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The Relationship Between Colorado Teacher Salary and Colorado Teacher Turnover

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THE RELATIONSHIP BETWEEN COLORADO TEACHER SALARY AND COLORADO TEACHER TURNOVER

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ABSTRACT

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This secondary research study used quantitative research methods to gather and analyze statistical data on specific factors that have been demonstrated to impact teacher retention and assessed their relative importance in impacting teacher turnover. The data utilized for this study were peer-reviewed, publicly available, government data collected by the Colorado Department of Education. The time period examined in this study was the school years of 2015-2019. The study found teacher salary was a significant determinant of teacher retention in Colorado. When controlling for other potentially important factors, such as academic performance, English language learners, socioeconomic status, minority students, and setting of school district, the study found a $1,000 increase in teacher salary was associated with a .25% decrease in teacher turnover.

The study also found that teacher salary was more important for retaining teachers than other factors. Some factors that still had an impact on teacher turnover were socio-economic status of the student population, academic performance, and the region in Colorado in which a district was located.

The study's findings are important for policymakers and school administrators who are interested in reducing teacher turnover in Colorado. The study's findings suggested that increasing teacher salary was one way to reduce teacher turnover but districts should also consider other factors when developing strategies to retain teachers.

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INTRODUCTION

Hiring and retaining quality teachers has been an emphasis and goal of schools and school districts for years (Ingersoll, 2001; Tran & Smith, 2019; Wenders, 2016; Yaffe, 2016). Research has shown that retaining teachers within a school or school district provides benefits to students and the educational organization in that student achievement could increase (Hanushek et al., 2016; Ronfeldt et al., 2013) and there is less stress on the educational organization (Henry & Redding, 2018; Ingersoll, 2001; Ronfeldt et al., 2013). Furthermore, schools and school districts could incur financial savings by retaining quality teachers (Sutcher et al., 2019).

Research on teacher retention has focused on determining the various reasons why teachers leave their positions (Berry & Shields, 2017; Harris & Adams, 2007; Klimek, 2019; Yaffe, 2016). Using teacher surveys and questionnaires, the literature sought to determine how to slow down teacher turnover. However, to seek a viable solution to improve teacher retention and lower teacher turnover, it is important to understand the causes of teacher turnover, teacher salary and its history, and the current state of teacher reform movements (Brehm et al., 2017; Camps, 2018; Colson & Satterfield, 2018; Grissom & Strunk, 2012; Kelley & Odden, 1995; Prostik, 1995; Stinebrickner, 2001; Wenders, 2016). This chapter both defines and discusses the impact of a growing teacher shortage, teacher retention, the transformation of the teaching profession, and teacher compensation.

Teacher Shortage

Sutcher et al. (2019) defined a teacher shortage as "an inadequate quantity of qualified individuals willing to offer their services under prevailing wages and conditions" (p. 4). Recent headlines have highlighted the growing teacher shortage across the nation. Two articles highlighted the issues with a teacher shortage on a national level and at the state level in Colorado. Noonoo (2021) headlined "Is Teaching Still an Appealing Profession? A Growing Teacher Shortage Worries Experts," which highlighted the fading allure of the teaching profession. Breunlin (2021) addressed the teacher shortage in the state of Colorado in an article titled, "Colorado's Teacher Shortage May Worsen Coming Out of The Pandemic. Could $13M Stop the Trend?"; it focused on teachers leaving the profession because of the COVID-19 pandemic and a push to add funds to attract individuals to the profession. This cycle of teacher shortages began in 2008 due to the Great Recession and evidenced itself during the 2009–2014 school years when enrollments in teacher education dropped from 691,000 students to 451,000 students (Berry & Shields, 2017). This reduction of 240,000 teacher education students equated to a 35% reduction. As the number of individuals being trained to enter the profession lowered, K-12 student numbers are expected to increase by nearly three million students in 10 years (Berry & Shields, 2017). Not only are schools going to need to hire teachers in response to teachers leaving during the COVID-19 pandemic but they are looking at bringing back programs cut during the Great Recession (Sutcher et al., 2019).

Berry and Shields (2017) concluded there were four main reasons for the current shortage of teachers: (a) student enrollment was showing an upward trend, (b) failure to restore teacher positions cut during the Great Recession of 2008, (c) fewer individuals entering the teaching profession, and (d) the 8% rate of attrition of U.S. teachers. Despite the hope that this shortage

would be short-lived, Garcia and Weiss (2019) stated, “The teacher shortage problem is much more severe than previously recognized” (p. 3). Not only was there a shortage of qualified teachers but as the shortage grew, some teachers hired did not meet education, experience, and certification requirements.

Statistics showed shortages and staffing shortfalls in the following specific areas: science, technology, engineering, math, and special education (Cowan et al., 2016). Carver-Thomas and Darling-Hammond (2019) analyzed statistics that showed foreign language teachers had a predicted turnover rate of 20%, by far the highest of any content area. Special education teachers had the second-highest predicted turnover rate at 15.6%, followed closely by math and science teachers at 14.7% (Carver-Thomas & Darling-Hammond, 2019).

Cowan et al. (2016) also noted that teacher shortages were especially high in specific settings such as rural and disadvantaged schools. Floden (as cited in Martin & Mulvihill, 2016) agreed: “What we have is a mismatch of the particular openings and of the particular training and willingness of certified teachers” (p. 177). Disadvantaged schools are classified based on their Title I status. Overall, math and science teachers in Title I schools have a turnover rate 70% higher than those in non-Title I schools (Carver-Thomas & Darling-Hammond, 2017). In another study analyzing national and state data, Stockard and Lehman (2004) found that “teachers with low salaries and in rural areas may more actively seek out other employment” (p. 761). Rural school administrators often reported they had few, if any, quality applicants for many open positions on an annual basis. This difficulty in finding qualified applicants was due to their remote locations and generally higher percentages of underrepresented students that qualified for free and reduced lunch (Tran & Smith, 2019).

Even as the teacher shortage is now once again in the headlines (Breunlin, 2021; Noonoo, 2021), this is not a new phenomenon. In the 1990s, there was also a concern regarding the shortage of teachers. The National Commission on Teaching and America's Future's (NCTAF, 1996) report *What Matters Most: Teaching for America's Future* indicated that schools were experiencing shortages of qualified teachers in the areas of math, physics, chemistry, bilingual, and special education. The reasons stated for the growing shortage of qualified teachers included below-market wages, micromanagement of daily instruction, and the teaching position being treated as semiskilled workers (NCTAF, 1996). At the time, one method districts used to address the teacher shortage was to hire underqualified staff. Underqualified staff included those who had an emergency or substandard license, no college major or minor in the field, or were unlicensed (NCTAF, 1996)

To address teacher shortages in the 1990s and the impending expected future growth for teacher demand, NCTAF (1996) made the following recommendations to districts and the nation as a whole to increase the number of teachers and also the quality of teachers in the classroom: (a) improve teacher recruitment, (b) reinvent teacher preparation and professional development, (c) develop teacher mentoring programs, and (d) encourage and reward teacher knowledge and skill (Berry & Shields, 2017). To combat the trend of districts having low numbers of applicants to fill positions, NCTAF suggested rewarding teachers for their knowledge and skill. Many policymakers and educational leaders examined a variety of incentives to bring more qualified candidates to their districts. Examples of incentives for applicants included signing bonuses, subsidized housing, hiring spouses, and additional pay for hard-to-fill positions (Yaffe, 2016).

Teacher Retention

The need to continually hire new teachers is due to a constantly revolving door as teachers enter and leave their positions for a variety of reasons (Henry & Redding, 2018; Ingersoll, 2001; Ronfeldt et al., 2013; Sutcher et al., 2019). Retaining teachers in a school has a lasting impact on the organization (i.e., school and district) and students (Ronfeldt et al., 2013). To minimize the lasting impact on those in the organization and students, it is important that lowering teacher turnover is addressed (Henry & Redding, 2018). As an organization effectively addresses teacher turnover, it would be able to divert resources (i.e., time and money) to other programs and increase student achievement. The following section explores the impact of teacher retention on student achievement and the school organization. As the impact of teacher retention on the school system is understood, it helps to understand the importance of teacher retention to move the organization forward.

Impact on the School Organization

There are ripple effects on staff when teachers leave an organization. Henry and Redding (2018) referred to this as "staff instability" (p. 5). When teachers depart a school, they also take intangibles that have been cultivated and grown over time: institutional knowledge, curriculum knowledge, and norms and policies of the organization. Not only are the intangibles removed from the organization but so are collaborative relationships that have been built and fostered over time.

An additional impact on the organization caused by turnover is that of available resources. As schools need to hire and train new teachers, resources are taken away from current staff such as providing professional development, training, and other needs are shifted to new teacher training and onboarding (Shields et al., 1999). As teachers leave and positions must be

filled, replacing teachers is a costly proposition to the organization in already tight budget times. Nguyen (2020) estimated the cost to replace teachers in some districts is between $10,000 to $26,5000 per teacher who leaves.

Carver-Thomas and Darling-Hammond (2019) reviewed data of teacher turnover from 2011-2013 and found the teacher turnover rate to be 16% of all teachers who either moved within the profession or left the profession entirely. Of this 16%, there were four main categories of why teachers moved or left in order of greatest percentage to least: (a) voluntary movers (37%), (b) voluntary preretirement (30%), (c) retirement (18%), and (d) involuntary turnover (14%). Carver-Thomas and Darling-Hammond showed four main predictors of teacher turnover that played a significant role in teacher turnover: (a) school characteristics, (b) teacher characteristics, (c) subject area, and (d) workplace conditions. Of the various workplace conditions related to turnover, Carver-Thomas and Darling-Hammond determined that compensation, specifically the highest possible salary a teacher could receive, had a significant relationship to turnover.

Teacher turnover has many perceived negative outcomes but there is a positive outcome from teacher turnover. Research showed that less effective teachers were more likely to leave than more effective teachers (Hanushek & Rivkin, 2010; Ronfeldt et al., 2013). Teacher effectiveness was defined by the academic achievement and growth of their students (Hanushek & Rivkin, 2010). Stockard and Lehman (2004) highlighted losing those teachers with fewer skills as a positive outcome. Teachers who struggled in the classroom and lacked the skills to effectively teach students left the profession and made way for those who were better equipped to teach. When less skilled teachers leave the profession, some self-select their way out and voluntarily leave, whereas others are involuntarily asked to leave.

Impact on Student Achievement

The ability of teachers to teach students effectively while implementing school instructional programs has shown it impacts student achievement (Newman et al., 2001). As teacher turnover continues to increase in schools, students are affected the most. Schools employ new teachers but these new teachers lack the knowledge of the school's instructional programs (Abelson & Baysinger, 1984; Harmsen et al., 2018; Prilleltensky et al., 2016). Ronfeldt et al. (2013) conducted a quantitative study to analyze what direct impact teacher turnover had on student achievement. They concluded that "teacher turnover has a significant and negative impact on student achievement in both math and ELA" (p. 21). Ronfeldt et al. found students were directly impacted by teacher turnover. Additionally, Ronfeldt et al. determined that teachers who remained in the school were also impacted by teacher turnover within their building. This impact was directly related to grade-level teams in which there was a change in staff membership. The growth of students in a grade level within a school that had teachers leave declined more than that of students within a grade level that had no change to the grade level teams (Ronfeldt et al., 2013).

The Transformation of the Teaching Profession

To understand teacher turnover, it is important to understand the teaching profession and how it has evolved. Specifically, what are some of the current strains put on teachers that impact a decision to leave or stay in the profession? The 10th Amendment of the United States Constitution (Constitution of the United States, n.d.) reads, "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people" (n.p.). As the 10th Amendment states, if a power is not specifically addressed in the Constitution, it is up to each state to oversee and govern those areas.

Public education is one decentralized area left up to the states to administer (U.S. Department of Education, 2005). As public education is decentralized, each state oversees and administers public education in a slightly different way. Not only is there state oversight but local boards of education for school districts also provide local leadership (Fischel, 2006).

As each state administers and oversees public education, there are similarities and differences in public education across the country. For example, compulsory attendance ages vary by state; 30 states require up to age 16, nine states require up to age 17, and 11 states require up to age 18 (U.S. Department of Education, 2005).

Throughout early America, most Americans lived on farms. Due to the rural housing, most children walked to single-room school buildings that had one teacher for enrollment of between 10 to 50 students and ages ranged from 5 to 18. These one-room schools were often taught by a young adult who was only doing this temporarily until they achieved a different occupation. The one teacher usually taught the students in recitation groups. Instruction focused on the 3Rs (reading, writing, and arithmetic; Prostik, 1995). This was a skill-specific method of teaching in which students would memorize rules and recite them (Fischel, 2006).

It was not until around 1840 and later that urban schools began to switch to a graded system in which students were grouped in different rooms and provided age-appropriate lessons (Fischel, 2006). Rural schools began to follow this method by moving to age-graded schools around 1880. As students were grouped by grades, this allowed educators to utilize a systematic curriculum with textbooks that were appropriate for each age group. This curriculum focused on basic literacy, arithmetic skills, geography, and history, as well as teaching students how to be productive democratic citizens (Fischel, 2006; Public Broadcasting Service [PBS], 2022). It was

interesting to note how important improved rural roads were as they were able to bolster and create a more consolidated education movement in the early 20th century (Fischel, 2006).

As the education system and profession grew, so did the percentage of women who became teachers. In the early 20th century, nearly 75% of teachers in the United States were women. However, as women were an important aspect of the education system, many felt marginalized due to working conditions and lack of leadership opportunities (Holcomb, 2021; PBS, 2022). Although a National Teachers Association (2023) had previously been formed with the purpose to "unite . . . to advance the dignity, respectability and usefulness of their calling" (n.p.), the prominence of the unionized movement began to grow (Holcomb, 2021; PBS, 2022). The two prominent unions, still relevant today, are the National Education Association and the American Federation of Teachers. Through the help of unionization, the teaching profession was able to make positive changes including equal pay for women, better pensions, and teacher tenure (PBS, 2022).

The next major milestone that impacted teachers was the U.S. Supreme Court decision in Brown v. Board of Education (1954) that removed segregation in public education. The written opinion from the United States Supreme Court stated, "Separate educational facilities are inherently unequal" (Friedman, 2010, para. 6). This decision highlighted and magnified the roles schools played in the national civil rights movement and put teachers in the middle of a national movement (PBS, 2022).

The next milestone that impacted teachers was the report, *A Nation at Risk*, released by the National Commission on Excellence in Education in 1983. This report was monumental as it laid out very clearly what content should be required for all students as well as an increase in the rigor of standards taught in schools. The report also made recommendations for improving

teacher quality. Recommendations that were to impact the profession were higher standards for teacher-preparation programs, mentoring programs, and competitive salaries (Park, 2004).

The Teaching Profession in the Last Twenty Years

The swiftest changes impacting the teaching profession today happened in the 21st century. The teaching profession has quickly evolved during the last 22 years with even more pressure being put on teachers to succeed. A major pressure point was in 2010 when a set of common core state standards was released followed by next generation science standards in 2013 (James, 2022). These standards were to align K-12 education across the United States and were adopted by 46 states. However, after adoption, controversy followed and 20 states either revised or renamed them so they were not truly a national standard (Will, 2019).

With a movement to create unified standards came a push to implement aligned student assessments (DeLuca & Bellara, 2013; James, 2022). States implemented standardized exams that were single, one-shot assessments to provide a picture of each student's progress and, collectively, the schools. Even with these one-shot assessments, teachers had to implement authentic assessments in their classrooms. Authentic assessments look at actual performance through assignments or complex tasks—not a one-shot assessment (Villarroel et al., 2018). Teachers must regularly balance their instruction and preparation for the two types of assessments (PBS, 2022).

With an increased emphasis on assessment, teacher evaluation systems drastically changed to incorporate student test scores (Will, 2019). In 2009, President Barack Obama signed into law the American Recovery and Reinvestment Act of 2009 that included funding for Race to the Top, a competitive grant program to allow states to innovate education (Howell, 2015). A key factor in receiving a portion of the competitive funding was to implement a new teacher

evaluation system that included student test scores as part of the process (Howell, 2015). As the federal incentives ended, many states also ended or adjusted their evaluation reforms contingent on receiving funding (Will, 2019).

Perhaps one of the most still pressing changes that have impacted teachers over the last 15 years is that of the mental health of students. Suicide rates for teens have nearly tripled over 10 years and depression has become increasingly common among teenagers (Will, 2019). With this increase, there has been an added increase and pressure to include social and emotional learning in public education. Social and emotional learning can be understood as

> the processes through which children and adults acquire and apply the knowledge, attitudes, and skills necessary to manage their emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. (Mahoney et al., 2018)

Berman et al. (2018) stated, “Schools play a central role in fostering healthy social, emotional, and academic development” (p. 5). For schools to have success in implementing this learning, they need consistent implementation, modeling, and relevant professional development for school staff. This professional development and understanding of social and emotional learning is vitally important due to the fact it is something seldom integrated into teacher preparation programs (Berman et al., 2018).

Teacher Compensation

As Carver-Thomas and Darling-Hammond (2019) demonstrated, the amount of potential earnings for a teacher plays a significant role in determining if the teacher would remain in their profession. This financial investment plays an important role in both retaining current teachers

and recruiting potential teachers. When employees are compensated with a significant financial investment, it creates a sense of value and respect (Tran & Smith, 2019).

Teacher salaries play a vital role in student success. Jackson et al. (2016) determined that when a school district has a higher teacher salary that might attract and retain highly qualified teachers, student outcomes improved. Teachers have the important role of educating all the youth who are the future of society. Without teachers, many students might never learn the vital skills and knowledge needed to be productive and participating citizens in society. However, many teachers felt as if they were underpaid for the valuable work they performed daily (Santoro & Morehouse, 2011; Tran & Smith, 2019). To understand what kind of incentives or adjustments might be made to help remedy the developing teacher shortage, it is important to understand the history of teacher salaries in the United States and how teacher compensation evolved into what it is today.

History of Teacher Compensation:
Boarding ‘Round

During the late 1800s, more than 77% of Americans lived in rural areas (Prostik, 1995). As many Americans were living in rural areas, “the rural one-room schoolhouse was the American public-school norm throughout most of the nineteenth century” (Prostik, 1995, p. 2). Most teachers were young, single women and did not view, nor was it expected, that teaching resulted in a career. In actuality, the view of the job for women was simply a stage in their life. “For women, a job in teaching acted as a transition from the parent's home to the husband’s home. . . . In fact, once married, most areas prohibited women from working in the classroom” (Prostik, 1995, p. 3). Due to the turnover of teachers and the transient nature of the job, wages were low. However, room and board were provided as part of compensation in rural areas. The room and board were not, in today’s terms, a place to stay (pseudo-permanently) and food.

Prostik (1995) described the situation: “Teachers frequently ‘boarded ‘round’ at the homes of pupil’s parents. Each week, the teacher would move into another student’s house and be provided room and board as part of their pay” (p. 5).

Like any compensation system, the boarding ‘round system had clear advantages and disadvantages. Kelley and Odden (1995) shared, “The ‘Boarding Round’ pay system was a strong incentive for teachers to maintain positive relations with community members and to maintain a high moral character. It also reflected the barter economy of the time” (p. 2). Another advantage of staying in the homes of students was it provided parents an opportunity to frequently interact with the teacher and gauge the quality of the teacher (Prostik, 1995). Eventually, boarding ‘round was phased out due to the fact the system provided very little stability and financial security for the teacher. The constant moving from house to house each week and having the community know the teacher’s private life was not ideal (Prostik, 1995). Prostik (1995) summed up the demise of this payment system by explaining, “In the end, the boarding ‘round pay system petered out under the forces of demographic change and education reformers’ will” (p. 6).

As many demands were being placed on education and changes were pushed by education reformers, a systemic overhaul of teacher compensation was needed. Kelley and Odden (1995) explained this change: “The Boarding Round system was replaced by a position-based salary system that reflected the new form of teacher work, the cash basis of the economy, and increased pre-service education requirements” (p. 2). As the teaching profession changed with an increase in demand and time for teachers, it brought about a differentiated salary schedule within education (Prostik, 1995).

History of Teacher Compensation: Differentiated Salary Schedule

The teacher compensation model that developed in the late 1800s and early 1900s became known as a differentiated salary schedule. The differentiated salary schedule was based on a variety of factors. As Prostik (1995) explained, "Teachers were paid based on their years of experience, gender, race, and the grade level that they taught" (p. 8). The many factors that influenced a variety of salary schedules provided some relative equity and individuals knew what their earning potential was and how it compared to others. The creation of differentiated salary schedules had a positive impact on teacher turnover as most teachers remained in their positions for over 10 years (Prostik, 1995). Another advantage of the differentiated salary schedules was that districts were able to keep costs under control as they knew how much each individual would make and how much they could potentially make when budget planning (Prostik, 1995).

Even with the advantages, the obvious disadvantage was different pay for different individuals for similar or, in some cases, the same work. This pay differential impacted the work environment as it fostered resentment and a sense of inequality (Prostik, 1995). As the disadvantages outweighed the advantages, it was replaced by a single salary schedule. Prostik (1995) explained that the main reason for this change was "an increasingly assertive female workforce [who] demanded higher salaries under the principle 'equal pay for equal work,' eventually leading schools toward today's single salary schedule" (p. 10).

The Single Salary Schedule

The single salary schedule compensation system provided a way in which all teachers were paid the same regardless of any other factor (Wenders, 2016). Prostik (1995) defined the single salary schedule as a system in which "pay level was determined solely by a teacher's years

of experience and level of academic preparation" (p. 11). The first single salary schedules for teachers were introduced in Denver, Colorado and Des Moines, Iowa in 1921 (Prostik, 1995). Kelley and Odden (1995) explained that even though there was a single-salary schedule, not everyone was paid the same amount: "Differentials were provided based on the objective measures of years of experience, educational units, and educational degrees" (p. 2). To provide compensation for individuals who remained in the profession and took the time to improve themselves professionally, it was an added layer to the salary schedule.

The single salary schedule and step and lane model were utilized in 2012 by 92% of school districts in the United States (Grissom & Strunk, 2012). One perceived major drawback of the single salary schedule was all teachers were paid equally based on years of employment and education. The traditional salary schedule provided a pre-determined salary increase for all teachers based on a published salary schedule (Colson & Satterfield, 2018).

This equal pay system also allowed school districts to create a sustainable budget in a time of limited resources. The Great Recession that began in 2008 severely impacted state budgets as 34 states cut their K-12 budget by the 2011-12 school year (Nelson & Balu, 2014). As budgets were being slashed, districts were faced with decisions on whether to cut spending in salary or other areas (Dzigbede, 2020). With a uniform salary structure generally in place, districts knew the impact on their budgets relatively easily.

Steps and Lanes

As the single salary schedule has been implemented over time since the early 1900s, there has been a great deal of focus on steps and lanes by both administration and teachers. The steps and lanes are the mechanisms for individuals to increase their salary. In most salary schedules, the steps are simply years of experience. Each year an individual remains with their

school district, they move up a step until they eventually cannot move any more steps or receive any further compensation (Bowen & Mills, 2017). Maxing out means they simply have no more steps to go up to gain a pay raise.

Lanes are usually associated with the education a teacher receives outside of their current job. Columns, in a table format, list the lanes and could vary from school district to school district but most are based on educational units. Some examples of educational units in lanes are 15 additional college credits, 30 additional college credits, a master's degree, a master's degree plus 15 additional college credits, and a master's degree plus 30 additional college credits. As the teacher gained more education and moved from lane to lane, each lane signified a percentage or specific dollar increase in their salary. Grissom and Strunk (2012) explained the rationalization of the lane movement: "Districts gain by rewarding characteristics most closely associated with teacher effectiveness, since such rewards provide a means of attracting and retaining teachers with those characteristics" (p. 666). Grissom and Strunk found the characteristics rewarded on a traditional salary schedule were linked to increasing teacher performance as well. The step and lane salary schedule provided a simple way for a school district to budget for salary increases.

Each year of service provided an additional raise; however, this push to reward and recruit higher degrees provided a false sense of increased success. Research suggested there appeared to be no substantial gains in teacher effectiveness beyond years four or five of a teaching career (Grissom & Strunk, 2012); furthermore, research showed little or no evidence that advanced degrees of teachers increased student achievement (Rivkin et al., 2005). Grissom and Strunk (2012) pointed out, "Despite the returns to education that are standard in the single salary schedule, substantial evidence exists that attainment of postbaccalaureate degree credits or

master's degrees has little bearing on teacher effectiveness." (p. 666). Ladd and Sorensen (2015) showed that simply obtaining a higher education did not make a teacher better. Master's degrees in math and science were shown to impact student achievement but nearly 90% of master's degrees in education programs did not show the same impact that math and science degrees did (Roza & Miller, 2009). Therefore, earning of additional degrees and coursework were ways to simply bolster one's salary while remaining at the same level of impacting student learning. Prostik (1995) shared why this incentive was provided to start with: "In states where teachers must update their licenses by taking additional courses, the salary increase received by moving to the right on the schedule may simply cover their education expenses" (p. 13).

There was conflicting evidence as to whether the step and lane salary schedule benefited teacher performance and student outcomes. One reason for the simple formula of a designated raise each year of service for teachers was the presence of teachers' unions. Teachers' unions are generally comprised of veteran teachers and, therefore, they usually focus on the needs of their constituents versus the needs of incoming teachers. As power is exercised by veteran teachers within the teachers' unions, emphasis and focus are on providing higher salaries and percentages of raises at the end of a career (Grissom & Strunk, 2012). The step and lane schedule creates a simple process for a potential teacher to know what their future salary would be when applying for and accepting a position. The teacher and the district simply look at their years in the field and level of education and place them accordingly on the salary schedule. Just as there is support from teachers' unions for the steps and lanes model, non-union individuals suggest, with everything being equal, a teacher considered ineffective would earn the same salary as an effective teacher with no differentiation in salary (Bowen & Mills, 2017). This leaves

administrators with little ability to adjust a teacher's salary with reward or incentive pay during recruitment (Bowen & Mills, 2017).

Variants to the Single Salary Schedule and Incentives

Salary and benefits constitute most school and district spending (Hanushek, 2015). The single-salary schedule has been the mainstay of teacher compensation for most of the 20th and 21st centuries, and policymakers have begun questioning whether it is the best model in terms of validity of purpose. With a shrinking number of teachers entering the profession and the many career teachers poised to retire, an extreme shortage of qualified teachers is expected. Hanushek (2007) described the key problem of relying on a single-salary schedule: "The traditional teacher salary scheme only rewards experience and the possession of advanced education degrees… neither of these, except initial experience levels, has been shown to be consistently related to student performance" (p. 581). Wenders (2016) described the traditional salary structure as a policy that could not be designed any worse for attracting and retaining quality talent. The single-salary schedule also made it difficult to hire specialists for difficult-to-fill positions (Murnane & Olsen, 1989).

During the 1980s, the *A Nation at Risk* (National Commission on Excellence in Education, 1983) report examined the creation and implementation of performance-based pay systems based on student achievement. Notably, similar programs were unsuccessful in raising student achievement and were disliked by many in the teaching profession (Prostik, 1995). The traditional salary schedule impacted effective and ineffective teachers equally as pay was not related to either's performance so there was no link between student achievement and salary (Colson & Satterfield, 2018).

Apart from the single-salary system, a variety of teacher compensation programs exist (Bowen & Mills, 2017; Colson & Satterfield, 2018; Dee & Wyckoff, 2015; Fuller et al., 2016; Hendricks, 2015; Kozlowski & Lauen, 2019; Pham et al., 2021). The thought behind introducing a merit-pay salary program, for example, was that as it sought to promote higher-measured student achievement, it would motivate teachers with monetary incentives (Brehm et al., 2017) and attract and retain higher-quality teachers to the profession (Bowen & Mills, 2017). When Brehm et al. (2017) and Colson and Satterfield (2018) reviewed merit-pay salary programs, they did not find the results they hoped for by implementing them. Brehm et al. found that in Houston, Texas, as teachers neared the award cutoff, efforts increased. Afterward, they decreased, resulting in an overall flattening of the performance improvement curves. Similarly, Colson and Satterfield found that strategic compensation plans resulted in student achievement levels equal to those of cheaper contemporary plans.

Another performance-based salary model utilized teacher evaluations as performance measures in place of student achievement scores. Stinebrickner (2001) described the obvious issue that many teacher evaluations were based on subjective measures, which could be an unfair portion of the merit pay process. Notably, teacher compensation based on student performance necessitated more flexible budgets to accommodate one-time cash flows. Most districts relied on grants to fund such programs initially and educators' unions influenced the adoption and implementation of such programs (Grissom & Strunk, 2012). Hence, despite getting locked into program obligations, they tended to run out of money after a few years.

Some researchers and policymakers argued that teachers entered the profession for altruistic reasons; thus, incentivizing success eroded their intrinsic motivations (Bowen & Mills, 2017; Firestone, 2014; Kozlowski & Lauen, 2019). Another argument against merit and

performance-based pay strategies stated they dehumanized teachers and cast them as interchangeable parts (Fuller et al., 2016). On the other hand, several scholars found advantages in using incentives to raise student achievement scores (Bowen & Mills, 2017; Firestone, 2014; Hanushek, 2015). It was found that teachers willing to embrace performance-based pay were generally more risk-tolerant; hence, incentives might create an influx of new, beneficial workforce personalities (Bowen & Mills, 2017). Pham et al. (2021) found merit pay, in some instances, had a positive and significant impact on test scores, especially with respect to math. In contrast to Pham et al., Brehm et al. (2017) and Colson and Satterfield (2018) found gains were minimal or short-lived.

Frontloaded salary schedules have gained popularity in recent years (Grissom & Strunk, 2012; Hendricks, 2015). Grissom and Strunk (2012) defined frontloading as "giving larger raises early in a teacher's career and smaller raises later" (p. 665). The rationale was twofold: attract and retain quality teachers and reward those with the most significant performance gains over time. Hendricks (2015) concurred with this option, finding that increasing salaries for novice teachers over those of established teachers increased retention. Notably, front-loaded salary schedules were found to attract and retain quality (Grissom & Strunk, 2012) as they allowed teachers to weigh their options about competitive salaries vs. challenging education scenarios. Significant raises provided early in a teacher's career further incentivized them to stay in the field past the first four to five years along the steepest slope of the experience vs. attrition curve (Grissom & Strunk, 2012). Those who endured this period tended to stay in the profession until retirement age.

Many states permit formal or informal bargaining between district representatives and teachers' associations and unions (Grissom & Strunk, 2012). Owing to the inherent difficulty of

modifying teacher salary schedules, districts have begun to consider both salary and non-salary options such as loan forgiveness programs, signing bonuses, and retention bonuses (Grissom & Strunk, 2012).

Colorado Data

In 2017, the Colorado State Legislature passed Colorado House Bill 17-1003 titled *Strategic Plan to Address Teacher Shortages*. This bill was created due to a 24.4% decline in individuals completing educator preparation programs in Colorado colleges and universities since the 2010-2011 academic year. To address this issue, the bill required the Department of Higher Education to examine the recruitment, preparation, and retention of teachers. As part of the examination process, the Colorado Department of Education (CDE, 2023) administered a survey and released the results, in which 81% of responding urban/suburban districts reported fewer initial or professionally licensed candidates applying for positions. The percentage was even higher for rural/small districts with 85% reporting fewer applicants (CDE, 2023). Once the examination was complete, a strategic plan was created to address teacher shortages.

Since 1990, when utilizing constant dollars, teacher salaries have remained on the decline. The average difference in teacher salary from 2016-17, when compared to 1989-90, was a decline of 1.7% nationally (Carver-Thomas & Darling-Hammond, 2019). In fact, between 1989-1990 to 2016-2017 school years, Colorado declined in teacher salary more than 10% (Sutcher et al., 2019). Not only has Colorado declined in average teacher salary when using constant dollars but Colorado currently ranks 25th nationally with an average annual salary of $57,706 per teacher according to the National Education Association (NEA, 2021).

For veteran teachers, even though the average teacher salary is on par with the United States national average, it is a different story for first-year teachers. The same NEA (2021) report

ranked Colorado 48th in the United States for average starting salary for teachers. Stockard and Lehman (2004) showed that teachers who left the profession did so at the beginning of their careers so the average starting salary was a concern for new teachers.

With Colorado school districts falling so low on the teacher salary schedule spectrum, examining teacher salary and teacher turnover in Colorado is important for policymakers to make an informed decision on where to prioritize their resources. Garcia and Weiss (2019) emphatically summarized, "Low teacher pay is reducing the attractiveness of teaching jobs" (p. 11). The results of this study might cause a reprioritization of resources for Colorado school districts with higher turnover in which decreasing teacher turnover is a priority.

Moving forward, it is important to understand the following factor: what role does teacher compensation play in teacher shortages? As the research shows, compensation, specifically teacher salaries, could play a role in relieving the teacher shortage overall (Hendricks, 2015; Ingersoll, 2001) so understanding teacher compensation and the impact compensation has on teacher turnover is key to eventually finding a viable solution for retaining hiring quality educators.

Purpose of the Study

The challenge of retaining teachers and reaping the benefits in student performance is increasingly difficult as teachers switch schools or leave the profession entirely (Carver-Thomas & Darling-Hammond, 2017). Educational leaders are continually challenged with limited resources and how to best allocate those resources (Colson & Satterfield, 2018; Strunk & Marianno, 2019; Tran & Smith, 2019). Evaluating the educational landscape and teacher turnover could provide insights into the state and national policies that might lead to teacher shortages. The literature review contained in Chapter II identifies factors that impact teacher

turnover. The purpose of this study was to evaluate the impact of teacher salary on teacher turnover after controlling for other important factors. The results of this study might help provide educational leaders with data to help develop a teacher retention strategy.

Research Question

This study was guided by the following research question:

Q1 How does teacher salary impact teacher retention in the state of Colorado when controlling for other potentially important factors, including academic performance, English Language Learners, socioeconomic status, minority students, and the setting of the school district?

Definition of Terms

Throughout this study, the following terms were utilized and are defined as follows:

Academic Performance: Many measurements are used to measure academic growth and achievement. For this study, academic performance was measured by the percentage of total points earned on the Colorado district performance framework.

English Language Learners (ELL): A student who is a non-native English speaker. This study utilized the percentage of all students within the district identified as ELL as defined by federal guidelines.

Free and Reduced Lunch (FRL) Status: Free and reduced lunch status is utilized as an indicator of children in poverty. To qualify for free or reduced lunch, an individual or family must apply and then be approved based on federal guidelines. For this study, the total percentage of students within a district that meets the federal guidelines was utilized as a measurement of socioeconomic status.

Minority Students: The percentage of students of the total school population who are considered minorities—the non-dominant group. For this study, minority students were all students who are non-White and non-Asian.

Salary: Fixed compensation paid regularly for services (Merriam-Webster, n.d.).

Type of District: The CDE (2022) defines districts as one of the following types: metro, outlying city, urban-suburban, outlying town, and remote.

Turnover Rate: The number of people who left their position divided by the prior year's headcount (CDE, 2023).

Summary

Teacher turnover continues to increase and has a direct impact on student achievement (Grissom & Strunk, 2012; Ronfeldt et al., 2013). A key contributing factor to teacher turnover is compensation, specifically teacher salary (Carver-Thomas & Darling-Hammond, 2019; Imazeki, 2005; Kain et al., 2004; Stinebrickner, 2001). It is important to draw upon previous research on factors impacting teacher turnover so the role teacher salary plays in the impact of teacher retention can be statistically analyzed. Analyzing teacher turnover with a view of how it is impacted by compensation and other factors provide an avenue to further address means to lower teacher turnover.

CHAPTER II

LITERATURE REVIEW

The factors leading to teacher turnover are examined in this literature review. As discussed in Chapter I, teacher turnover impacts schools and their districts in many ways. This literature review examines factors that have been demonstrated to impact teacher turnover. The main factors affecting teacher turnover must be understood so teacher turnover can be adequately addressed.

Factors Impacting Teacher Turnover

Research has shown that many interwoven factors impact teacher turnover. The analysis by Kain et al. (2004) disentangled several factors that affect teachers' decisions to change districts: low achievement scores, student demographics (e.g., minority groups and socio-economic status), and salary. These factors are most relevant to the current study. Gaining a deeper understanding of how these factors impact teacher turnover is key for districts in developing effective retention policies.

Teacher Compensation

Relevant literature indicated that teacher salary is linked to teacher turnover. Imazeki (2005) and Kain et al. (2004) tested this hypothesis in Wisconsin and Texas, respectively, finding that teachers were more likely to remain in their positions if they were afforded salary increases. These studies concluded that by raising salaries, teacher turnover could be lowered.

To determine how compensation could attract more qualified candidates to the teaching profession, multiple studies examined ways to not only attract candidates but also retain them for

longer periods. Stinebrickner (2001) and Jackson et al. (2016) found that simply increasing overall salaries increased the candidate pool, which would allow districts to determine the best candidates for each position. Rickman et al. (2017) confirmed these findings and added that states would retain high-quality teachers if they offered higher salaries, especially in the hard-to-fill areas of math, science, and computers.

Notably, when teachers face changing life circumstances, they often realize their salaries cannot sustain their needs. Garcia et al. (2009) found a clear example in Texas after examining teacher salaries and turnover rates. Kozlowski and Lauen (2019) found 14% of teachers quit their profession when they found they could no longer support their families on their salaries. Similarly, both Griffith (2016) in an Education Commission of the States report and a study conducted by Gilpin (2011) found teacher salaries did not compete with similarly educated workers outside the teaching profession. Hence, many teachers were attracted to the higher potential income outside of teaching.

Benefits are another aspect of teacher recruitment and retention. The availability and affordability of health insurance, retirement programs, vacations, and other benefits are vital attractors. However, Tran and Smith (2019) found that focusing on improved benefits packages was insufficient for retention. They discovered that improving salaries was more influential, especially in rural areas and hard-to-staff subject areas. Interestingly, Harris and Adams (2007) argued that teachers tended to retire earlier than other professionals due to pension programs.

As schools and districts look to decrease teacher attrition with salary increases, they are thwarted by a lack of federal and state funding. Districts operate on very limited budgets with only slight annual increases, usually tied to state law and inflation. Most districts rely on property taxes to fund school activities in which nearly 80% of the budget comprises salaries and

benefits (Camps, 2018). Imazeki (2005) explained, “Finally, while there is abundant evidence that increasing salaries can help retain teachers, the political reality is that the funding for such increases is limited” (p. 448). School districts tend to have great difficulty obtaining sufficient operational and maintenance funds; hence, during unforeseen budget crises, the first thing often sacrificed is teacher salaries (Dzigbede, 2020).

School Setting and Type

Notably, the school setting (e.g., geography, crime rate, and affluence) is known to affect teacher recruitment and retention. Based on National Center for Education statistics, Sorensen and Ladd (2020) classified community types as urban, suburban/town, or rural. Colorado schools are classified as Denver metro, urban-suburban, outlying city, outlying town, or remote. Multiple studies have shown that the school setting influenced how long teachers stayed at the school and/or its district (Fuller et al., 2016; Newton et al., 2018; Tran & Smith, 2019; Turner & Spain, 2020). The setting also played a role in the recruitment of teachers. Rural and urban settings seemed to suffer the most in this regard (Tran & Smith, 2019; Turner & Spain, 2020). These settings were notably considered to be opposite in the context of many attributes. The CDE (2022) utilizes two categories for urban: Denver metro and urban-suburban. The CDE defines Denver metro as “districts located within the Denver-Boulder standard metropolitan statistical area which compete economically for the same staff pool and reflect the regional economy of the area” and defines an urban-suburban setting as “districts which comprise the state’s major population centers outside of the Denver metropolitan area and their immediate surrounding suburbs” (p. 1). The CDE does not use the term rural but uses ‘outlying town’ defined as “districts in which most pupils live in population centers in excess of 1,000 persons but less than seven thousand persons,” and ‘outlying city’ as “districts in which most pupils live in population

centers of seven thousand persons but less than thirty thousand persons" (p. 1). Notably, urban districts have a more difficult time with teacher retention than rural districts (Sorensen & Ladd, 2020).

Urban school systems also struggle to advance students based on academic success. However, in large metropolitan settings, there is often a push to ensure rapid advancement. Hence, policy experimentation in these settings is commonplace. Unfortunately, policy changes are known to negatively affect teacher recruitment and retention (Turner & Spain, 2020). For instance, the long-term policy of No Child Left Behind, as researched by Wronowski (2021), produced a sense of demoralization among teachers as they felt a sense of loss of autonomy in their classrooms.

In contrast, rural schools are often located in isolated areas and contain smaller numbers of students. Teachers, especially younger ones, tend to face difficulties adjusting to this type of setting. Tran and Smith (2019) noted that the most attractive starting salary for teachers in a rural setting was $47,606. This turned out to be an exceptional result as rural districts are generally smaller and poorer.

All types of school settings contain observable and unobservable characteristics that could impact turnover (Newton et al., 2018). An interesting unobservable characteristic is the school's socio-organizational cohesion. Fuller et al. (2016) found that if teachers perceived strong organizational cohesion with which they could connect, they were likely to stay longer. On the other hand, an easily observable characteristic is crowding. Newton et al. (2018) found that in the Los Angeles Unified School District, the more crowded the school, the greater the teacher turnover.

Another influential setting is the school level (i.e., elementary or secondary). Generally, high school teachers remain at their schools for shorter periods than those in elementary schools (Carver-Thomas & Darling-Hammond, 2017; Murnane & Olsen, 1989; Newton et al., 2018). However, compared with elementary school teachers, secondary school teachers' chances of staying are greater (Newton et al., 2018).

Student Achievement

Within the educational landscape, there has been a push to advance student achievement based on standardized testing results (Hanushek et al., 2016; Loeb et al., 2005; Ryan et al., 2017; Sun et al., 2017). This began with *A Nation at Risk* (National Commission on Excellence in Education, 1983) and was continued with the No Child Left Behind Act of 2001 (Sun et al., 2017). With the push for state and national accountability through standardized assessment, teacher turnover has increased (Newton et al., 2018; Ryan et al., 2017; Sun et al., 2017). It was interesting to note that with the implementation of the No Child Left Behind Act of 2001, Sun et al. (2017) found it impacted involuntary mobility, meaning some teachers were forced to transfer or resign, increasing by 111%, but it had no impact on voluntary attrition. The findings of Ryan et al. (2017) agreed, showing that accountability systems affected teacher turnover as high-stakes testing led to higher stress, which then led to attrition across the board. Newton et al. (2018) agreed with Ryan et al. when they concluded that the achievement level of students at a school was a statistical predictor of teacher turnover at both the elementary and secondary levels.

With the high availability of student achievement data, studies found that schools with overall lower testing scores attracted teachers the least (Hanushek et al., 2016; Holme et al., 2017; Newton et al., 2018). This was not surprising as high stakes testing requirements create disincentives for teachers in these areas. Test-based accountability systems are becoming more

and more common. These test-based accountability systems both punish and reward teachers based on student test scores (Ryan et al., 2017).

The appropriateness of teacher-administered tests was on the radar for quite some time before 2017 (Ryan et al., 2017). In 2005, Loeb et al. found test appropriateness was a strong predictor of teacher turnover. In areas where students were showing low achievement levels, it could take a toll on a teacher. In many low-achieving schools, students tended to suffer from low intrinsic motivation, exacerbated by conditions that promoted inappropriate behaviors. This further contributed to teacher burnout (Newton et al., 2018).

Apart from standardized testing scores, it is important to comprehend the impact of teachers on students regarding their academic and personal growth (Chetty et al., 2014). Depending on their character, teachers tend to have strong positive or negative influences on their students, even later in life. When teachers lack incentives that match the importance of their jobs and roles, poor outcomes should be expected (Rickman et al., 2017). Furthermore, when teachers leave their jobs frequently, the lack of consistency in students' classroom lives is known to have detrimental effects, even at home (Hanushek et al., 2016).

When analyzing interstate student academic success concerning teacher experience and pay related to longevity, Grissom and Strunk (2012) found that as teachers were paid more for greater experience, more students scored below the basic benchmarks on standardized reading and math assessments. This determination contradicted several extant findings, including the one by Rickman et al. (2017), who found that lower incentives led to lower outcomes. Grissom and Strunk further surmised that districts that frontloaded teacher salaries enjoyed better student achievement.

Student Demographics

Student demographics are also known to affect teacher turnover (Gilpin, 2011, 2012; Holme et al., 2017; Loeb et al., 2005; Newton et al., 2018; Sorensen & Ladd, 2020; Sun et al., 2017). Student demographics were widely reported and key attributes included ELL, minority status, and poverty level. Newton et al. (2018) related these attributes to teacher turnover when their results showed a relationship between school academic climate and teacher turnover.

Schools that enrolled larger populations of poverty-level students consistently had higher rates of teacher turnover (Gilpin, 2011; Sorensen & Ladd, 2020). Gilpin (2011) also found that with a 75% total student poverty level within a school, teacher turnover increased by 5%. With teachers leaving at a higher rate on an annual basis, these schools experienced cyclic chronic turnover rates (Holme et al., 2017).

When a school showed an increase of at least 20% in ELL students, there was an 8% increase in experienced teachers leaving (Gilpin, 2011; Loeb et al., 2005). Higher percentages of ELL students were found to nearly double the likelihood of predicting teacher turnover (Loeb et al., 2005). As teachers left schools with an increased population of ELL students, this created positions that were more likely to go unfilled (Carver-Thomas & Darling-Hammond, 2017).

The Colorado Landscape

An analysis of Colorado state funding to school districts by Gaulden and Gamm (2022) found that over the last 14 years, while state funding to school districts increased by 47%, the average teacher salary over that same period only increased by 27%. Over that same 14-year period, it was determined that funding going to school districts was less used on instruction (down 45.4% in 2011 to 39.1% in 2021) and more on administration (Gaulden & Gamm, 2022).

Since the year 2000, the number of school administrators increased by 132% while public school students increased by 25% (Gaulden & Gamm, 2022).

While teacher salaries have grown in Colorado over time, the price of a home in Colorado increased at an even greater rate. In 2021, there was an average increase of 20% for a single-family home (Berdie et al., 2022). The Keystone Policy Center (Berdie et al., 2022) analyzed home prices compared to average teacher salaries in Colorado and determined that less than 20% of homes in the state were valued at a price that was affordable for teachers earning the average salary in the school district where the home was located.

Over time, the percentage of housing that is affordable in Colorado, even broken down by nine regions, has significantly declined since 2015; however, from 2007 to 2015, there was an increase in affordable housing before the decrease since 2015 (Berdie et al., 2022). Only three regions in Colorado have over 60% of housing valued at a rate a teacher on an average salary could afford: San Luis Valley, Pueblo and Raton Basin, and the Eastern Plains (Berdie et al., 2022). Four regions have less than 15% of housing affordable for an average salary: Colorado Springs, Northern, Metro Denver, and Mountain (Berdie et al., 2022).

The report, *Teacher Retention, Mobility, and Attrition in Colorado, Missouri, Nebraska, and South Dakota*, prepared by the Institute of Education Science (Meyer et al., 2019), examined teacher turnover in Colorado, Missouri, Nebraska, and South Dakota over two years. This report determined that Colorado had the lowest percentage of teachers who stayed in their teaching position at 78.5%. All other states were above 82% with Nebraska being the highest at 85.9%. Additionally, this analysis found the percentage of stayers in rural schools at 83% was almost identical to nonrural schools at 82% for the entire study. This nearly identically percentage showed that for the period of analysis, the setting of the school did not make an impact on

teacher retention. However, Colorado was an anomaly in that it had the greatest difference between rural schools (80.7%) and nonrural schools (78.7%) with a 2% difference as all other states had a less than one percentage point difference.

An Agenda for Research

Given that teacher turnover has had a direct impact on schools' educational goals and focus areas over the past 10 years, Colorado has ranked in the bottom 50% of the average teacher salary in the United States (NEA, 2021; Rickman et al., 2017). Rickman et al. (2017) examined and ranked average teacher salaries in each state using adjusted and unadjusted methods. This adjusted rate examined factors that might impact teacher salary including teacher characteristics, cost of living, natural amenities, and setting. During the 2009–2011 school years (Rickman et al., 2017), Colorado ranked 24th in unadjusted teacher salaries. However, after examining the fully adjusted salary, the state ranked 46th. A similar analysis of teacher compensation was conducted by Carver-Thomas and Patrick (2022) utilizing 2019–2020 teacher salary data. The average annual starting salary in the United States at the time was $41,163, with Colorado ranked 47th at $35,292. When adjusting for the cost of living, Colorado was ranked 50th at $34,297.

According to a NEA (2021) dataset using unadjusted figures, Colorado ranked 31st in the 2016–2017 school year, 32nd in 2017–2018, and 26th in 2018–2019. Thus, Colorado has remained stagnant since the 2009–2011 report by Rickman et al. (2017) As policymakers and educational leaders attempt to maximize the use of tax funds, it is vital to understand the impacts of modifying teacher salaries and to strive to address each aspect according to its effects on turnover. The answer to the following research question could determine if adjusting teacher salary in Colorado might decrease teacher turnover and provide more consistency in schools across Colorado:

Q1 How does teacher salary impact teacher retention in the state of Colorado when controlling for other potentially important factors, including academic performance, English Language Learners, socioeconomic status, minority students, and the setting of the school district?

Previous Research Methods

To analyze teacher turnover, several methods exist. For example, an empirical quantitative study was conducted by Ladd (2011) who utilized statewide survey data from North Carolina to measure teachers' perceptions of working conditions and the impact on their desire to stay or leave. In that study, the teacher work environment was found to be affected by student demographics, working conditions, leadership, teacher empowerment, and levels of collaboration. The salary was omitted because "adjusting the salaries for cost-of-living differences would likeliest reduce the variation even further, rendering it minuscule" (Ladd, 2011, p. 245). The findings showed that "teachers' perceptions of working conditions at the school level are highly predictive of an individual teacher's intentions to leave the school" (Ladd, 2011, p. 251).

Garcia et al. (2009) analyzed teacher turnover in Texas and its relationship with salary using statewide school-district statistics over three years (2003–2006). After calculating the Pearson product-moment correlation coefficient, the districts were divided into quartiles based on average salary. Then, the difference between the highest and lowest quartiles was used to verify that teacher salary moderated turnover, "where the average teacher salary was higher, a moderate tendency was present for the teacher turnover rate to decrease" (Garcia et al., 2009, p. 5).

Ingersoll (2001) used the U.S. Department of Education's National Center for Education Statistics Schools and Staffing Survey results and the Teacher Follow-up Survey results from the late 1980s to examine teacher turnover in three stages: first was establishing the magnitude of

teacher turnover, second was accounting for multiple regressions that incorporated reasons for turnover, and third examined why the teachers stated they were leaving their positions.

Ingersoll's (2001) method was used by Boe et al. (2008) to examine a 1991–1992 dataset containing information about 12 teaching areas: special education, English, mathematics, science, social science, arts/music, foreign languages, physical and health education, bilingual education and English-language learners, elementary education, vocational/business education, and other general education.

Conclusion

This literature review presented many factors that impact teacher entry and turnover within the profession. A factor of high interest that was very influential in impacting teacher turnover was teacher compensation. Based on this finding, the goal of this research study was to use Colorado school data to verify and quantify the impact of teacher salary on teacher turnover in relation to the identified factors of school setting, student achievement, and student demographics, which also impacted teacher turnover.

CHAPTER III

RESEARCH METHODOLOGY

The purpose of this study was to evaluate the impact of teacher salary on teacher turnover after controlling for other important factors. To determine this impact, a quantitative study was performed utilizing a multilevel model (MLM) approach. The literature review has already shown that, in many instances, especially in qualitative research findings, teacher salary played a significant role in teacher turnover. This chapter outlines the quantitative research steps that took place to analyze the impact of teacher salary on teacher turnover in Colorado.

The results of this study would allow school districts to understand the impact of salary on teacher turnover, as compared to other factors, and allow decision-makers to make informed decisions utilizing statistical data. This study is considered a secondary data analysis. The data utilized were collected by the Colorado Department of Education (2023) and the Keystone Policy Center (Berdie et al., 2022) for other purposes and are publicly available. This study provides another avenue of data in the data-driven decision-making process.

Quantitative Research Designs

To adequately reduce teacher turnover, understanding the impact of current salary structures is vital to making informed decisions. There is currently little interest by school districts to move away from the traditional salary schedule structure (Camps, 2018; Grissom & Strunk, 2012). Qualitative studies with limited sample sizes have been previously conducted in which teacher surveys and interviews showed an impact of salary on teacher turnover (Bowen & Mills, 2017; Fuller et al., 2016; McHenry-Sorber & Campbell, 2019). Prior quantitative research

regarding teacher turnover has used a very targeted sample size (Colson & Satterfield, 2018; Gilpin, 2011; Ryan et al., 2017). Through using a quantitative study with data from 178 school districts in Colorado, a much greater, state-wide sample size to determine how much of a role teacher salary plays in teacher turnover. The following research question addressed both turnover and salary:

> Q1 How does teacher salary impact teacher retention in the state of Colorado when controlling for other potentially important factors, including academic performance, English Language Learners, socioeconomic status, minority students, and the setting of the school district?

Creswell (2007) defined quantitative research as the type in which "the investigator identifies a research problem based on trends in the field or on the need to explain why something occurs" (p. 13). The purpose of this study was to evaluate the impact of teacher salary on teacher turnover after controlling for other important factors.

For this study, average teacher turnover and average teacher salary were analyzed across the state of Colorado over four years. Creswell (2007) described the relationship as follows: "Some quantitative research problems require that you explain how one variable affects another… by explaining a relation among variables, you are interested in determining whether one or more variables might influence another variable" (p. 13). In this study, the percentage of students receiving free and reduced lunches, the number of minority students, and the presence of ELL students were considered.

Epistemological View

An objectivist approach was used to answer the research question. Crotty (1998) defined objectivism as "the epistemological view that things exist as meaningful entities independently of consciousness and experience, that they have truth and meaning residing in them as objects and that careful research can attain that objective truth and meaning" (pp. 5–6). Objectivist

epistemology leverages the theoretical perspective of positivism. Crotty explained this as the view that "what is posited or given in direct experience is what is observed, the observation in question being scientific observation carried out by way of the scientific method" (p. 20). Crotty clarified that because a study is quantitative, it does not mean it falls within the positivism perspective. The important aspect of research reaching the positivism perspective is the research is objective, valid, and generalizing (Crotty, 1998). He stated, "What turns their study into a positivist piece of work is not the use of quantitative methods but the attribution of objectivity, validity, and generalizability to quantitative findings" (p. 41).

An objective approach to data analysis was adopted to determine how salary impacted teacher turnover in Colorado. The validity of the findings of this research is important in providing options to policymakers at a variety of levels. The statistical methods used were thoroughly vetted and supported the replication of the results by peers. The results of the quantitative analysis provided facts in the decision-making process. An objectivist holds that facts guide decisions and what ought to be done (McHugh & Way, 2017).

Research Question and Hypotheses

During this research, the following research question was addressed:

Q1 How does teacher salary impact teacher retention in the state of Colorado when controlling for other potentially important factors, including academic performance, English Language Learners, socioeconomic status, minority students, and the setting of the school district?

This research question and the findings from the literature review led to the following hypotheses:

H1 There will be a significant negative relationship between salary and teacher turnover after controlling for the impact of academic performance, ELL, socioeconomic status, minority students, and the setting of the school district.

H01 There is no relationship between teacher salary and teacher turnover.

Methods

The data used to prove or disprove the hypotheses were publicly available from the CDE (2023) and the Keystone Policy Center (Berdie et al., 2022). These data were organized by school district and spanned a range of four school years (2015-2019) for each. Because the data were organized hierarchically, with years nested under districts, a multilevel modeling approach was used to evaluate the impact of salary and other covariates on teacher turnover rates. Details on the data source, variables of interest, and analysis are provided in the following subsections.

Data Collection

The CDE (2023) collects data annually from all 178 public school districts in Colorado. The data are made publicly available in spreadsheet form on the CDE website. Archived data cover the 1999 school year until the present. The data utilized for this research included the percentage of teacher turnover per district for the following school years: 2015–2016, 2016–2017, 2017–2018, and 2018–2019. This temporal range was selected to avoid potential COVID influences outside the scope of this study. The percentages of students receiving free and reduced lunches, minority students, and ELL students were also provided. The Keystone Policy Center (Berdie et al., 2022) modeled and calculated housing affordability models for all districts in Colorado.

Variables

Each school and district has several attributes that might impact teacher turnover. All factors are reported annually to the CDE (2023) and are made publicly available. The housing

affordability data were calculated by the Keystone Policy Center (Berdie et al., 2022). For this study, the following variables were examined:

- *Academic performance* was measured using the District Performance Framework (DPF) provided by the CDE (2023). The DPF accounted for academic achievement, academic growth, and postsecondary and workforce readiness. Districts were assigned one of five accreditation categories: accredited with distinction, accredited, accredited with an improvement plan, accredited with a priority improvement plan, and accredited with a turnaround plan.
- *ELL students* were reported by percentage per district.
- *Free and reduced lunch status* reflected the percentage of students identified as eligible for free and reduced lunch programs as determined by federal guidelines.
- *Minority student status* reflected the percentage of students identified as non-White in a district.
- *Salary* was reflected for all staff members at every school including teachers. The average salary per district was reported.
- *District type* was one of the following: Denver metro, urban–suburban, outlying city, outlying town, or remote.
- *Turnover rate* reflected the number of staff who left their positions per district.
- *Housing affordability* was the proportion of housing within a school district that was affordable for teachers earning the average salary within that district.

Data Analysis

To evaluate the impact of average teacher salary on turnover, data for each of the 178 school districts were utilized across the given four-year span. Each district was examined at four-

time points, resulting in a two-level hierarchical data structure in which the years were nested under schools. Prior research showed that hierarchical data structures decreased the likelihood of arriving at false levels of correlation significance (e.g., Type-I errors; Wampold & Serlin, 2000). They also improved the detection of covariates and the elucidation of their effects (Shadish et al., 2002).

Multilevel models (MLMs) accounted for hierarchical data structures by considering data as occurring at different levels and allowing for error components at each level. Conceptualized as regression models at each level, MLMs accommodated a variety of data types. For this study, an approach like the one described by Bell et al. (2013) was adopted. A model-building strategy was used to estimate a series of models of increasing complexity so the best fit could be determined based on the data. Beginning with an unconditional model with no variables available with which the intraclass correlation coefficient (ICC) could be calculated, subsequent models added appropriate fit indices and incorporated multilevel variables until the optimal set was found. In this case, four models were found. This study used variables at the year level (Level 1: salary, academic performance, ELL, free and reduced lunch, and minority percentage) and the district level (Level 2: type of district; affordability region). The four models are described as follows.

Model 1 is an unconditional model used to assess between-year variations in teacher turnover. The ICC estimated from this model indicated how much of the variation in turnover was accounted for by the school years. If the ICC was large, then the year had a significant impact on turnover and the model was likely the best fit for the MLM. Alternatively, a small ICC indicated the year did not significantly impact turnover; hence, the data could be examined using a single-level regression model. Model 1 reflected the formula of (1):

$$Turnover_{ij} = \beta_{0j} + e_{ij}, \quad (1)$$

where $Turnover_{ij}$ was the turnover rate for a year *i* in district *j*, β_{0j} was the average turnover rate for district *j*, and e_{ij} was the year-level error term.

Model 2 was a two-level model in which years were nested within districts as a random intercept method that reflected mean (intercept) differences across the Level-1 variables but not slope differences. For this study, salary was the primary variable of interest as well as four additional covariates. To detail this model, it was helpful to first describe each level followed by the complete model equation. The level-1 equation can be written as:

$$Turnover_{ij} = \beta_{0j} + \beta_{1j}Salary_{ij} + \beta_{2j}AcPerf_{ij} + \beta_{3j}ELL_{ij} + \beta_{4j}FreeReduce_{ij} + \beta_{5j}Minority_{ij} + e_{ij}, \quad (2)$$

where $Turnover_{ij}$, β_{0j}, e_{ij} was the same as in (1), $Salary_{ij}$ was the salary for year *i* in district *j*, β_{1j} was the slope coefficient associated with $Salary_{ij}$, $AcPerf_{ij}$ was the academic performance for year *i* in district *j*, β_{2j} was the regression coefficient associated with $AcPerf_{ij}$, ELL_{ij} was the English language learning student percentage for year *i* in district *j*, β_{3j} was the regression coefficient associated with ELL_{ij}, $FreeReduce_{ij}$ was the free and reduced lunch eligible percentage of students for the year *i* in district *j*, β_{4j} was the regression coefficient associated with $FreeReduce_{ij}$, $Minority_{ij}$ was the non-White minority percentage of students for year *i* in district *j*, and β_{5j} was the regression coefficient associated with $Minority_{ij}$. The level-2 equation was written as:

$$\beta_{0j} = \gamma_{00} + \mu_{0j}, \quad (3)$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20},$$

$$\beta_{3j} = \gamma_{30},$$

$$\beta_{4j} = \gamma_{40},$$

$$\beta_{5j} = \gamma_{50}$$

where γ_{00} was the grand mean turnover rate across years and districts, μ_{0j} was the error term representing a unique effect associated with district *j*, and γ_{10} was the average effect of salary, γ_{20} was the average effect of $AcPerf_{ij}$, γ_{30} was the average effect of ELL_{ij}, γ_{40} was the average effect of $FreeReduce_{ij}$, and γ_{50} was the average effect of $Minority_{ij}$. Substituting the level-2 equation (3) into the level-1 equation (2) yielded the complete equation for Model 2:

$$Turnover_{ij} = \gamma_{00} + \gamma_{10}Salary_{ij} + \gamma_{20}AcPerf_{ij} + \gamma_{30}ELL_{ij} + \gamma_{40}FreeReduce_{ij} + \gamma_{50}Minority_{ij} + \mu_{0j} + e_{ij} \quad (4)$$

Model 3 differed from Model 2 only at its level-2 stage where it included an error term for each regression coefficient. This random intercept and random slope model allowed not only mean differences in the variable(s) but also slope differences that represented different variable impacts on the outcome. Model 3 could be explicitly stated:

$$Turnover_{ij} = Turnover_{ij} = \gamma_{00} + \gamma_{10}Salary_{ij} + \gamma_{20}AcPerf_{ij} + \gamma_{30}ELL_{ij} + \gamma_{40}FreeReduce_{ij} + \gamma_{50}Minority_{ij} + \mu_{0j} + \mu_{1j}Salary_{ij} + \mu_{2j}AcPerf_{ij} + \mu_{3j}ELL_{ij} + \mu_{4j}FreeReduce_{ij} + \mu_{5j}Minority_{ij} + e_{ij} \quad (5)$$

with the same assumptions and variable definitions of (4) but μ_{1j} was the additional slope term representing a unique effect associated with salary, μ_{2j} was the additional slope term representing a unique effect associated with academic performance, μ_{3j} was the additional slope term representing a unique effect associated with English language learner percentage, μ_{4j} was the additional slope term representing a unique effect associated with free and reduced lunch

percentage, and μ_{5j} was the additional slope term representing a unique effect associated with a minority percentage.

Finally, Model 4 incorporated a level-2 variable of the district type and affordability region. For this model, the type of district and affordability region were included as additional fixed effects in the level-2 equations. Model 4 was thus stated:

$$Turnover_{ij} = \gamma_{00} + \gamma_{01}DistrictType_j + \gamma_{02}Affordability_j + \gamma_{10}Salary_{ij} + \gamma_{11}DistrictType_j(Salary_{ij}) + \gamma_{12}Affordability_j(Salary_{ij}) + \gamma_{20}AcPerf_{ij} + \gamma_{21}DistrictType_j(AcPerf_{ij}) + \gamma_{22}Affordability_j(AcPerf_{ij}) + \gamma_{30}ELL_{ij} + \gamma_{31}DistrictType_j(ELL_{ij}) + \gamma_{32}Affordability_j(ELL_{ij}) + \gamma_{40}FreeReduce_{ij} + \gamma_{41}DistrictType_j(FreeReduce_{ij}) + \gamma_{42}Affordability_j(FreeReduce_{ij}) + \gamma_{50}Minority_{ij} + \gamma_{51}DistrictType_j(Minority_{ij}) + \gamma_{52}Affordability_j(Minority_{ij}) + \mu_{0j} + \mu_{1j}Salary_{ij} + \mu_{2j}AcPerf_{ij} + \mu_{3j}ELL_{ij} + \mu_{4j}FreeReduce_{ij} + \mu_{5j}Minority_{ij} + e_{ij} \quad (6)$$

It had the same assumptions and variable definitions of prior models, but $DistrictType_j$and $Affordability_j$ referred to the type of district j and affordability region j, and γ_{01}, γ_{11}, γ_{21}, γ_{31}, γ_{41}, γ_{51}, γ_{02}, γ_{12}, γ_{22}, γ_{32}, γ_{42}, γ_{52} were the additional coefficients associated with the inclusion of $DistrictType_j$ and $Affordability_j$. It should be noted that because there were multiple levels of each district type and affordability region, they were each dummy coded into multiple variables for purposes of the analysis. Specifically, the five district types were coded into four variables and the nine affordability districts were coded into eight variables.

The MLM analyses were conducted using the PROC MIXED statements and options with the SAS software using maximum likelihood estimation. Before the analysis, each continuous variable was grand-mean centered to facilitate interpretation. Model evaluations of the improved model fit relied on Akaike's information criterion (AIC) and the Bayesian

information criterion (BIC) for comparison. For both AIC and BIC, smaller values indicated a better fit. To test the primary hypothesis of a negative relationship between salary and teacher turnover after controlling for the impact of other studied variables, the fixed effect for salary in the final model was specifically examined. Given the one-directional nature of the hypothesis, a one-tailed significance test was used so a negative coefficient with a *p*-value less than .05 would indicate rejection of the null hypothesis.

Conclusion

The purpose of this study was to evaluate the impact of teacher salary on teacher turnover after controlling for other important factors. Other variables that were shown through prior research to have an impact on teacher turnover were accounted for in the multi-level model approach. By accounting for other variables, school districts could utilize data to determine where to utilize scarce resources in attempting to decrease teacher turnover in their respective districts.

CHAPTER IV

ANALYSIS

The primary objective of this study was to investigate whether the teacher salary was the most significant determinant of teachers' decisions to stay in their position or leave. By utilizing quantitative research methods, this study aimed to gather and analyze statistical data on specific factors that were demonstrated to impact teacher retention and assess their relative importance in impacting teacher turnover. This chapter reviews the statistical analysis used to answer the following research question and hypotheses,

Q1 How does teacher salary impact teacher retention in the state of Colorado when controlling for other potentially important factors, including academic performance, English Language Learners, socioeconomic status, minority students, and the setting of the school district?

H1 There will be a significant negative relationship between salary and teacher turnover after controlling for the impact of academic performance, ELL, socioeconomic status, minority students, and the setting of the school district.

H01 There is no relationship between teacher salary and teacher turnover.

The time period examined in this study was the school years of 2015-2019 so factors would not be influenced by the COVID-19 pandemic.

Development and Description of the Data

To develop the complete dataset used in the analysis, data were downloaded from the CDE (2023) website. The CDE annually collects data from each of the 178 school districts in Colorado including data for both students and teachers. The data available from the CDE included information for the BOCES organizations, Division of Youth Services, and Colorado

School of the Deaf and Blind. Since the BOCES is a cooperative of multiple Colorado school districts within a region and the Division of Youth Services and Colorado School of Deaf and Blind are specialized campuses, these were all removed from the data to be analyzed. The Keystone Policy Center (Berdie et al., 2022) calculated and modeled housing affordability models for each school district in Colorado and placed the districts in regions.

Each spreadsheet was imported into SAS and then combined into a single dataset using the district code identifier for each of the 178 school districts. For the level-2 categorical variables of District Type and Affordability, each school was assigned the appropriate category label given the details described in Chapter 3.

Turnover rate was determined by downloading the Personnel Turnover Rate by District and Position Categories file from CDE. The sole row utilized in this study was the Teacher position for each school district and the sole column used was Turnover Rate. The turnover rate was calculated by the number of people who left a position divided by the prior year headcount. Turnover rate was a district-level average percentage on a 0 to 100 scale. Across the years examined, turnover rate averaged from 17.48% to 18.47% for all Colorado districts included in the study.

The average teacher salary was calculated by downloading the Average Teacher Salary file from the CDE (2023). This file contained the average teacher salary by district across the state of Colorado. Salary is a district-level average on a thousands scale. Across the years, salary ranged from $41,510 to $44,400.

To measure academic performance, District Performance Framework data were used from the CDE (2023). This file contained the average teacher salary by district across the state of Colorado. Salary. District accreditation ratings were downloaded for each year. To measure

achievement, the data used from this file were from the Total Points Earned column. This data measured what percent of all possible data points the district received as calculated by the CDE. The CDE calculates a total score based on the categories of academic achievement, academic growth, and postsecondary readiness. Academic performance is defined as a district-level average on a scale that is essentially a weighted average on a 0 to 100 scale. Across the years examined, academic performance ranged from 61.15% to 61.84%.

English Language Learner data for each district were gathered by downloading the Instructional Program by District file from the CDE (2023). This file contained the number of students eligible and also the percentage of students in the district for each program offered and collected by the CDE. For this study, the column, EL incl M1 and M2 was utilized. M1 and M2 denoted that students were English Language Learners who were now in the first or second year of monitoring status. English Language Learner was a district-level average percentage on a 0 to 100 scale. Across the years, the percentage of ELL students ranged from 9.59% to 12.95%.

Free and reduced lunch status, a data point for socio-economic status, was measured by downloading the file K-12 Free and Reduced Lunch Eligibility by District. This file contained a percentage of students by district who qualified for free and reduced lunch according to the U.S. Department of Education (2005) guidelines. These data reflected a district-level average percentage on a 0 to 100 scale. Across the years examined, the percentage of free and reduced lunch status students ranged from 48.04% to 50.24%.

Student minority data were found by utilizing the CDE (2023) Race/Ethnicity and Percent Minority by District file. This file listed all the ethnicities in each school district and a collective total of percent of minority students by district. Minority student status was reported as

a district-level average percentage on a 0 to 100 scale. Across the years examined, the percentage of minority students ranged from 33.69% to 35.05% in the Colorado schools studied.

Table 4.1 provides the summary descriptive statistics for the variables utilized separated by year.

Table 4.1

Summary Descriptive Statistics for Variables Utilized

	School Year			
	2015	2016	2017	2018
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Turnover	18.47 (9.90)	17.91 (8.35)	17.68 (8.87)	17.48 (9.23)
Salary	41.51 (7.42)	42.65 (7.08)	42.80 (7.33)	44.40 (7.58)
Academic Performance	61.76 (11.62)	61.79 (11.01)	61.84 (10.05)	61.15 (9.68)
English Language Learners	11.35 (13.36)	12.95 (13.77)	10.16 (12.12)	9.59 (11.44)
Free & Reduced Lunch	50.24 (18.65)	49.01 (18.22)	49.36 (18.59)	48.04 (18.48)
Percent Minority	33.69 (22.29)	34.48 (22.13)	34.97 (22.59)	35.05 (22.05)

The first categorical variable examined was District Type. The district type was determined by downloading the School Districts Listed by Setting file from the CDE (2023). This file identified where each school district was located by setting type: Denver Metro, Outlying City, Urban-Suburban, Outlying Town, or Remote. For analysis in SAS, each setting was assigned a number, 1-5. Table 4.2 displays the mean and standard deviation of each variable by setting type for each setting.

Table 4.2

Setting Type

Variable	Denver-Metro *M* (*SD*)	Urban-Suburban *M* (*SD*)	Outlying City *M* (*SD*)	Outlying Town *M* (*SD*)	Remote *M* (*SD*)
Academic Performance	55.58 (11.99)	61.58 (11.55)	56.61 (9.47)	61.13 (9.37)	63.88 (10.30)
English Language Learners	26.49 (17.17)	8.31 (7.85)	13.70 (12.45)	13.78 (13.27)	6.35 (8.69)
Free & Reduced Lunch	49.13 (25.59)	41.94 (20.88)	52.83 (16.81)	47.11 (18.20)	51.09 (16.44)
Percent Minority	56.40 (23.01)	41.92 (19.00)	47.72 (20.27)	36.45 (20.12)	26.23 (19.73)
Turnover	17.97 (6.66)	15.96 (4.61)	16.60 (5.20)	17.38 (8.33)	18.70 (10.75)
Salary	57.71 (7.36)	47.75 (3.35)	44.89 (4.90)	43.15 (6.02)	38.86 (4.35)

When analyzing the mean while accounting for district setting, some interesting observations appeared. Of the five different settings, the remote setting had the highest mean teacher turnover at 18.7% while also having the lowest average teacher salary at $38,860. Additionally, the remote setting also had the highest academic performance mean at 63.88%. The region with the lowest teacher turnover mean was the Denver metro area with a teacher turnover of 17.97%. Coincidentally, the Denver metro area also had the highest mean teacher salary at $57,710 and the highest percentages of ELL and minority students.

The second categorical variable examined was housing affordability. The cost of living in relation to the teacher salary might play a factor in teacher turnover. To account for the affordability of homes across the state, data collected and analyzed by the Keystone Policy Center (Berdie et al., 2022) were used to address housing affordability and costs. In the report,

the Keystone Policy Center analyzed housing prices in each district and region against the average teacher salary in the district. The districts were then put into nine regions and it was determined what percentage of local housing was affordable for a teacher earning an average salary in the district. To account for this variable in SAS, each affordability region was assigned a number, 1-9. Table 4.3 displays the mean and standard deviation for each variable by affordability region.

Table 4.3

Affordability Area

Affordability Area	Share of Local Affordable Housing %	Academic Performance *M (SD)*	English Language Learners *M (SD)*	Free & Reduced Lunch *M (SD)*	Percent Minority *M (SD)*	Turnover *M (SD)*	Salary *M (SD)*
Colorado Springs	14	63.41 (11.74)	6.58 (6.30)	42.62 (20.40)	32.39 (17.13)	18.69 (7.73)	$43,210 (4.31)
Eastern Plains	61	62.58 (8.64)	9.30 (11.71)	54.42 (15.13)	28.91 (19.94)	17.68 (11.33)	$37,230 (3.55)
Metro Denver	13	56.77 (11.63)	21.62 (16.96)	44.57 (23.31)	48.05 (24.12)	19.17 (7.58)	$53,050 (9.76)
Mountain	12	66.21 (9.14)	13.65 (14.36)	37.05 (14.67)	26.68 (17.22)	17.48 (7.67)	$46,530 (6.39)
Northern	13	62.27 (8.50)	13.72 (11.39)	40.47 (13.72)	34.18 (19.23)	13.47 (5.24)	$46,410 (5.15)
Pueblo and Raton Basin	63	59.02 (11.19)	2.44 (2.21)	56.56 (15.52)	39.73 (23.48)	19.19 (9.66)	$41,880 (5.82)
San Luis Valley	73	60.76 (10.93)	10.20 (13.08)	67.66 (15.97)	55.29 (27.86)	19.61 (9.35)	$39,660 (3.96)
Southwest	29	57.22 (10.91)	8.70 (8.71)	50.50 (13.09)	34.41 (17.27)	18.15 (7.13)	$41,800 (3.56)
Western Slope	35	63.63 (12.20)	10.96 (11.25)	40.20 (12.08)	24.59 (14.04)	17.77 (6.68)	$45,930 (4.45)

When examining the data by affordability region, teacher turnover had the highest mean in the San Luis Valley at 19.61%. The San Luis Valley affordability region also had the highest percentage of minority and free and reduced lunch status. The mean salary for the San Luis Valley region was second lowest at $39,660.

The region with the lowest teacher turnover was the Northern affordability region with a teacher turnover of 13.47%; it did not have the highest or lowest for any other category examined. The teacher salary for the Northern region was in the middle of the districts in Colorado examined at $46,410.

The affordability region with the highest teacher salary was the Metro Denver region at $53,050. The Metro Denver region was the lowest in academic performance and was the second lowest in teacher turnover at 19.17%. The region with the lowest salary was the Eastern Plains at $37,230; it was the sixth lowest in teacher turnover of all nine regions at 17.68%.

Model-Building Analysis

To answer the research question and hypotheses of this study, a model-building approach was used as detailed in Chapter 3. To facilitate interpretation of analysis results, variables of interest were grand mean centered prior to the analysis. First, a two-level unconditional model was used to assess between-year variations in teacher turnover as an ICC estimate. The results of this analysis are provided in Table 4.4 in the Model 1 column. The ICC estimate was calculated as the covariance estimate for the intercept divided by the sum of the covariance estimates of the intercept and the residual. Explicitly stated:

$$ICC = \frac{\sigma^2_{year}}{\sigma^2_{year} + \sigma^2_{error}}$$

Given the results from Model 1, the ICC was calculated as

$$ICC = \frac{29.49}{29.49 + 53.07} = 0.36$$

This indicated that 38% of the variation in district turnover was accounted for by the nesting of years within districts so it was indeed important to account for this hierarchical nature of the data[1].

The second step in the analysis was to evaluate Model 2, which is a two-level model in which years are nested within districts as a random intercept method that reflects intercept differences across the Level-1 variables. The results of this analysis are provided in the Model 2 column of Table 4.4. Examining these results, among the five level-1 variables, three were found to significantly impact turnover. Specifically, higher salary was associated with lower turnover (β = -0.14, SE = 0.07, p = .04), higher district academic performance was associated with lower turnover (β = -0.18, SE = 0.04, p < .01), and higher percentage of free and reduced lunch status students was associated with higher turnover (β = 0.08, SE = 0.03, p = .02). However, the effects of percentage of English language learners (β = 0.05, SE = 0.04, p = .22) and percentage of minority students (β = -0.04, SE = 0.03, p = .19) were not statistically significant. Examining model-fit, both fit indices showed improved fit for Model 2 (AIC = 4741.90, BIC = 4767.30) when compared to Model 1 (AIC = 5062.70, BIC = 5072.20).

The third step in the analysis was to evaluate Model 3, which differed from Model 2 by including an error term for each regression coefficient allowing for slope difference in addition to intercept differences. Model 3 was not able to be evaluated as the variance-covariance matrix (G) was not positive definite as required to obtain accurate model estimates (Kiernan et al.,

[1] As data reflect district changes across years, a two-level growth model was also explored. The fixed effect for school year was not statistically significant in these models.

2012). One of the common reasons for this matrix not to be positive definite was after accounting for the other variables in the model, there was not enough variation in one or more random effects (Wicklin, 2019). Another reason was the model might be mis-specified (Wicklin, 2019). Overall, there appeared to be insufficient ability for the inclusion of slope parameters to be able to improve the model. This suggested the relationship between the variables and turnover did not meaningfully differ across the level of the units. This was documented in Table 4.3 in column Model 3 by noting null values for those expected estimates. Consequently, the inclusion of slope parameters was not considered for any subsequent models. Even without the inclusion of Model 3, Model 4 was able to address the research question.

The fourth and final step of the analysis was to evaluate Model 4. Given the results for the Model 3 analysis described above, this analysis was modified to exclude the slope estimates for the level-1 variables while including the two categorical level-2 variables of District Type and Affordability. The results of this analysis are provided in the Model 4 column of Table 4.4. Examining the results among the five level-1 variables, three were found to significantly impact teacher turnover. Specifically, higher salary was associated with lower turnover ($\beta = -0.25$, SE = 0.09, $p < .01$), higher district academic performance was associated with lower turnover ($\beta = -0.16$, SE = 0.04, $p < .01$), and higher percentage of free and reduced lunch status students was associated with higher turnover ($\beta = 0.10$, SE = 0.03, $p < 0.01$). However, the effects of percentage of English language learners ($\beta = 0.04$, SE = 0.05, $p = .42$) and percentage of minority students ($\beta = -0.04$, SE = 0.03, $p = 0.28$) were not statistically significant.

Examining the level-2 variables for Model 4, the affordability regions of the Eastern Plains and Northern affordability regions were the only significant variables with β estimates of -7.15 (SE = 2.35, $p < .01$) and -7.35 (SE = 2.60, $p < .01$), respectively. These estimates indicated

that controlling for other variables in the model, being in the Eastern Plains or Northern affordability regions (compared to the Metro Denver affordability region, the reference category) were associated with lower turnover rates. District type, the other level-2 variable, was not significant for any category, indicating it did not have a significant effect on turnover rates.

Examining model-fit across the estimated models as presented in Table 4.4, it could be seen that there were mixed indicators of improvement when comparing Model 2 to the more complex Model 4. The AIC value slightly improved for Model 4 (AIC = 4741.80) compared to Model 2 (AIC = 4741.90) while the BIC value did not improve for Model 4 (AIC = 4805.30) compared to Model 2 (BIC = 4767.30). The difference in changes in fit could likely be attributed to BIC taking a higher penalty for increased complexity as the two level-2 categorial variables added many new terms to be estimated.

Given the fit of Model 4, it was advantageous to test the assumptions to ensure a reliable interpretation of the results. The normality of residuals was assessed using a histogram and Q-Q plot of the residuals. These visualizations can be found in Figure 4.1. The left panel of the figure presents the histogram of the residuals, which reveals a distribution that mostly resembled a bell-shaped curve, indicating a normal distribution. The right panel of Figure 4.1 presents the Q-Q plot, in which the residual points closely followed the straight diagonal line, with some minor deviations at the ends, indicating a reasonable fit to the model. Similarly, the homoscedasticity of residuals was evaluated using a plot of the residuals versus predicted values. Provided in the Figure 4.2 plot, the residuals showed a roughly equal spread across the entire range, although they were slightly clustered toward the mean. Finally, upon examining the residuals in relation to other model variables, no issues pertaining to linearity, independence, or other assumptions were identified.

Table 4.4

Estimates from Two-Level Linear Models Predicting Teacher Turnover

Fixed Effects		Model 1 *M* (*SD*)	Model 2 *M* (*SD*)	Model 3 *M* (*SD*)	Model 4 *M* (*SD*)
Intercept		0.00 (0.49)	-0.05 (0.42)	-	3.03 (1.98)
Salary			-0.14 (0.07)*	-	-0.25 (0.09)**
Academic Performance			-0.18 (0.04)**	-	-0.16 (0.04)**
English Language Learners			0.05 (0.04)	-	0.04 (0.05)
Free & Reduced Lunch			0.08 (0.03)*	-	0.10 (0.03)**
Percent Minority			-0.04 (0.03)	-	-0.04 (0.03)
Type of District	Urban-Suburban				1.17 (3.26)
	Outlying City				0.45 (3.21)
	Outlying Town				1.86 (2.99)
	Rural				1.97 (3.08)
Affordability Area	Colorado Springs				-2.56 (2.67)
	Eastern Plains				-7.15 (2.35)**
	Mountain				-2.78 (2.62)
	Northern				-7.35 (2.6)**
	Pueblo and Raton Basin				-4.64 (2.73)
	San Luis Valley				-5.12 (2.78)
	Southwest				-5.20 (2.81)
	Western Slope				-3.17 (2.52)
Error Variance					
Level-1		53.07 (3.25)**	48.83 (3.09)**	-	48.90 (3.09)**
Level-2 Intercept		29.49 (4.6)**	18.56 (3.46)**	-	14.44 (3.04)**
Salary				-	
Academic Performance				-	
English Language Learners				-	
Free & Reduced Lunch				-	
Percent Minority				-	
Model Fit					
AIC		5062.70	4741.90	-	4741.80
BIC		5072.20	4767.30	-	4805.30

Note: *Statistically significant, $p<.05$; **Statistically significant, $p<.01$; ICC = .38

Figure 4.1

Residual Histogram and Q-Q plot for Model 4

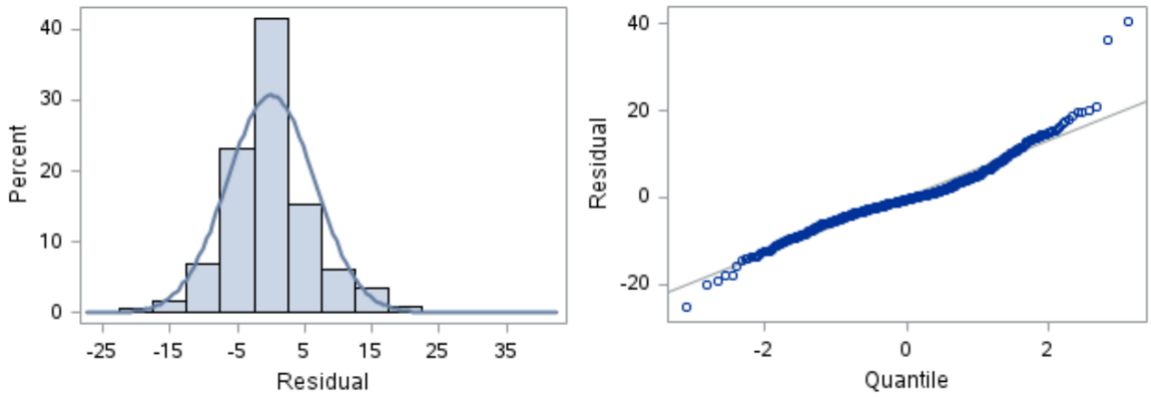
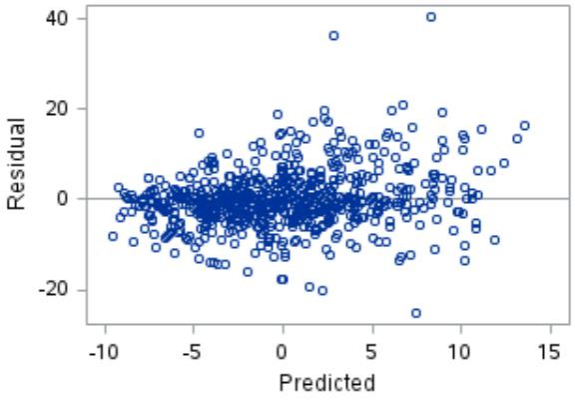


Figure 4.2

Plot of the Residuals Versus Predicted Values for Model 4



When considering the goals of this study, Model 4 included the level-2 predictors that were expected to impact the relationship between salary and turnover and was also a reasonable fit to the data. Balancing the goals of this study with the mixed indicators of model improvement, Model 4 was used to answer the research question.

Evaluating Study Hypothesis

The purpose of this study was to evaluate the impact of teacher salary on teacher turnover after controlling for other important factors. The results of Model 4 were examined to test the hypothesis of there being a significant negative relationship between salary and teacher turnover after controlling for the impact of Academic Performance, ELL, socioeconomic status, minority students, setting of the school district, and affordability of the school district. Looking at the Model 4 column of Table 4.4, there was a significant negative relationship between salary and turnover when controlling for the other variables in the model ($\beta = -0.25$, SE = 0.09). A one-tailed test was used to evaluate the significance of this result. The critical *t*-value for this one-tailed test with 407 degrees of freedom at the .01 significance level was -2.33. As the observed *t*-value of -2.72 was more extreme in the negative region than the critical t-value, it could be concluded that the relationship between salary and teacher turnover was statistically significant at the .01 significance level.

Consequently, the null hypothesis was rejected and the alternative hypothesis of significant negative relationship between salary and teacher turnover after controlling for the model variables was supported. This result indicated that as the average salary of a teacher in a school district increased by $1,000, the teacher turnover rate for the district decreased an average of 0.25%. Figure 4.3 visually presents this trend, plotting the average teacher salary for each district along with its associated turnover rate. The line in Figure 4.3 reflects the expected -0.25% reduction in turnover rate given each $1,000 change in average teacher salary.

Figure 4.3

Impact of Salary on Teacher Turnover

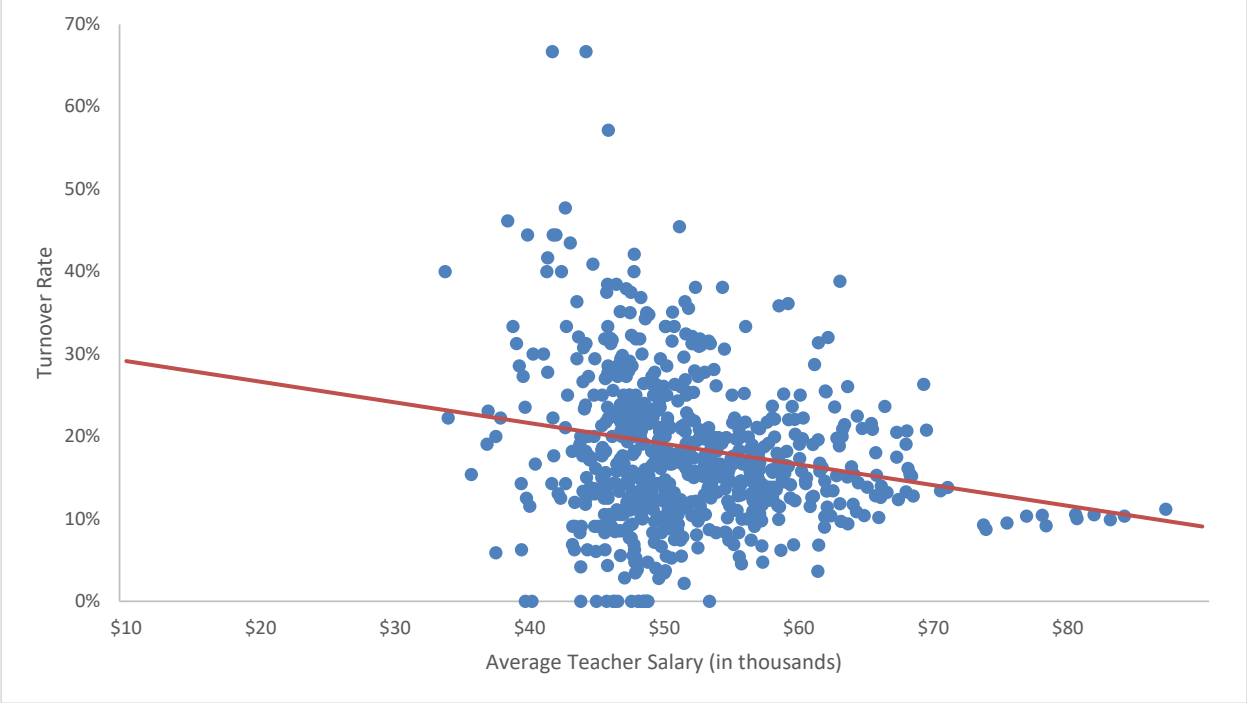


Figure 4.3 presents the relationship between average teacher salary for each district and district turnover rate. The x-axis represents average teacher salary while the y-axis represents turnover. The plot includes a line reflecting the association between salary and turnover, indicating that for every $1,000 change in salary, turnover decreased by 0.25%. Although this figure did not visually account for the other covariates in the model, it provided a simple and accessible illustration of the direction and strength of the relationship of salary and turnover. The relationship visually represented in the figure illustrates the strength of the relationship indicated by the results of the multilevel regression even after accounting for other important covariates such as percentage of ELL students, academic performance, and percentage of free and reduced lunch students.

Conclusion

This study used a multi-level modeling approach to quantitatively analyze factors associated with teacher turnover in Colorado school districts. This analysis evaluated the effects categorical variables—salary, academic performance, percentage of free and reduced lunch students, and percent of minority students—had on teacher turnover. The two categorical variables, district type and affordability, were used to create a hierarchical linear modeling approach to account for the nested structure of the data.

The analysis showed that higher academic performance and higher teacher salaries were associated with lower teacher turnover. At the same time, districts that had a higher percentage of students with free and reduced lunch status were associated with districts with higher teacher turnover rates. The categorical variables of setting and affordability had no impact except for a significant impact in the affordability regions of the Eastern Plains and Northern areas of the state.

To answer the research question posed based on the data and data analysis, teacher salary had the greatest impact of all other variables and factors on teacher turnover. The data clearly showed that with all factors being equal, average teacher salary did have the highest impact on teacher turnover.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Teacher turnover has been and is still a growing problem for K-12 education (Ingersoll, 2001; Tran & Smith, 2019; Wenders, 2016; Yaffe, 2016). Research has shown that as teacher turnover increases, it puts a strain on the K-12 educational system (Hanushek et al., 2016; Henry & Redding, 2018; Ronfeldt et al., 2013) and most importantly, harms student growth and achievement (Newman et al., 2001; Ronfeldt et al., 2013). If teacher turnover is going to be addressed, all decision makers must be informed with data as to what is the impact of various factors, including salary, on teacher turnover.

Background

Teacher turnover is calculated by the number of teachers who leave a school or position divided by the total amount of teachers in a building. The Colorado average amount of teacher turnover over the years of this study, school year 2015-16 through school year 2018-19, was approximately 17%. Teacher turnover has a financial impact on schools (Nguyen, 2020), an impact on staff who remain (Ronfeldt et al., 2013), and an impact on student achievement (Abelson & Baysinger, 1984; Harmsen et al., 2018; Prilleltensky et al., 2016).

Purpose of the Study

To strive to find answers to assist K-12 districts and schools in curbing teacher turnover, it was important to understand reasons why teachers leave. This study took a quantitative approach to determine how important salary was in teacher turnover while accounting for other

factors such as academic performance, English language learners, socioeconomic status, minority groups, and setting of the school district.

Research Question

A purpose of educational research is to support and add to the body of knowledge in educational leadership (Creswell, 2014; Johnson & Christensen, 2010). This research was pursued to answer the following research question:

Q1 How does teacher salary impact teacher retention in the state of Colorado when controlling for other potentially important factors, including academic performance, English Language Learners, socioeconomic status, minority settings, and setting of school district?

When controlling for all factors, salary had a statistically significant impact on teacher turnover. Two other factors had a statistically significant impact as well: academic performance and free and reduced lunch (as a proxy for socio-economic status). The factors of minority and English language learners did not have a statistically significant value in any of the models.

Discussion of Findings

Review of the statistical data analyzed in this study showed that some factors did indeed have an impact on teacher turnover. Throughout Colorado, some factors had a greater significant impact than others. The analysis of the data showed that teacher salary did indeed have a statistically significant impact on teacher turnover. Other factors that had a statistically significant impact were academic performance and socioeconomic status.

Salary

The findings from the analysis indicated teacher salary had a significant impact on teacher turnover. The regression analysis in Models 2 and 4, where the coefficient for salary was significant, verified the role salary played in teacher turnover. This finding demonstrated that higher salaries were associated with lower teacher turnover.

The negative relationship between salary and turnover was consistent with prior research in the field that suggested low pay was a significant factor in teacher attrition (Imazeki, 2005; Kain et al., 2004; Kozlowski & Lauen, 2019; Rickman et al., 2017). The quantitative findings from this study added to and confirmed the existing literature by providing evidence that higher salaries were associated with lower turnover rates.

This study's results also highlighted the importance of accounting for the hierarchical nature of data when analyzing turnover. The use of a two-level model in Models 2 and 4 allowed for the nesting of years within districts to be considered, which helped to provide a more accurate estimate of the actual statistical relationship between salary and turnover.

Academic Performance

In the analysis of the data, higher district academic performance was associated with lower turnover rates. Similar to teacher salary in Models 2 and 4, higher academic performance had a significant impact on teacher turnover. The dataset demonstrated that with a 6% increase of academic performance, as measured by the district performance framework, there was a 1% decrease in teacher turnover.

As this was a quantitative study, the study did not explore the reasons behind the relationship between academic performance and teacher turnover. The goal of this study was to statistically and in an unbiased method determine which factors demonstrated an impact on teacher turnover. A possible explanation for this statistical finding was that schools with higher academic performance might offer more supportive working conditions such as leadership, professional development opportunities, and positive school culture, which could also contribute to lower teacher turnover rates but were hard to quantify.

English Language Learners

English language learners (ELLs) was utilized as a level-1 variable in the statistical analysis. The effects of the percentage of ELL students within a school district were found not to be statistically significant. This suggested that the relationship between the percentage of ELL students within a school and teacher turnover did not meaningfully differ across districts and did not have a significant impact on teacher turnover.

Socioeconomic Status

The analysis of data in this study found that in districts in which there was a higher percentage of free and reduced lunch students (as a measure for socioeconomic status), there was an increase in teacher turnover. This could be interpreted to mean that schools with a higher proportion of students from low-income families had more difficulty retaining teachers. The data analysis showed that for an increase of 10% of students identified as receiving free and reduced lunch, there was a 1% increase in teacher turnover within the dataset.

It is important to consider the implications of this finding for students who rely on free and reduced lunch programs. High teacher turnover rates are detrimental to student achievement as frequent changes in teachers could disrupt learning and lead to lower quality instruction (Abelson & Baysinger, 1984; Harmsen et al., 2018; Newman et al., 2001; Prilleltensky et al., 2016). Thus, students who might be in the greatest need of stable, high-quality instruction could be less likely to receive such instruction because of teacher turnover.

Schools identified as having a high percentage of free and reduced lunch students, often identified through federal Title I programs, might need to take steps to address teacher turnover and ensure a stable and supportive learning environment for their students. Based on findings

discussed earlier, this could focus on increasing teacher salaries to rates higher than schools within a district that have lower percentages of students identified as free and reduced lunch.

The variable of socioeconomic status could be linked to the previously discussed variable of academic achievement. Berliner (2009) demonstrated that schools with higher populations of low-income students performed worse on standardized assessments than schools with lower percentages of low-income students. Berliner suggested that due to the link of income and student achievement, outside of school factors should be considered and addressed. As school districts attempt to address outside of school factors impacting low-income students, based on this data set, that could also have an impact on lowering teacher turnover.

Minority Students

The percentage of minority students within a district did not have a statistically significant impact on teacher turnover. It is worth noting that this result was specific to the dataset of the years analyzed specific to Colorado. Further research in a different time span or location might produce different results. However, unlike academic performance and socioeconomic status, the percentage of minority students in a district did not impact decisions by teachers to stay in their positions or leave according to the results of this study.

Setting

The categorical variable of setting did not have a significant statistical impact on teacher turnover. The remote setting, which also contained the most districts at 86, had the highest teacher turnover at 18.7%. Not only did the remote setting have the highest turnover but it was also found to have the lowest teacher salary at $38,859.86. The average salary in remote settings was $4,288.42 less than the second lowest setting, outlying town, at $43,148.28. It was interesting to note that not only did the remote setting have the highest teacher turnover but the

remote setting also had the highest academic performance. This combination of results did not align with the earlier discussion of lower student achievement being linked to higher teacher turnover.

The urban-suburban setting, which contained 15 districts, had the lowest percentage of teacher turnover at 15.96%. Th urban-suburban setting also had the lowest percentage of free and reduced lunch students at 41.94%. This matched with previously discussed data in that the percentage of free and reduced lunch students in a district statistically impacted teacher turnover.

Housing Affordability

The analysis of data in this study showed that housing affordability had a significant impact on teacher turnover only in certain regions of Colorado. Specifically, the affordability regions of the Eastern Plains and Northern Colorado had a statistically significant impact. When comparing the two regions to the control region, Denver Metro, there was approximately a 7% decrease in teacher turnover just by being in the Eastern Plains or Northern regions. These two regions had the biggest spread between highest share of affordable housing within a district region (100% for Eastern Plains and 99% for Northern) and lowest share of affordable homes within a district in region (3% Eastern Plains and 4% for Northern).

The ability to pinpoint regions within a state in which there was higher teacher retention was a positive aspect of this analysis. By identifying regions with higher teacher retention, it is possible to delve deeper in these regions and analyze and look for characteristics to identify why teachers were remaining in their teaching positions longer than in other regions of the state. To look closer at the two regions in which there were statistically significant impacts, Eastern Plains and Northern, some interesting data points should be noted. The turnover rate for the Northern affordability region was 13.46%, which was the lowest of all regions. This region was not the

highest or lowest in any other category. In the categories that had been demonstrated to have a statistical impact (academic performance, free and reduced lunch, and salary), the region ranked fourth, eighth, and third, respectively.

The Eastern plains affordability region was 17.68%, which ranked second lowest. In the statistically significant categories of academic performance, free and reduced lunch, and salary, the region ranked fifth, seventh, and ninth, respectively. This region had the lowest salary of all regions and one of the highest percentages of free and reduced lunch yet was near the bottom in teacher turnover.

The statistical data analyzed in this study showed that in some regions, housing affordability played an important role in teacher turnover as teachers might be more likely to stay in districts where they could afford to live. This was consistent with previous research that showed a link among housing affordability, job satisfaction, and retention (Carver-Thomas & Darling-Hammond, 2017; Papageorge & Woessmann, 2019).

Implications

Based on the findings and analysis of this study, school boards across the state of Colorado and Colorado lawmakers could prioritize teacher salaries to reduce teacher turnover and the subsequent impact on student achievement. This analysis clearly showed that as a district pays its teachers a higher salary, teachers are more likely to stay. The literature showed that retaining quality teachers impacted student achievement in a positive manner (Abelson & Baysinger, 1984; Harmsen et al., 2018; Newman et al., 2001; Prilleltensky et al., 2016). If decision makers want to make lasting impacts on student achievement in the classroom, the priority should be through retaining quality teachers with a higher salary.

State lawmakers who determine state education funding on an annual basis could utilize data in this study to make a case for funding increases to provide for higher salaries for teachers. When additional funds are allocated to school districts, lawmakers might want to link additional funds to teacher salary if reducing teacher turnover is a priority. Another way lawmakers might want to assist in decreasing teacher turnover is by adding funding factors, earmarked for salary, by the factor of socioeconomic status as represented by students eligible for free and reduced lunch.

As housing affordability was determined to be statistically significant in some regions of Colorado, policy makers should consider developing targeted policies to address the issues of housing affordability in those regions. Policy makers might explore ways to fund affordable housing options or incentives such as housing subsidies or tax breaks to retain teachers in low affordability regions.

Overall, the findings in this study suggested that increasing teacher salaries might be an effective strategy for reducing turnover among teachers. This has important implications for policymakers and school district administrators who are seeking to improve teacher retention and reduce the costs, both monetary and related to student achievement, associated with teacher turnover.

Limitations and Future Research

This study had some limitations that should be considered. The specific limitations could be used and adjusted to continue research on the topic of teacher turnover. As these limitations were not part of this study, they are questions and topics this study has prompted that could be utilized and merit research beyond this study and the findings presented.

First, this study spanned a four-year period prior to the COVID-19 pandemic. This study began prior to the pandemic and the ramifications and long-term consequences of the pandemic are not yet known. The time span for this study took place years after the recession of 2008 so districts had realized the impact of the recession and had made policy decisions since then regarding teacher salary.

The COVID-19 pandemic that began in 2020 impacted the teaching profession. With strains put on teachers and schools by the pandemic and associated parent pressures (Kalaitzidis & Duarte, 2021; Pressley, 2021), teacher turnover reached even higher levels than in the period examined in this study (Barnum, 2023; Camp et al., 2023). Data utilized for this study are continuing to be collected. Thus, this study and analysis could be replicated for subsequent years, including COVID-19 years, and there could be a comparison of pre-COVID-19 to COVID-19 years and to years beyond COVID-19.

Second, this study focused on teacher turnover. There are other roles within a school district on which similar data are collected: district superintendent, principals, and paraprofessionals. Data from each other role could be analyzed as well to compare the results of each job type to see if the results are similar or dissimilar.

Third, this study solely looked at the state of Colorado, especially during pre-COVID years. As this study was Colorado specific, it could be replicated and used to perform a multi-state or national study. To do this, there would need to be a determination of what data are currently collected, reported, and accessible that are similar across the United States or a given region. Once common data points are found, this study could be replicated to determine if the findings of this study are the same across the United States or other regions or if results vary by region.

Another study could be done to replicate this study for all 50 states individually and then compare state-by-state results. This would provide a way to quickly see a state-by-state comparison of what was impacting teacher turnover the most in each state. By finding what was impacting teacher turnover, states could make informed policy decisions to help retain quality teachers.

Fourth, this study focused on district level data. Another study could be conducted by drilling down to the school level within districts and examining it even closer. This could be done by doing a three-level analysis that would analyze schools within districts.

Finally, this study focused on the use of data in a quantitative matter to determine the relationships of the various variables and teacher turnover. This study did not account for other factors that have been shown in qualitative studies to impact teacher turnover. Some other factors that have been demonstrated in qualitative studies to impact teacher turnover are the school or district culture, supports provided in the school or district, and relationship with the supervisor (Newton et al., 2018; Simon & Johnson, 2015; Sutcher et al., 2019; Thibodeaux et al., 2015). A future study could be performed that takes a mixed method approach and utilizes data while also performing a qualitative random survey analysis of individuals within the data set.

Conclusion

Teacher turnover is a growing problem for K-12 education and has a significant impact on the education system, staff, and most importantly, the students. The purpose of this study was to evaluate the impact of teacher salary on teacher turnover after controlling for other important factors. The findings demonstrated that teacher salary had a statistically significant impact on teacher turnover. Other factors that had an impact on teacher turnover were academic

performance and socioeconomic status. The percent of minority students and ELLs were shown, within this study, to not have an impact on teacher turnover.

The findings of this study indicated that decision-makers should be informed with data about the impact of various factors, including salary, on teacher turnover if this problem is to be addressed effectively. This study highlighted the importance of increasing teacher salaries and addressing the needs of schools with a higher percentage of free and reduced lunch students to reduce teacher turnover rates. Decreasing teacher turnover rates is crucial for ensuring a stable and supportive learning environment for all students.

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