the policy response for addressing minority teacher staffing has been to increase the supply of minority teachers through recruitment. Ingersoll and May (2011) argue that this is the wrong point to emphasize in the teacher pipeline, but this assumption has been largely untested. As a result, little attention has been paid to what happens to minority teachers once they enter the profession, and empirical research on minority teacher attrition has been limited, produced mixed findings, and has done little to advance understanding of the implications of minority teacher retention (Ingersoll & May, 2011).

Research also suggests other personal variables may interact to influence teacher attrition. Findings regarding gender are not universal, as Marso & Pigo (1997) found higher attrition rates among male teachers, and Adams (1996) found women are more likely to leave teaching than males (Sass, Flores, Claeys & Pérez, 2012). Complicating the influence of gender, Kirby et al (1999) found ethnicity and gender are not associated with attrition during a teacher’s early

career, but later in their careers, Caucasian females and African-American males are at a higher risk of leaving the profession. Such findings suggest gender may interact with other factors to influence teacher attrition.

Research surrounding the impact of teacher preparation on student performance often examines the relative importance of subject-matter preparation (knowing what to teach) versus pedagogical knowledge (knowing how to teach) on student achievement (Ingersoll & May, 2012). Typically, the amount of preparation teachers receive in these areas varies with the type of preparation the teacher receives, either traditional teacher education or alternative preparation. Traditionally, states have required individuals to complete a program of study in a university-based teacher preparation program and receive a bachelor's degree in a specific field of education. However, in recent years many states, including New Mexico, have developed alternative pathways to gaining a teaching license. Alternative teacher preparation typically allows individuals with bachelor's degrees in a content area to earn a teaching credential with additional pedagogical training. Alternatively-licensed teachers in New Mexico must complete a post-baccalaureate training program or online portfolio and then must pass the state's teacher licensing tests to become certified to teach.

Nationally, more than 40 percent of new teachers come from nontraditional or alternative pathways, and hence the impact this preparation has on persistence in the field is of significance both to teacher preparation leaders and policymakers (Ingersoll & May, 2012). In addition to teacher preparation, the quality of the mentoring and induction program that beginning teachers receive

has a direct effect on the development and performance of novice teachers, and a direct association exists between perceived preparation quality and decisions to leave the teaching profession (DeAngelis, Wall & Che, 2013). Novice teachers report mentorship support is critical, and when they receive it, teachers feel secure in their ability to teach. Effective mentoring and induction programs can help new teachers' self-efficacy, and sustained support may support lower attrition rates and increase teacher effectiveness (Lambert, 2012).

State-level discussions regarding teacher retention often focus on the relatively low salaries paid to teachers as a contributing factor influencing decisions to leave the profession. Research indicates wages play a role in retaining teachers, and national research indicates teachers are more likely to quit or transfer when they work in districts with lower wages, especially relative to alternative wage opportunities (Loeb, Darling-Hammond & Luczak, 2005). Additionally, teachers in fields with higher wage alternatives, such as mathematics and science, may be especially vulnerable to salary differences when deciding to remain in the teaching profession (Loeb et al, 2005).

Teacher-turnover, particularly in low-achieving, low-income schools, is a well-documented challenge that has prompted school leaders and policy makers to design incentives to attract and retain teachers in hard-to-staff areas (Dolton & Van Der Klaauw, 1999; Loeb et al, 2005; Clotfelter, Ladd, Vigdor & Wheeler, 2006). Typically, these incentives include pay raises or bonuses (Hanushek, Kain, & Rivkin, 2002). Yet, without a better understanding of the reasons why teachers

leave, financial incentives may not work, and retention policies may not effectively retain teachers (Boyd et al, 2009).

School and Community Characteristics

When given the opportunity, many teachers choose to leave schools serving large concentrations of poor, low-performing and non-white students, leaving schools with few replacement choices (Boyd et. al, 2009). Research also suggests sorting effects occur among teachers, producing striking differences in the qualifications of teachers across districts. Low-income, low-achieving, non-white students tend to find themselves in classrooms with the least skilled teachers (Hanushek et al, 2002). High-poverty schools in rural and urban areas are up to 6.5 percent more likely than affluent schools to have trouble filling positions in special education and nearly 10 percent more likely to have trouble filling positions in math. Also, 20 percent of teachers in high-poverty schools had three or fewer years of teaching experience, compared with 11 percent of teachers in low-poverty schools (Kowal, Hassel & Hassel, 2008).

Often, high turnover in high-poverty schools is interpreted as evidence of teacher discontent with their students. However, Johnson, Kraft & Papay (2012), which included a statewide survey of school working conditions in Massachusetts, reports the apparent relationship between student demographics and teacher turnover is not driven by the teacher's response to their students, but by poor work environments, which are more common in schools serving low-income populations. Though research is limited, several studies have identified school factors associated with teacher turnover, including salary levels and poor

working conditions, indicating that compensation may affect teacher decisions. (Boyd et al, 2009). Darling-Hammond (2010) similarly found teachers are more likely to leave teaching when they work in districts with lower wages relative to alternative wage opportunities (Darling-Hammond, 2010).

Poor school working conditions also contribute to teacher turnover. Novice teacher surveys indicate that feelings about administrative support, resources for teaching, and teacher input are strongly related to decisions to leave the profession, and teachers in more advantaged communities experience easier working conditions, including pupil loads, influence teaching decisions. Darling-Hammond & Ingersoll (2001) found teacher attrition is higher in schools with poor support from school administration, student discipline problems, and limited faculty input into school decision-making, even after controlling for school and student demographics. Poor working conditions are also related to school leadership. Principals also tend to be subject to the influences that lead to teacher attrition, and struggling schools tend to experience high rates of principal turnover, which further contributes to school instability (Boyd et al, 2009). Together, many variables, including teacher characteristics and preparation, school demographics, and working conditions converge to influence whether a novice teacher retention.

Chapter 3

Methods

Analysis was conducted to identify the teacher, school, and community variables that predict early-career teacher retention in New Mexico. A dataset obtained from the New Mexico Public Education Department that includes teachers who worked in New Mexico between the years 2008 and 2013 was analyzed using SPSS Version 21.0. This teacher roster file, updated annually, contains information about the 22 thousand teachers licensed and practicing in New Mexico and where these teachers taught during each school year. The dataset contained a unique identification number that could be matched across school years to a teacher's placement in New Mexico public schools across. This teacher placement file was then matched, using the unique teacher identification number, with separate datasets containing information about teacher scores on the state licensing examinations and teacher preparation programs. These data were originally obtained from the New Mexico Public Education Department and were merged by the New Mexico Legislative Finance Committee, who then removed the unique teacher identification numbers.

The dataset contained information about teachers, including demographic information, information about the teacher's current teaching placement, and information about the teacher's license, including licensure test scores and endorsed subject areas. Using a *years of experience* field reported by the Public Education Department, teachers who started teaching in 2008 were selected for

cohort analysis. This dataset was then matched to PED teacher roster files for school years 2009-2013. Each of the subsequent teacher roster files contained information about teacher placements, including grade-level, subject, and school. Demographic information about each school collected from the Public Education Department, including student demographics, was matched to teacher placement schools to provide information about school context. Finally, information collected from the U.S. Census regarding demographic information about the county in which the teacher's placement location was included within the dataset, and demographic information about the placement school in school year 2013 was collected from the U.S. Department of Education.

Independent Variables:

Teacher Variables

Teacher ethnicity

- As reported to the PED via the teacher's licensure application. Caucasian, Hispanic, Native American, African American, Asian, and Native Hawaiian ethnicities will be included and coded individually as dichotomous variables.

Age

- Reported as a continuous variable and derived from the birth date reported to the Public Education Department in the teacher's licensure application.

Gender

- Reported to the Public Education Department in the teacher's licensure packet and coded as a dichotomous variables.

Type of Teacher Preparation

- Teachers may complete either alternative or traditional preparation programs, dichotomously coded as reported to the Public Education Department. Alternatively licensed teachers may have completed either a post-baccalaureate program on online portfolio to earn a license. The data set does not distinguish between these two types of alternatively licensed teachers.

Teacher Academic Aptitude

- The teacher's score on the New Mexico Teacher Assessment of Basic Skills, a test of basic reading and math skills typically completed prior to the teacher's admission to a preparation program. The Basic Skills assessment results should be interpreted with caution as the score is a limited measure of basic academic skills. However, the teacher's score provides a basic measure of general reading, writing, and mathematics skills.

Teacher's Pedagogical Knowledge

- The teacher's score on the New Mexico Teacher Assessment of Competency, which is required prior to teacher licensure and is intended to measure the teacher's knowledge of pedagogical skills in elementary or secondary instruction.

Teacher's Area of Licensure

- Teachers in New Mexico may be issued three basic licenses: elementary, secondary, or special education. In addition, teachers may be awarded

endorsements within subject areas. The following subjects will be included and coded as dichotomous variables: English language arts, math, science, social studies, special education, and “other subjects.”

Grade Level Taught

- As reported to the Public Education Department and classified as elementary, middle, or high school placement in 2008.

Content Area Taught

- As reported to the Public Education Department and classified within one of the following subject areas: elementary, English language arts, math, science, social studies, special education, and “other subjects.”

Salary

- The teacher’s salary in 2008, as reported to the Public Education Department and included as a continuous variable. Early career teacher salaries in New Mexico do not vary a significantly because statute in New Mexico establishes a minimum salary for teachers. In 2008, statute required school districts to establish minimum annual starting teacher salaries at \$30 thousand. While current law allows school districts to pay teachers salaries greater than the statutory minimum, most entry-level teachers earn close to \$30 thousand.

School Variables

School Poverty Level

- The percent of students qualifying for free or reduced price lunch (FRL) as reported to the Public Education Department in 2008.

Student Achievement

- The percent of students scoring proficient on the New Mexico Standards Based Assessment as reported by the Public Education Department.

Principal Turnover

- Whether the principal was new to the teacher's school in 2008, as reported to the Public Education Department and coded as a dichotomous variable.

School Size

- Number of students attending the teacher's school, as reported on the annual Common Core of Data School Universe Survey to the U.S. Department of Education National Center for Education Statistics in 2008.

Per-Pupil Funding

- New Mexico maintains a funding formula, known as the School Equalization Guarantee, which awards a per-pupil amount that is determined by a variety of school district factors, including number of at-risk students and school size. This per-pupil amount varies by district and is typically dispensed at the school district level, meaning that the amount reported may not be the true amount expended per student at a given school. However, per-pupil funding serves as a general measure of resources available to schools within a district and included as a continuous variable in model.

Community Variables

Median Family Income

- Median family income, as estimated by the U.S. Census, in 2008 for the county in which the teacher's school district is located. This continuous variable serves as a measure of the relative wealth or poverty level within the community.

Difference Between Teacher Salary and Median Family Income

- The difference between the teacher's annual salary, as reported in 2008, and the median family income of the county in which the teacher lives will be reported as a continuous variable, representing a proxy for alternative earning opportunities and relative wealth in the community.

School Locale Code

- Geocoding information reported on the annual Common Core of Data School Universe Survey to the U.S. Department of Education National Center for Education Statistics. Locale codes include eight categories that range from large city to rural. The 2008 code will be included as a categorical variable., dichotomously coded.

Dependent Variables:

- a. Whether a teacher is in the same school in SY09 and SY13
(dichotomous variable for each year)
- b. Whether a teacher remains in the profession in New Mexico in SY09 and SY13 (dichotomous variable for each year)

Logistic Regression Analysis

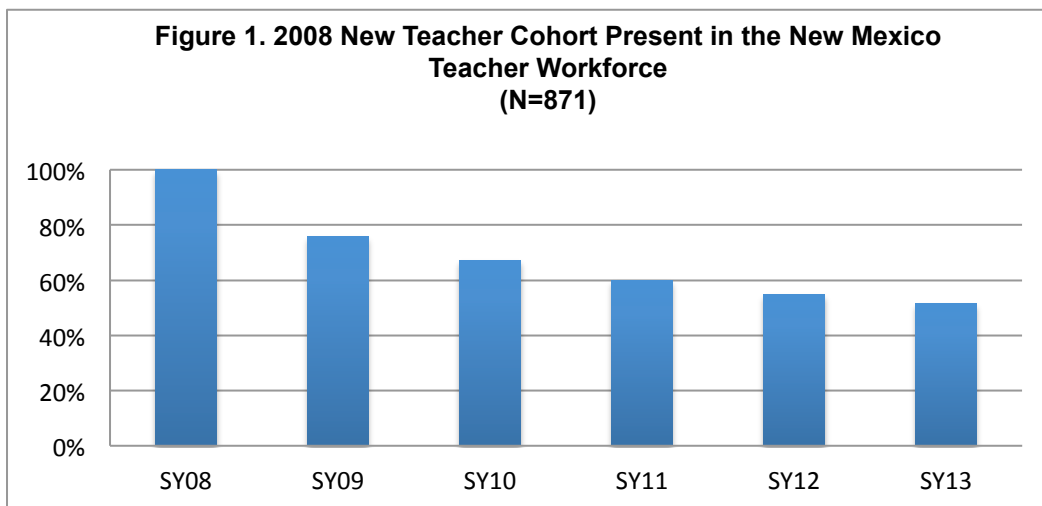
Logistic regression was used to analyze the relationship between teacher and school variables on teacher attrition. In this case, the development of a logistic regression model was appropriate because the predicted outcome, teacher retention, is a dichotomous variable. Logistic regression analysis is well suited for describing and testing relationships between a categorical outcome variable and one or more categorical or continuous predictors (Peng et al, 2002). Analysis was repeated using four dichotomous outcome variables: whether the teacher taught in New Mexico in SY09, whether the teacher taught in the same school in SY09 as in SY08, whether the teacher taught in a New Mexico school in SY13, and whether the teacher taught in the same school in SY13 as SY08.

As the purpose of building the statistical model was to explore rather than hypothesize, testing forward stepwise binary logistic regression was applied to the data, (as opposed to simultaneous entry) with likelihood-ratio change selected as the criterion. Selected binary and continuous predictors were included in the model as described in the variable section above. Overall, 38 predictors were included in the model, and these independent variables are listed above. Results from the model may contribute to the field's understanding of the influences on teacher attrition and provide information about the variables that predict teacher retention, informing policies aimed at improving early career teacher retention. Because New Mexico frequently cites the challenges faced by rural school communities, logistic regression analysis was repeated among teachers who begin their teaching placements in rural schools.

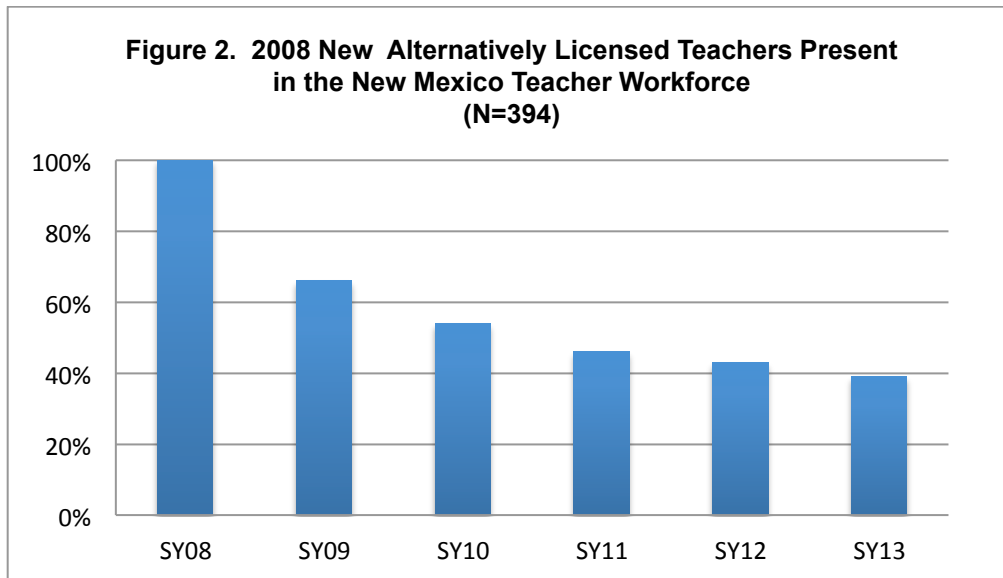
Chapter 4 Results

Descriptive Statistics

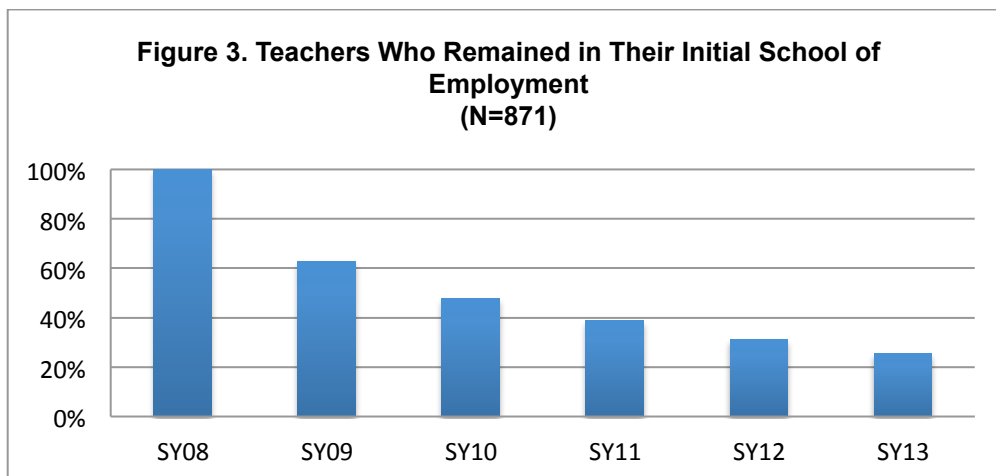
Of the 871 new teachers who entered New Mexico's public school system in SY08, 76 percent remained in SY09 and 51.4 percent remained in SY13. This pattern of attrition mimics the national average; 15 percent of teachers leave the profession after the first year and 50 percent leave within the first five years (Alliance for Excellent Education, 2008).



Retention among alternatively licensed teachers decreases even more dramatically. Of the alternatively licensed teachers new to the profession in 2008, only 39 percent remained in the New Mexico teacher workforce in SY13.



The presence of 2008 cohort teachers in their initial placement school declined much more dramatically than overall teacher attrition in New Mexico. In SY09, 63 percent of the 2008 teaching cohort remained in their initial school of employment, while only 26 percent of the cohort remained in their initial school of employment by SY13.



Among the SY08 cohort of all first year teachers in New Mexico, the majority, 74 percent were female and 59 percent were Caucasian. Thirty-two percent were Hispanic.

Table 1. Characteristics of Teachers Entered Into the Logistic Regression Model (N=871)

Categorical Variable	% of Cases in the Data
Male	74%
Caucasian	59%
Black	2%
Asian	1%
Hispanic	32%

Teachers included in the cohort earned an average salary of roughly \$32 thousand in SY08. Teachers in this cohort scored a mean of 271 on the state's basic skills teacher assessment and 264 on the state's test of competency. Both tests are scored on a scale of 300 possible points, though a score of 240 is required to earn a New Mexico teacher's license.

Table 2. Descriptive Statistics of Teacher Variables Entered into the Model

Continuous Variable	Cases with Data Available	Mean	Standard Deviation
Salary	760	\$31,703	\$5,653
Basic Skills Score	240	270.83	15.35
NMTA Competency Score	790	263.81	13.01

Additionally, nearly 39 percent taught elementary school, and 33 percent taught math, English language arts, social studies, or science at the secondary level. Remaining teachers taught other subjects or special education. Of the 871 teachers who began teaching in SY08, 45 percent held alternative licenses, 12 percent were licensed to teach special education (SPED), 35 percent were licensed

to teach elementary school, and 25 percent were licensed to teach at the secondary level. These values exceed 100 percent because teachers may hold multiple licenses at one time.

Table 3. Characteristics of Teachers' Credentials Included in the Logistic Regression Model (N=871)

Categorical Variable	% of Cases in the Data
Taught SPED 08	3%
Taught Elementary 08	39%
Taught Math 08	11%
Taught ELA 08	8%
Taught Social Studies 08	8%
Taught Science 08	6%
Taught Other Subject 08	25%
SPED License	12%
Elementary License	35%
Secondary License	25%
Alternative License	45%

Of the teachers included in the model, most were evenly dispersed among schools in cities (21 percent), rural locations (27 percent), and towns (25 percent). Forty-five began their teaching careers in schools led by a principal new to the school.

Table 4. School Characteristics of Teachers Included in the Logistic Regression Models (N=871)

Categorical Variable	% of Cases in the Data
New Principal to the school 08	45%
City	21%
Rural	27%
Suburb	5%
Town	25%
Unknown School Location	22%

Teachers entering the New Mexico workforce in SY08 began their careers in schools with poverty rates slightly higher than the state's average poverty rate of 70 percent (Weinberg & Pahl, 2012). Additionally, the schools in which 2008 cohort teachers tended to work had slightly lower minority student populations than the state average of 60 percent Hispanic and 9 percent Native American (Weinberg & Pahl, 2012).

Table 5. Descriptive Statistics of School Variables Entered into the Models

Continuous Variable	Teacher Cases with Data Available	Mean	Standard Deviation
Total School Enrollment	790	339.45	362.22
Native American students, as percent of school population	753	10.19%	22%
Free Reduced Price lunch students, as percent of school population	733	72.89%	25%
Asian students, as a percent of school population	753	1.08%	2%
Hispanic students, as a percent of school population	753	56.43%	28%
African American students, as a percent of school population	753	2.36%	3%
Caucasian students, as a percent of school population	753	29.93%	23%
Pupil to Teacher Ratio 2008	750	19.85	73.7
Per Pupil Funding, 2008	803	\$5,890.27	\$713.83

On average, the teacher cohort began their careers working in communities where mean annual wages were roughly \$31 thousand per year. The starting salaries of teachers included in the cohort were, on average, \$538 less than the median income in the community in which they taught.

Table 6. Descriptive Statistics of Community Variables Entered into the Models

Continuous Variable	Teacher Cases with Data Available	Mean	Standard Deviation
Average Total Annual Wages in the County	790	\$31,199.22	\$5,776.52
Difference between Median County Salary and Teacher Salary	696	(\$538.02)	\$7,751.32

Logistic Regression Analysis

Forward stepwise binary logistic regression was applied to the entire teacher dataset with likelihood-ratio criterion. Overall, two significant models were developed to predict workforce retention in SY13 and initial school of employment retention in SY13. However, no model applied to the entire dataset was able to significantly predict either teaching in SY09 or remaining in the original placement school in SY09. Two significant models were also developed using just a cohort of teachers who began their careers in rural school settings.

Model 1: Taught in School Year 2013

The best model, which most accurately predicts whether a teacher persisted in the New Mexico public school workforce in SY13, was significant, $\chi^2 = 42.752$ ($df=3$, $p < 0.001$). Of the 38 variables included in the SY13 retention model, three were significantly predictive of a teacher remaining in the profession in SY13 and included in the best model. Holding an alternative license decreased a teacher's likelihood of being in the teacher workforce by 43 percent over the null model, where the mean retention rate was 51 percent. This percent likelihood

is the percent by which the probability of an individual teacher remaining in the profession increases, holding all other variables constant. Being of Hispanic ethnicity increased a teacher's likelihood of remaining in the SY13 New Mexico teacher workforce by 198 percent, while higher funding per pupil funding levels also increased a teacher's likelihood of retention SY13 (Appendix 1).

Table 7. Impact of Retention in the SY13 New Mexico Teacher Workforce by Significant Variable

Decreased Likelihood	
Variable	Percent Likelihood
Alternative Likelihood	43%
Increased Likelihood	
2008 per pupil funding	100%
Hispanic (teacher ethnicity)	198%

Model 2: Taught in Initial School of Employment SY13

Logistic analysis was then repeated to identify the variables that predicted whether a teacher would not only remain in the state's workforce but also their initial school of employment in SY13. The best model was also significant, $\chi^2=56.113$ ($df=8$, $p<0.001$). In this model eight of the 38 variables significantly predicted whether a teacher would remain in their initial school of employment. Being male and Caucasian decreased a teacher's likelihood of remaining in their initial school of employment by 58 percent over the null model, 26 percent retention on average. Teaching an elective course also decreased a teacher's likelihood of remaining in their initial placement school, and holding an alternative license also made a teacher's retention less likely. Older teachers were more likely to remain in their initial placement schools, as were teachers in

schools with higher proportions of Caucasian students. Also in this model, having a new principal in 2008 made a teacher more likely to remain teaching in her initial placement school, increasing likelihood by 161 percent, and increases in mean county wages were also associated with increased likelihood of teacher retention (Appendix 2).

Table 9. Impact of SY13 Retention in an Initial School of Employment by Significant Variable

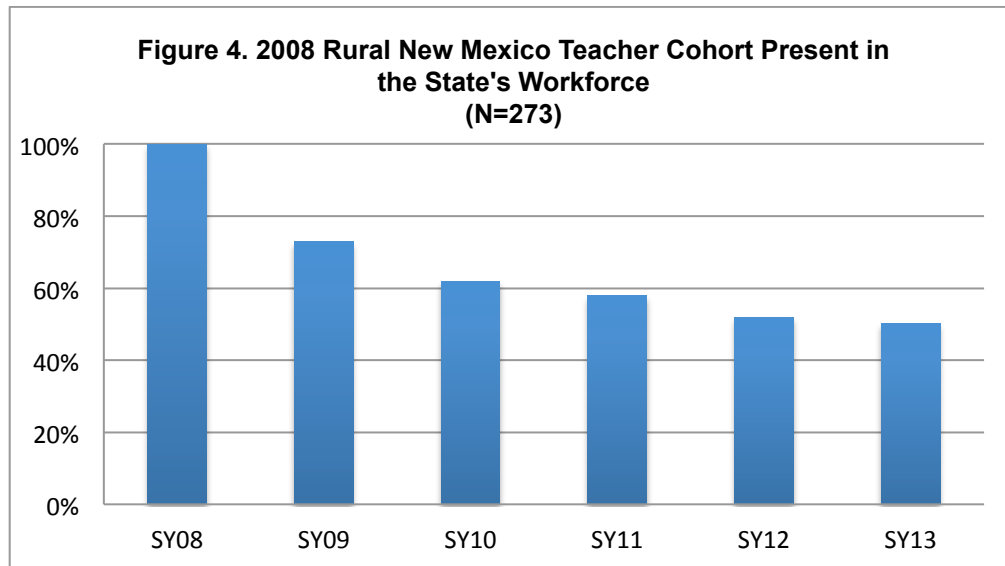
Decreased Likelihood	
Variable	Percent Likelihood
Male	58%
Caucasian (teacher ethnicity)	58%
Other Subject 08	46%
Alternative License	48%
Increased Likelihood	
New Principal 08	161%
Average Total Annual Wages in the County	100%
Proportion of Caucasian Students	101%
Age (teacher)	102%

Several variables expected to predict teacher retention, including the two measures of teacher salary, school poverty level and community poverty level, were not significant in any of the best models. This variable may not have been significant because nearly all schools within the dataset serve a population where the majority of students are FRL.

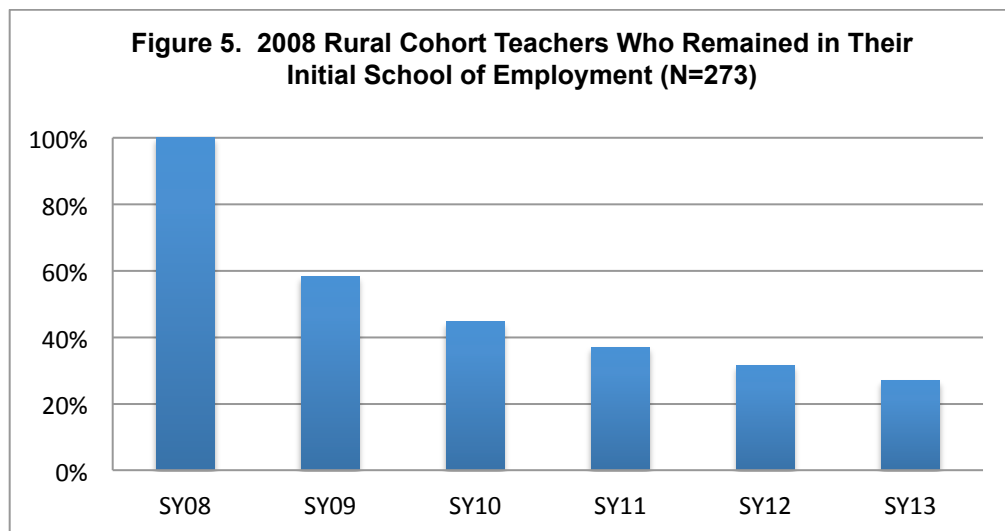
Analysis of Teachers in Rural Schools

Separate analysis was conducted selecting teachers who taught in a school designated as “rural” by the U.S. Department of Education in 2008. Overall, the persistence of teachers who began their teaching careers in rural New Mexico

schools is similar to that of the entire 2008 cohort; 52 percent continued teaching in New Mexico in SY13.



The rate at which teachers in the rural cohort remained in their initial school of employment was also quite similar to the overall state attrition rate; 25 percent remained in their initial schools of employment in SY13.



Model 3: Taught in the New Mexico Workforce SY13, Rural Cohort

No models that improved the predictive power of the null model could be developed to predict whether a teacher in the rural cohort remained in the same

school in SY09. However, a model that predicted whether a teacher in a rural community school would remain in the New Mexico teacher workforce in SY13 was significant, $\chi^2=20.01$ ($df=2$, $p<0.001$). In this model, two variables of the 38 were associated with increases in retention likelihood. In this case, teaching social studies increased a rural teacher's likelihood of remaining in the profession by 400 percent, and holding an elementary license increased a teacher's likelihood by 462 percent. Interestingly, neither of these variables was significantly predictive in the model that included all teachers.

Model 4: Taught in Initial School of Placement in SY13, Rural Cohort

A significant model to predict the probability of a teacher in the rural cohort remaining in their initial school of employment in SY13 was developed, $\chi^2=44.61$ ($df=6$, $p<0.001$). In the most predictive model, six independent variables were significantly associated with remaining in an initial rural school placement. Hispanic ethnicity reduced a teacher's likelihood of remaining in their initial placement school by 31 percent, while holding an elementary license or alternative license each reduced the likelihood of a teacher working in a rural community remaining in their initial school of employment. Teaching English language arts, having a new principal in 2008, and larger student-to-teacher ratios increased a teacher's likelihood of remaining in her initial placement school.

Table 10. Impact of SY13 Rural Teacher Retention in an Initial School of Employment by Significant Variable

Decreased Likelihood	
Variable	Percent Likelihood
Hispanic (teacher ethnicity)	31%
Elementary License	18%
Alternative License	15%
Increased Likelihood	
English Language Arts 08	728%
New Principal 08	399%
Pupil to Teacher Ratio 08	109%

Chapter 5

Discussion

Results obtained through this study suggest certain variables are associated with early career teacher attrition and retention in New Mexico, and that these variables, at times, influence teacher decisions in certain contexts but not others. Additionally, several variables predicted to have an effect on teacher attrition did not significantly influence teacher persistence in any of the models. Overall, findings are consistent with previous research that shows teacher turnover is strongly correlated with individual teacher characteristics (Ingersoll, 2001). Because no models significantly predicted overall teacher persistence in SY09, the study's application is limited to the description of variables associated with teacher persistence across the first five years of their careers in New Mexico and does not provide information regarding what predicts decisions by New Mexico teachers to leave the workforce during the first four years of teaching.

Few variables were significantly associated with persistence across multiple models, except for holding an alternative license, which reduced the probability of teacher persistence in nearly every model. Possessing an alternative license reduced the probability of remaining in the New Mexico teacher workforce by 43 percent, and having an alternative license reduced a teacher's probability of remaining in the same school in SY13 by 48 percent. Similarly, having an alternative license reduced the probability of a teacher in a rural community remaining in same school in SY13 by 15 percent. Such findings are

consistent with Ingersoll et. al, (2011) but provide little information about the cause of the relationship between alternative licensure and attrition.

New Mexico developed an alternative pathway to teaching licensure to attract adults who possess a bachelor's degree and aspire to teach but do not wish to earn a second bachelor's degree to gain a teaching licensure. To earn an alternative teaching credential, teacher candidates must complete a post-baccalaureate alternative licensure program through an accredited teacher preparation program or complete an online portfolio. Perhaps alternatively licensed teachers are less invested in remaining in the New Mexico educator workforce. Perhaps because alternatively licensed were not primarily trained as teachers, they may be more likely to view themselves as having other career options. Alternatively, the difference in alternative license persistence may be explained by genuine differences in the preparation these two groups receive. The influence of teacher preparation and the importance of pedagogical training on teacher attrition is consistent with the findings of Ingersoll & Perda (2010), which noted math and science teachers who had received less pedagogical preparation were less likely to remain in the teaching profession. Notably, performance on the state's teacher licensing exam, which is intended to measure a teacher's pedagogical knowledge, was not associated with teacher attrition in any model. However, this finding may suggest that the state's teacher assessment is not a valid or reliable measure of pedagogical knowledge and hence is an inappropriate measure for predicting whether pedagogical knowledge influences teacher attrition decisions.

Because the distinguishing feature of alternative licensure is the difference in teaching preparation received, the consistent influence of alternative licenses on teacher persistence suggests the preparation New Mexico teachers receive prior to entering the classroom impacts their decisions to remain in the profession. Because alternatively licensed teachers typically receive less formal pedagogical preparation than traditionally prepared teachers, the findings of this research affirm that teacher preparation in New Mexico matters for teacher retention. The specific elements and features of teacher preparation that influence teacher decisions to remain in the profession warrant further research because teacher licensing and preparation standards are determined by the state and thus serve as policy levers which may be modified to improve outcomes for students in New Mexico.

Several other variables were identified as significantly predictive in individual models, and interesting patterns related to ethnicity emerged. Caucasian teachers were 58 percent less likely to remain teaching in their initial teaching placement for five years than non-Caucasian teachers. However, Caucasian teachers were not more or less likely to remain in the New Mexico workforce overall. In contrast, being Hispanic increased a teacher's likelihood of remaining in the teacher workforce by 198 percent, compared to non-Hispanic teachers, but being Hispanic decreased a rural teacher's likelihood of remaining in their initial school of employment by 31 percent. Prior research regarding the impact of ethnicity on teacher retention has thus far been inconclusive, in some cases suggesting minority teachers leave the profession at higher rates and in

other cases suggesting that Caucasian teachers are more likely to leave the teacher workforce.

The pattern of results observed in New Mexico may support the research of Kane & Orsini (1999), who noted minority teachers may be leaving the teaching profession because of a lack of diversity in teacher or student populations, and the findings of Ingersoll & May (2011), who assert minority teachers are more likely to persist in schools in which they experience “cultural synchronicity.” population, New Mexico is unique because of its diverse population. Hispanic teachers, who view themselves as similar to their students, may be more likely to remain in the profession and their initial teaching placements, while Caucasian teachers may seek to find teaching placements in which they also experience “cultural synchronicity.” Such influences may explain why Caucasian teachers in New Mexico are more likely to leave their initial placement schools but not the profession overall and why Hispanic teachers are more likely to remain in the profession overall but less likely to remain in rural schools.

In the cases related to ethnicity, the analysis included in this research only identifies predictors associated with teacher retention and cannot explain why certain teachers are not retained. Further research is needed to better understand why ethnicity is associated with attrition patterns in New Mexico, but policymakers may still use information about the influence of ethnicity on attrition. Teacher ethnicity may not be a policy issue that can be immediately controlled. However, an awareness of the tendency of Hispanic teachers to remain

in the New Mexico and Caucasian teachers to leave their initial placement schools may influence teacher behaviors as they search for jobs and recruitment efforts as principals seek teachers. Policymakers and principals may seek to actively recruit Hispanic New Mexicans to enter teaching. Additionally, if cultural synchronicity plays a significant role in the retention of New Mexico teachers, policymakers and community leaders may seek to develop policies to support teachers who come from a given community and hope to return to teach in the same community.

Several other teacher variables associated with attrition nationally were associated with retention patterns in New Mexico in a manner consistent with prior research. Teacher's content area was generally not predictive of teacher retention in the workforce. However, teaching certain subjects in rural settings was associated with increased persistence. Academic aptitude, as measured by a teacher's performance on the state's basic skills test was not associated with teacher attrition in any model.

Salary, both as an absolute value and in comparison to median local salaries, was not associated with teacher retention in New Mexico in any of the models developed. These findings do not support the results of several national studies, including the work of Darling-Hammond (2010), which found that teachers are more likely to leave teaching when their salaries are lower relative to alternative wage opportunities in the community, and the meta-analysis of Borman and Dowling (2008), which cited several studies that suggest salary is associated with retention. Little variance existed with the teacher data set, as one

standard deviation equaled roughly \$5 thousand within the data. It may be small variations in salary do not impact retention, or it may be that in New Mexico factors other than compensation appear to affect teacher employment decisions. Thus far, New Mexico has primarily focused on compensation incentives as a means to retain teachers, but this research suggests small compensation increases may not be the most effective strategy. Instead, other initiatives to retain teachers should be considered because the logistic regression analysis included in this research did not identify salary as a significantly predictive of retention. If policymakers aim to improve teacher retention and are dealing with limited resources, investing in programs known to improve retention, such as induction and mentoring, may be a more effective way to keep New Mexico teachers in the workforce than small compensation increases alone. Ultimately, more research is needed to fully understand the relationship between teacher retention and compensation. Future research ought to focus on better understanding why teachers choose to leave the classroom and the elements of teacher preparation that may serve as protective factors in retaining teachers.

Though few school and community level variables predicted retention, both principal turnover and per-pupil student funding were associated with teacher retention. Per-pupil funding was positively associated with teacher retention in the New Mexico workforce in SY13 in a manner consistent with the findings of Borman and Dowling (2008), which found that teacher work conditions strongly influence attrition decisions. These researchers found that student-teacher ratios, school expenditures for support and teaching materials, and

instructional spending were all associated with attrition. While student-teacher ratios were only significantly predictive of retention among rural teachers, the predictive value of per-pupil funding may suggest this variable serves as a proxy measure for school resources. Schools with lower levels of funding may be less able to invest in resources and supports for teachers, including salary increases and training support. Teachers who feel adequately supported through school resources may be more likely to remain in the profession. The relationship between per-pupil funding and teacher retention may also suggest that teacher retention is related to school size because New Mexico's Public School Funding Formula heavily subsidizes small schools; small schools and small school districts, those with fewer than 200 students, generate significantly more revenue per-student through the state's funding formula than do larger schools and districts. Thus in this case, it may be that per-pupil funding is related to teacher retention by way of school size.

When a new principal assumes leadership over a school, the turnover may lead to instability or other change within the school. Surprisingly, teachers who worked in a school with a new principal in 2008 were more likely to remain in this school in SY13 by a factor of 1.6. This finding contradicts most existing research, which tends to suggest principal turnover is associated with school instability and teacher attrition; Ingersoll (2001) found teacher attrition is associated with poor support from school administration, and Boyd et al (2009) found struggling schools tend to have high rates of principal and teacher turnover, contributing to school instability. The relationship between having a principal

new principal to the school and teacher retention in this study warrants further study to better understand the relationship between the two.

Limitations

Because the analysis described in this research relied on employment records, information about school programs and working conditions, which may likely influence teacher career decisions, were unavailable and thus not included in the model. Generally, analysis related to school-based factors and teacher retention is conducted using survey or interview data. Survey data, though valuable in providing qualitative information about teacher decisions may be affected by participation and self-report biases. In contrast, the analysis completed for this project relied on employment and licensing records obtained from the New Mexico Public Education Department. These records include objective information about all teachers employed and licensed in New Mexico and their school communities. However, findings related to the relationship between teacher attrition and student demographics do not provide information to fully explain the reasons that teachers left. Despite these limitations, analysis of the available and measurable teacher, school, and community variables associated with teacher attrition in New Mexico contributes to the state's basic understanding of the conditions which predict whether an early career teacher leaves the profession, allowing policymaker and preparation institutions to enhance protective factors or mitigate risk factors.

Additionally, this study did not examine programmatic variables, such as teacher mentoring and induction, known to improve teacher retention rates

because this information was not available through the PED datasets. Such programs, though not discussed in this research, should be studied and considered by policymakers and school leaders, particularly to improve the retention of teachers who present characteristics, like alternative licensure, that are associated with lower retention. Finally, the results included in this research provide only descriptive information about which teachers are more or less likely to remain in the public school workforce, and they do not provide information about the alternative employment of former New Mexico teachers. In many cases, it is possible that teachers left the New Mexico workforce to become educators in other states or the private schools system. Information used in this project could not provide information about these alternative teaching employment options.

Chapter 6

Conclusion

Given the high cost of teacher turnover, states benefit from cost-effective strategies to train and retain effective teachers. A better understanding of the variables that predict teacher attrition in New Mexico should inform policymakers and guide targeted teacher support efforts. While many of the variables included in this analysis cannot be altered directly by policymakers, understanding the variables that predict attrition may enable teacher preparation programs to more effectively prepare and support teachers who are most likely to leave the profession. Research consistently suggests teacher retention is linked to student achievement, and thus New Mexico has an interest in retaining effective teachers to support student learning. Given the strong evidence that teacher effectiveness increases sharply after the first few years of teaching, this kind of churning in the beginning teaching force reduces productivity in education overall; “the education system never gets a long-term payoff from its investment from novices who leave” (Darling-Hammond, 2003). Better identification and understanding of teacher and school characteristics associated with attrition provides New Mexico policymakers with information about the factors that make teachers more likely to remain in the profession, reducing the financial and academic losses experienced when teachers leave.

Results from this analysis may be used to craft policies that more effectively support teachers and improve their likelihood of remaining in the state’s teacher workforce. Thus far, the state has primarily focused on financial

incentives in its attempt to retain teachers. However, results from this analysis suggest that salary is not significantly associated with teacher retention because salary was not significantly predictive of retention in any of the models. Thus, small increases in salary alone may not be a very effective means of retaining teachers without further understanding the relationship between teacher retention and compensation. Instead, the state should consider other policy levers, such as teacher preparation, which does appear to be predictive of retention as a way to retain its workforce. Faced with limited, New Mexico ought to also consider in strategies known to improve teacher retention, including induction and mentoring programs which seem to improve a teacher's chances of retention (DeAngelis et al, 2013). Also, New Mexico may consider ways to recruit teachers into communities in which they experience cultural synchronicity. Teachers have a larger impact on student achievement than any other school-based factor, and thus finding ways to stop the churn of teachers out of the classroom after they have gained training and experience is important for improving student achievement in New Mexico.

Finally, the findings of this study may be used to guide future teacher retention research. While this research highlighted the fact that traditionally licensed teachers are significantly more likely to remain in the profession than alternatively licensed teachers, the explanations for this research are merely speculative. Future research is needed to identify the specific elements of teacher preparation that may contribute to persistence within the future. Additionally, this study only identified characteristics that make a teacher more or less likely to

leave the profession. Future research should focus on explaining why teachers are leaving the profession in order to improve retention in the field.

Chapter 7

Appendices

Appendix 1: Taught in SY13 Model of Best Fit

The best model to predict whether a teacher persisted in the New Mexico public school workforce until SY13 was significant, $\chi^2 = 42.752$ ($df=3$, $p < 0.001$). This model also passed tests of goodness of fit and tests searching for collinearity. Regarding goodness of fit, the model passed the Hosmer and Lemeshow Test and was not significant ($p < 0.966$ NS). The forward stepwise binary logistic regression model improved the overall predictive accuracy of the null model by 8.6 percent, resulting in an overall percentage correct of 62 percent. Additionally, the model more accurately predicted a teacher remaining in the profession, 80.9 percent accuracy, than not remaining in the profession, 40.4 percent accuracy.

Two independent variables, if the teacher identified as Hispanic and per pupil funding level, were predictive of significantly higher probabilities of remaining in the New Mexico teacher workforce in SY13, while having an alternative license was predictive of a significantly lower probability of remaining in the New Mexico workforce in SY13. Two additional variables were nearly significantly predictive of remaining in the New Mexico teacher workforce: being male ($p < 0.091$) and holding an elementary-level license ($p < 0.052$), but were excluded from the model because they failed to meet the $p < 0.05$ threshold. Odds ratios included in the chart below indicate the factor of increase (ratios above 1) or decrease (ratios below 1) of a teacher's likelihood of remaining in the New Mexico teacher workforce in SY13 if all other variables are held constant

(Courtney & Prophet, 2011). Odds ratios may be converted the change in percent likelihood associated with each variable.

Table 11. A Summary of Outcome Statistics of Significant Variables in the Best Stepwise Binary Logistic Regression Model Predicting Presence in the New Mexico Teacher Workforce in SY13

Categorical Variable	B	Standard Error	Significance	Exp (B)/Odds Ratio
2008 per pupil funding	0	0	0.046	1.000
Hispanic (teacher ethnicity)	0.682	0.193	0.000	1.978
Alternative License	-0.841	0.178	0.000	0.431

Appendix 2: Taught in the Same School in SY13 Model of Best Fit

The best model to predict whether a teacher who began working in SY08 would remain in the same school in SY13 was also significant, $\chi^2= 56.113$ ($df=8$, $p<0.001$). The model also passed the Hosmer and Lemeshow Test for goodness of fit, which was not significant ($p< 0.250$ NS). The forward stepwise binary logistic regression model improved overall percentage over the null model by 19 percent, resulting in an overall percentage correct of 72.4 percent. However, the model more accurately predicted a teacher leaving the profession, 95.1 percent accuracy, than remaining in the profession, 12.7 percent accuracy.

Four independent variables were significantly predictive of higher probabilities of remaining in the same school placement for five years: having a new principal in 2008, higher average median wages in the county in which the school is located, having a higher proportion of Caucasian students within the school, and age. Four independent variables were significantly predictive of lower probabilities of remaining in the same school in SY13: being a male teacher, being a teacher of Caucasian ethnicity, teaching an elective subject, and holding an alternative teaching license. Several variables were nearly significantly predictive but were excluded from the model, including higher pupil to teacher ratios ($p<0.08$), and Asian ethnicity of the teacher ($p<0.066$).

Table 12. A Summary of Outcome Statistics of Significant Variables in the Best Stepwise Binary Logistic Regression Model Predicting Remaining in the Same School in SY13

Categorical Variable	B	Standard Error	Significance	Exp (B)/Odds Ratio
New Principal 08	0.4800	0.2040	0.0190	1.6160
Average Total Annual Wages in the County	0.0000	0.0000	0.2900	1.0000
Proportion of White Students	0.0000	0.0040	0.0250	1.0100
Age	0.0220	0.0100	0.0240	1.0230
Male	-0.5470	0.2560	0.0330	0.5780
Caucasian (teacher ethnicity)	-0.5430	0.2000	0.0070	0.5810
Other Subject 08	-0.7670	0.2700	0.0050	0.4640
Alternative License	-0.7340	0.2210	0.0010	0.4800

Appendix 3: Rural Teacher Persistence in the SY13 Workforce Model of Best Fit

Binary logistic regression analysis was repeated using the cohort of rural teachers to predict whether a teacher persisted into SY13, and the best model was significant, $\chi^2= 22.010$ ($df=2$, $p<0.001$). This model also passed tests of goodness of fit and tests searching for co linearity. Regarding goodness of fit, the model passed the Hosmer and Lemeshow Test and was not significant ($p< 0.783$ NS). The forward stepwise binary logistic regression model improved overall percentage over the null model by 7.1 percent, and resulted in an overall percentage correct of 68.8 percent. The model accurately predicted remaining in the New Mexico workforce in SY13 71.3 percent of the time and predicted a teacher leaving the profession with 64.8 percent accuracy.

Table 13. A Summary of Outcome Statistics of Significant Variables in the Best Stepwise Binary Logistic Regression Model Predicting Rural Teachers Remaining in the New Mexico Workforce in SY13 (N=273)

Categorical Variable	B	Standard Error	Significance	Exp (B)/Odds Ratio
Social Studies	1.387	0.382	0.048	4.001
Elementary License	1.531	0.382	0	4.621

Appendix 4: Rural Teacher Persistence in Initial School of Employment in SY13 Model of Best Fit, Rural Cohort

A significant model to predict the probability of a teacher in the rural cohort remaining in their initial school of employment in SY13 was developed, $\chi^2 = 44.612$ ($df=6$, $p < 0.001$). This model passed tests of goodness of fit and tests searching for collinearity. Regarding goodness of fit, the model passed the Hosmer and Lemeshow Test and was not significant ($p < 0.540$ NS). The forward stepwise binary logistic regression model improved overall percentage over the null model by 8.6 percent, and resulted in an overall percentage correct of 73.8 percent. The model accurately predicted remaining in the same school in SY13 53.1 percent of the time but correctly predicted a teacher leaving the profession 84.8 percent accuracy.

Four independent variables increased the probability of a rural teacher remaining in their initial school of employment in SY13: teaching English or Language Arts, holding an elementary license, having a new principal in SY08, and higher pupil to teacher ratios. Two variables, a teacher's Hispanic ethnicity and holding an alternative license were significantly associated with a reduced probability of remaining in the initial school placement in SY13.

Table 14. A Summary of Outcome Statistics of Significant Variables in the Best Stepwise Binary Logistic Regression Model Predicting Rural Teachers Remaining in their Initial Placement School in SY13 (N=273)

Categorical Variable	B	Standard Error	Significance	Exp(B)/Odds Ratio
Hispanic (teacher ethnicity)	-1.165	0.493	0.018	0.312
English Language Arts 08	1.985	0.74	0.007	7.278
Elementary License	1.979	0.503	0.000	0.181
Alternative License	-1.878	0.567	0.001	0.153
New Principal 08	1.384	0.458	0.003	3.992
Pupil to Teacher Ratio 08	0.088	0.043	0.041	1.092

Chapter 8

References

- Alliance for Excellent Education. (2005). Teacher attrition: A costly loss to the nation and to the states. Retrieved from <http://www.all4ed.org/publications/TeacherAttrition.pdf>
- Alliance for Excellent Education (2008). *What keeps good teachers in the classroom? Understanding and reducing teacher turnover*. Washington, DC: Alliance for Excellent Education.
- Barnes, G., Crowe, E & Schaefer, B. (2007) The cost of teacher turnover in five school districts. *National Commission of Teaching and America's Future*. Retrieved from <http://files.eric.ed.gov/fulltext/ED497176.pdf>
- Borman, G.D. & Dowling, N.M. (2008) Teacher attrition and retention: a meta-analytic and narrative review of the literature. *Review of Educational Research*, 78(3), pp.367-409.
- Billingsley, B. (2003) Special education teacher retention and attrition: a critical analysis of the literature. *Center on Personnel Studies in Special Education*, RS-2E.
- Boyd, D., Grossman, P., Ing, M., Lankford, H. & Wyckoff, J. (2009) The influence of school administrator on teacher retention decisions. Retrieved from http://www.stanford.edu/~sloeb/papers/Admin%20and%20Retention%2012_12_09.pdf
- Clotfelter, C., Ladd, H.F., Vigdor, J., & Wheeler, J. (2006). High-poverty schools and the Distribution of teachers and principals. *North Carolina Law Review* 85, 1345-1369.
- Darling-Hammond, L. (2003). Keeping good teachers: why it matters, what leaders can do. *Educational Leadership*, 60(8), 6-13.
- Darling-Hammond, L. (2010). Recruiting and retaining teachers: turning around the race to the bottom in high-needs schools. *Journal of Curriculum and Instruction*, 4(1).
- DeAngelis, K. J., Wall, A. F., & Che, J. (2013). The Impact of Preservice Preparation and Early Career Support on Novice Teachers' Career Intentions and Decisions. *Journal Of Teacher Education*, 64(4), 338-355.
- Dolton, P., & Van Der Klaauw, W. (1999). The turnover of teachers: A

competing risks explanation. *The Review of Economics and Statistics*, 81(3), 543-552.

- Educational Testing Service to Reveal Results of 'Parsing the Achievement Gap II. (2009). *Entertainment Close-up*
- Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2002). Why public schools lose teachers. *The Journal of Human Resources*, XXXIX(2), 327-354.
- Hanushek, E. A., & Rivkin, S. G. (2010). The quality and distribution of teachers under the no child left behind act. *Journal of Economic Perspectives*, 24(3), 133-150.
- Hudson, F. & Meagher, K. () Variables associated with stress and burnout of regular and special education teachers. *University of Kansas, Department of Education*, 02-G008101012, pp. 1-235.
- Ingersoll, R.M. (2001) Teacher turnover and teacher shortages: An Organizational analysis. *American Educational Research Journal*, 38(3), pp. 499-534.
- Ingersoll, R.M. & May, H. (2011) Recruitment, retention, and the minority teacher shortage. *Consortium for Policy Research in Education*, RR-69, 1-54.
- Ingersoll, R.M. & May, H. (2012) The magnitude, destinations, and determinants of mathematics and science teacher turnover. *Educational Evaluation and Policy Analysis*, 34 (4), pp. 435-464.
- Ingersoll, R.M., & Perda, D. (2010). Is the supply of mathematics and science teachers sufficient? *American Educational Research Journal*, 47(3), pp. 563-594.
- Johnson, S., Kraft, M., & Papay, J. (2012). How context matters in high-need schools: the effects of teachers' working conditions on their professional satisfaction and their students' achievement. *Teachers College Record*, 114(10),39.
- KOAT (2013). More young teachers leaving New Mexico: Teacher's union says turnover hurts students. *KOAT News*. Retrieved from <http://www.koat.com/news/new-mexico/albuquerque/more-young-teachers-leaving-new-mexico/21430088>
- Kowal, J., Hassel, B.C, & E. A. Hassel (2008) Financial incentives for hard-to-staff positions. *Center for American Progress*.
- Lambert, D. (2012). Effective practices and resources for support of beginning

- teachers. *Academic Leadership Journal*, 10(1), 1-13.
- Lankford, H., Loeb, S., & Wyckoff, J. (2002). Teacher sorting and the plight of urban schools: A descriptive analysis. *Education Evaluation and Policy Analysis*, 24(1), 37-6.
- Lee, V. & Burkham, D. (2002) *Inequality at the Starting Gate: Social Background Differences in Achievement as Children Begin School*. Washington, D.C.: Economic Policy Institute.
- Loeb, S., Darling-Hammond, L. & Luczak, J. (2005) How teaching conditions predict teacher turnover in California schools. *Peabody Journal of Education*, 80(3), 44-70.
- New Mexico Public Education Department (2012) 2012 data. Retrieved from <http://www.ped.state.nm.us/AssessmentAccountability/AcademicGrowth/NMSBA.html>
- New Mexico Effective Teaching Task Force (2011). *Report and Recommendations*, New Mexico Public Education Department.
- Milner, H. (2012). Beyond a Test Score: Explaining Opportunity Gaps in Educational Practice. *Journal Of Black Studies*, 43(6), 693-718.
- Peng, C., Lee, K., & Ingersoll, G. M. (2002). An Introduction to Logistic Regression Analysis and Reporting. *Journal Of Educational Research*, 96(1), 3.
- Peters, J. (2014). Education exodus: New Mexico teachers speak about why they're leaving the profession. *Santa Fe Reporter*.
- Pahl, M. & Courtney, J. (2012) Public Education Department- Promoting Effective Teaching in New Mexico. New Mexico Legislative Finance Committee, Report 12-12.
- Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How Teacher Turnover Harms Student Achievement. *American Educational Research Journal*, 50(1), 4-36. doi:10.3102/0002831212463813.
- Sass, D. A., Flores, B., Claeys, L., & Pérez, B. (2012). Identifying Personal and Contextual Factors that Contribute to Attrition Rates for Texas Public School Teachers. *Education Policy Analysis Archives*, 20(15), 1-25.
- Synar, E., & Maiden, J. (2012). A comprehensive model for estimating the

financial impact of teacher turnover. *Journal Of Education Finance*, (2), 130.

Southern Education Foundation (2013). A new majority: Low income students in the South and nation. Retrieved from <http://www.southerneducation.org/getattachment/0bc70ce1-d375-4ff6-8340-f9b3452ee088/A-New-Majority-Low-Income-Students-in-the-South-an.aspx>

U.S. Department of Agriculture (2014). New Mexico state fact sheet. *U.S. Department of Agriculture, Economic Research Service*. Retrieved from <http://www.ers.usda.gov/data-products/state-fact-sheets/state-data.aspx?StateFIPS=35&StateName=New%20Mexico#.U20fIS-VthM>

Weinberg, S.M.. & Mercer-Smith, R. (2012). Public Education Department

Teacher and Administrator Preparation in New Mexico. New Mexico Legislative Finance Committee. Report 12-3.

Weinberg, S.M & Pahl, M. (2012) Public Education Department- Developing

Early Literacy in New Mexico. New Mexico Legislative Finance Committee, Report 12-05