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A conceptual framework of teacher turnover: a systematic review of the empirical international literature and insights from the employee turnover literature

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ABSTRACT

We present a conceptual framework of teacher turnover, which is guided by the broader employee turnover literature and supported by the empirical literature. Synthesising nearly forty years of international research on teacher turnover through a systematic review process, we organise the determinants of teacher turnover into nine categories grouped into personal correlates, school correlates, and external correlates. External correlates are defined as factors that are outside the individual or the workplace such as the general unemployment rate or union presence. For each category, we discuss the empirical results and their implications for teacher turnover. We also highlight gaps in the empirical literature and suggest policy levers to positively influence the teacher workforce.

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Teacher attrition; teacher retention; teacher labour market; systematic review; conceptual framework

Introduction

Teacher labour markets strongly affect learning outcomes and equity for students. Policymakers have spent a considerable amount of time working to recruit and keep qualified teachers in the classroom (Hanushek et al., 2004; Ingersoll & Smith, 2003; Loeb et al., 2012). In the United States, teacher quality is a rare point of bipartisan consensus in American education, with both No Child Left Behind (NCLB) and the Every Student Succeeds Act (ESSA) emphasising the importance of hiring and retaining high-quality teachers in every classroom. Internationally, many countries, such as England, India, Mexico, and Pakistan have also invested in schools, policies and interventions to incentivise and retain teachers (Barrera-Osorio & Raju, 2015; Foster, 2019; Muralidharan & Sundararaman, 2011; Ross & Hutchings, 2003; Santibanez et al., 2007). For instance, substantial efforts in England have been spent to examine how school organisational characteristics may improve teacher retention (Sims, 2020) as a preponderance of evidence indicates an important driver of the large variations in the teacher workforce

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among schools and districts is turnover. Scholars continue to conclude we need to learn more about teacher labour markets to better address the uneven distribution and quality of teachers (Feng & Sass, 2017; Ingersoll, 2001).

There are few comprehensive conceptual frameworks explaining why teachers stay or go. Individual studies of teacher turnover often present a tailored framework, focusing on a narrow range of factors such as the quality of a school as measured by student performance on standardised assessments. Although there are two frequently referenced reviews of teacher turnover (Borman & Dowling, 2008; Guarino et al., 2006), significant advancements in the empirical international literature over the past 15 years demands a more complete conceptual framework for organising the current state of the knowledge-base. Indeed, more than 130 empirical international studies conducted on teacher turnover have been published since these two papers were published, nearly four times the original studies reviewed in them.

Many recent studies on the determinants of teacher turnover also examine critically important new areas for research. Teacher evaluation, merit pay, and race and gender congruence have substantially expanded what we know about what drives teacher turnover (Barrera-Osorio & Raju, 2015; Feng & Sass, 2018; Grissom & Keiser, 2011; Pham et al., 2021). Additionally, the development of large longitudinal data systems, "big data," in the last decade has allowed researchers to empirically advance our understanding of teacher turnover using large sample sizes and rigorous quasi-experimental techniques. These developments not only offer new insights and the opportunity to develop a more comprehensive conceptual framework of teacher turnover, but also illustrate the need for them to be captured in a new conceptual framework of teacher turnover that helps advance educational research, practice and policy.

Given this need for a comprehensive conceptual framework of teacher turnover, in this study, we present a conceptual framework guided by theory and existing literature on employee turnover, of which teacher turnover is a subset. Our conceptual framework is further informed by a systematic review of the empirical literature. The questions guiding our review are:

(1) What are the conceptual and empirical determinants of teacher turnover?
(2) Are there gaps in the empirical research on teacher turnover? If so, what are they?
(3) What policy levers can be used to affect teacher turnover?

Literature review

Evolution of conceptual frameworks on teacher turnover

The evolution of conceptual frameworks on teacher turnover can be divided into three phases: (1) foundation building; (2) sector-specific applications; and (3) connections among research, policy, and practice. The foundation building phase includes the development of turnover as an area of study, leading to the second phase where the factors of teacher turnover become an independent field of study. The third and most current phase, containing the new developments integrated into our proposed conceptual framework, concerns the linkages among researchers, policymakers, and practitioners seeking to improve teacher workforce quality. Figure 1 provides a high-level overview

Foundation Building Phase			Sector-specific Phase		Research, Practice, and Policy
MS (1958)	*PS (1973)*	*CT (1986)*	*GSB (2006)*	*BD (2008)*	*Nguyen & Springer (2021)*
Decisions to Participate	Job Satisfaction	Personal Correlates	Teacher Characteristics	Personal Factors	Personal Factors
Decisions to Produce	Organizational Factors	Work Correlates	Teacher Qualifications	Teacher Characteristics	Teacher Characteristics
	Work Environment	External Correlates	Psychological Factors	Teacher Qualifications	Teacher Qualifications
	Job Content			School Factors	School Factors
	Personal Factors			School Org. Characteristics	School Org. Characteristics
				School Resources	School Resources
				Student Body Charact.	Student Body Characteristics
					Relational Demography
					External/Policy Factors
					Accountability
					Workforce
					School Improvement

Figure 1. Evolution of conceptual frameworks of teacher turnover. *Notes*: MS is March and Simon; PS is Porter and Steers; CT is Cotton and Tuttle; GSB is Guarino, Santibanez, and Daley; and BD is Borman and Dowling.

of major conceptual frameworks of teacher turnover and how they have evolved over time.

Foundation building

The foundation-building phase is characterised by the development of a comprehensive field of turnover (Cotton & Tuttle, 1986), which was first systematically documented in the 1950s, and by the 1970s its study began in earnest in the fields of organisational management, industrial and organisational psychology, sociology, and economics. The catalyst for this phase is often attributed to March and Simon's (1958) survey of organisational theory whereby they catalogued "the experience of executives, the scientific management movement, sociologists, social psychologists, political scientists, and economists, little of which had been well substantiated empirically" (Tosi, 2009, p. 7). While their work set the stage for establishing employee turnover as a field of study, and several influential studies were published in the general spirit of their conceptualisation of turnover (Hulin, 1966; Schuh, 1967), it was not until the 1970s that the study of turnover truly expanded, and with it came new frameworks, research agendas, and empirical examination of the determinants of turnover.

Porter and Steers (1973) published a highly influential review of turnover, delineating various factors that had previously been grouped generically as job satisfaction into five key categories: job satisfaction; organisational factors; immediate work environment; job content; and personal factors. For each of these categories, the likelihood of turnover is seen as the relationship between the level of return received by the organisation and an employee's expectations for what they should receive. Mobley et al. (1979) revisited the work of Porter and Steers (1973) finding more evidence to validate previous findings regarding the influence of age, tenure, job satisfaction, and job content, and concluding that education, pay, promotions, and peer interactions are less conclusively related to turnover than previously believed.

In the early 1980s, Bluedorn (1982) offered another prominent conceptual model for turnover. He identified Mobley et al. (1979) as a good, but imperfect, model for understanding determinants of employee turnover. Bluedorn (1982, p. 268) argued existing models of turnover "tend to be more complementary than contradictory", and that a more complete understanding of the turnover process needed to be developed, particularly given new research findings on the linkages between organisational commitment and turnover. His unified model of turnover emphasised two dimensions that were not all that different from prior work: opportunity-based factors such as promotion, greater reward, and number and quality of occupational roles; and individual characteristics such as job satisfaction, age, education, and marital status. However, where he truly contributed to the literature was a path analysis that showed job satisfaction feeding directly into one's organisational commitment, which subsequently informs whether one conducts a job search and ultimately leaves. The next highly influential meta-analysis and review by Cotton and Tuttle (1986) examined how workers' industry moderates the relationships between many independent variables and turnover, which, along with the aforementioned studies, helped catalyse sector-specific applications of employee turnover in fields like sales, healthcare, business. Cotton and Tuttle (1986) organised turnover determinants into three broad categories: personal correlates, work-related correlates,

and external correlates. Personal correlates capture how characteristics of the individual employee, like age, gender, education, marital status, number of dependents, and ability, influence turnover. Work-related correlates are variables associated with the workplace, like job and salary satisfaction, organisational commitment, and autonomy. External correlates include factors outside the individual or workplace, such as the general unemployment rate and union presence. They also concluded union status, pay, and education level are important predictors of turnover.[1]

Overall, these studies provided the foundation for the scholarly study of employee turnover and the factors that may influence turnover. Next we examine the conceptual frameworks used specifically for teacher turnover.

Sector-specific applications

As noted earlier, Figure 1 provides a high-level overview of major conceptual frameworks of teacher turnover and how they have evolved during the foundation building and sector-specific application phases. We start with the two frameworks most often used by educational researchers to motivate their study of teacher turnover. Guarino et al. (2006) put forward a conceptual framework for teachers based on the economic labour market theory of supply and demand. They found gender, race/ethnicity, ability, and psychological and family-related factors all influence who enters and leaves the profession. They concluded by categorising and examining policies that may positively affect the composition of the teacher workforce, like compensation policies, pre-service policies, and in-service policies. Their work is informed by, but goes further than, traditional foundation building literature, using the broad framing of economic labour market theory of supply and demand to summarise the driving forces of turnover within teacher labour markets specifically.

Borman and Dowling (2008) conducted a meta-analysis and narrative review of the research on teacher turnover that built on Guarino and colleagues. In their review of 34 studies, they identified over 60 factors that are empirically associated with teacher turnover, and these factors fall into five broad categories: teacher characteristics; teacher qualifications; school organisational characteristics; school resources; and student body characteristics. Teacher characteristics include age, gender, and race/ethnicity, while qualifications include teacher training, certification, experience, ability, and speciality area. School organisational characteristics include urbanicity and work environment, and school resources detail characteristics such as average class size and the availability of teaching materials. Lastly, student body characteristics capture student demographics at the school level that were associated with higher turnover in Guarino et al. (2006): socioeconomic composition, achievement level, and racial/ethnic composition. Borman and Dowling (2008) reported their meta-analytic results for each of these five categories.

While this study was more thorough than Guarino et al. (2006) in its examination of teacher turnover factors, the authors did not leverage the broader employee turnover literature, which had grown considerably as a result of pioneering work during the foundation building phase. The five categories that they formed are reasonable depictions of the numerous predictors of teacher turnover. Still, there was a lack of a conceptual framework explaining turnover in the broader workplace and policy contexts and they do not consider theoretical factors that may influence teacher turnover such as school

improvement and accountability policies. These latter points have more recently been integrated into studies of teacher turnover, and are a defining feature of the third phase in the evolution of conceptual frameworks.

Research, practice, and policy

The Research, Practice, and Policy phase is defined by an increased effort to improve the quality of the teacher workforce, which has been accompanied by an increased prevalence of longitudinal data systems, an expansion of the variables used to study turnover, particularly external factors that may be influenced to affect the teacher labour market, and a rise in the number and rigour of quantitative teacher turnover research. We identify four primary developments in the teacher turnover literature that have emerged during this phase: relational demography, accountability, school improvement, and workforce. We assert these new developments are essential for understanding what factors influence turnover decisions in schools and how to improve the teacher workforce quality.

Relational demography

A new area of development in the literature on teacher turnover comes from the field of relational demography, and the related fields of representative bureaucracy in political science (Fairchild et al., 2012; Grissom et al., 2015; Sohn, 2009) and self-categorisation theory in social psychology (Tsui et al., 1992; Turner & Oakes, 1986). Relational demography posits people are influenced by the composition of other people around them; that is, the degree of similarity in age, race, gender, or other characteristics between persons in regular contact in the workplace influences worker attitudes and behaviours (Tsui & O'reilly, 1989). The literature in this area suggests there are positive outcomes for teachers and students when there is race or gender congruence between teachers and principals, teachers and teachers, or teachers and students. Recent research in relational demography suggests teacher-principal race/gender matching and teacher-student race matching can positively influence teacher attrition.

Accountability

There have been major developments in state and national initiatives designed to attract and retain qualified teachers, which coalesce into a regime of accountability-based practices. Integral to the logic of accountability is that it is beneficial for low-performing teachers to leave the classroom, which therefore means that some attrition is good.

Murnane and Steele (2007) highlighted other proposed policies, such as the use of teacher evaluation and merit pay, that are meant to increase the supply of effective teachers and distribute them more equitably across schools and districts. Recent work has highlighted how teacher evaluation policies can impact teacher satisfaction, commitment, and retention (Marsh et al., 2011; Murphy et al., 2013; Koedel et al., 2017).

Some policies go beyond simply measuring teacher effectiveness and instead link individual teacher performance, most often determined by student performance, with consequences and rewards. In 2009, the Teacher Incentive Fund, a 600 USD million U.S. federal grant, wanted to spur student achievement by implementing performance-based compensation systems in high-need schools. Other state and regional merit pay

programmes have also been implemented and evaluated in the last ten years (Pham et al., 2021). There is evidence that these national, state, and local initiatives may influence the teacher labour market and teacher retention decisions (Harrell et al., 2004; Hill & Barth, 2004). Lastly, recent works have linked administrator or principal effectiveness to teacher satisfaction, commitment, and attrition (Boyd, Grossman et al., 2011; Grissom, 2011). Teacher evaluation and merit pay, federal policies such as NCLB, and principal effectiveness must be considered to accurately conceptualise teacher retention and attrition in the era of accountability.

School improvement

Recently, there have been numerous attempts at improving and evaluating schools. Many of these attempts have included a strong focus on teacher development and leadership (Bryk et al., 2015; Coburn & Penuel, 2016). These school improvement efforts aim to increase teacher engagement and develop the employee's capacity as a teacher and leader (Nguyen & Hunter, 2018). Both theoretically and empirically, these efforts can incentivise teachers to stay in their schools (Guarino et al., 2006). However, while such reforms have been in place for over a decade, only recently has there been any rigorous analysis of the effects of school improvement efforts on teacher turnover (Heissel & Ladd, 2018; Sun, Penner et al., 2017). These studies find school reforms and research-practice partnerships may indirectly affect the teacher labour market and therefore should be included in a framework for teacher turnover.

Workforce

Workforce determinants are drawn primarily from the generalised employee turnover literature (Cotton & Tuttle, 1986; Griffeth et al., 2000; Rubenstein et al., 2017). These workforce factors include the employment opportunities inside and outside of teaching, as well as those policies that can influence turnover at the district or state levels that are not related to accountability or school improvement efforts. This includes employment rate, teacher salary, non-teacher salary, late hiring, retention bonus, union presence, and tenure. The employee turnover literature indicates the overall employment rate and existence of alternative job opportunities generally influence whether people leave their current occupation (Griffeth et al., 2000), and these determinants can logically be extended to teacher turnover as teachers constitute one of the largest public employee groups in the world, particularly in the United States (Barbieri et al., 2011; C. T. Clotfelter et al., 2011; U.S. Census, n.d.). Others have also argued that understanding teacher turnover would contribute to understanding turnover broadly (Grissom et al., 2016). Late hiring, the practice of hiring teachers past the start of the school year, is another factor that may relate to teacher attrition (Cotton & Tuttle, 1986; Jones et al., 2011). Non-teacher salaries, teacher salaries,[2] and teacher retention bonuses could incentivise or disincentivize teachers from leaving the profession (Griffeth et al., 2000; Rubenstein et al., 2017). Lastly, tenure and pension reforms are expected to affect teacher turnover (Koedel & Xiang, 2017).

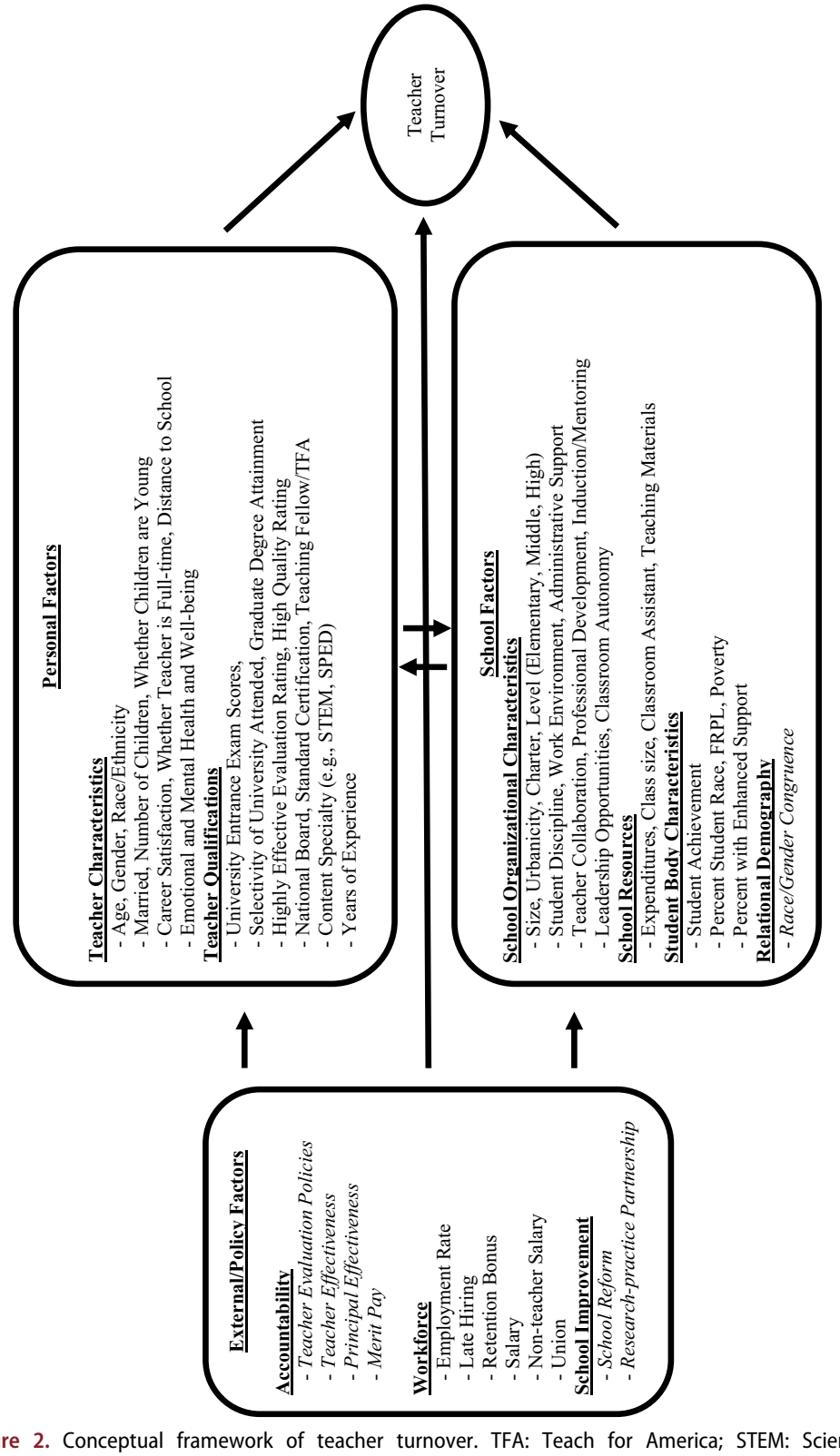

Figure 2. Conceptual framework of teacher turnover. TFA: Teach for America; STEM: Science, Technology, Engineering, Maths; SPED: Special Education; PD: Professional Development; Elem.: Elementary; FRPL: Free-or-Reduced Priced Lunch; Enhanced support includes IEP/LEP: Individualised Education Plan/Limited English Proficiency

A new conceptual framework on teacher turnover

With these additional developments and changes to the teacher turnover literature, we propose an updated conceptual framework to guide both our synthesis of the literature and the ongoing scholarship on teacher turnover. Adapting the findings from the employee turnover and synthesising the teacher turnover literature, we argue there are three primary categories – or "correlates" – that influence teacher turnover: (1) personal correlates, (2) school correlates, and (3) external correlates (Figure 1). Personal Correlates, which are subdivided into Teacher Characteristics, like age or gender, and Teacher Qualifications, like degree held or experience, have consistently been associated with turnover. School Correlates, which includes the subcategories School Organizational Characteristics, School Resources, Student Body Characteristics, and Relational Demography, recognises that the interactions between the individual

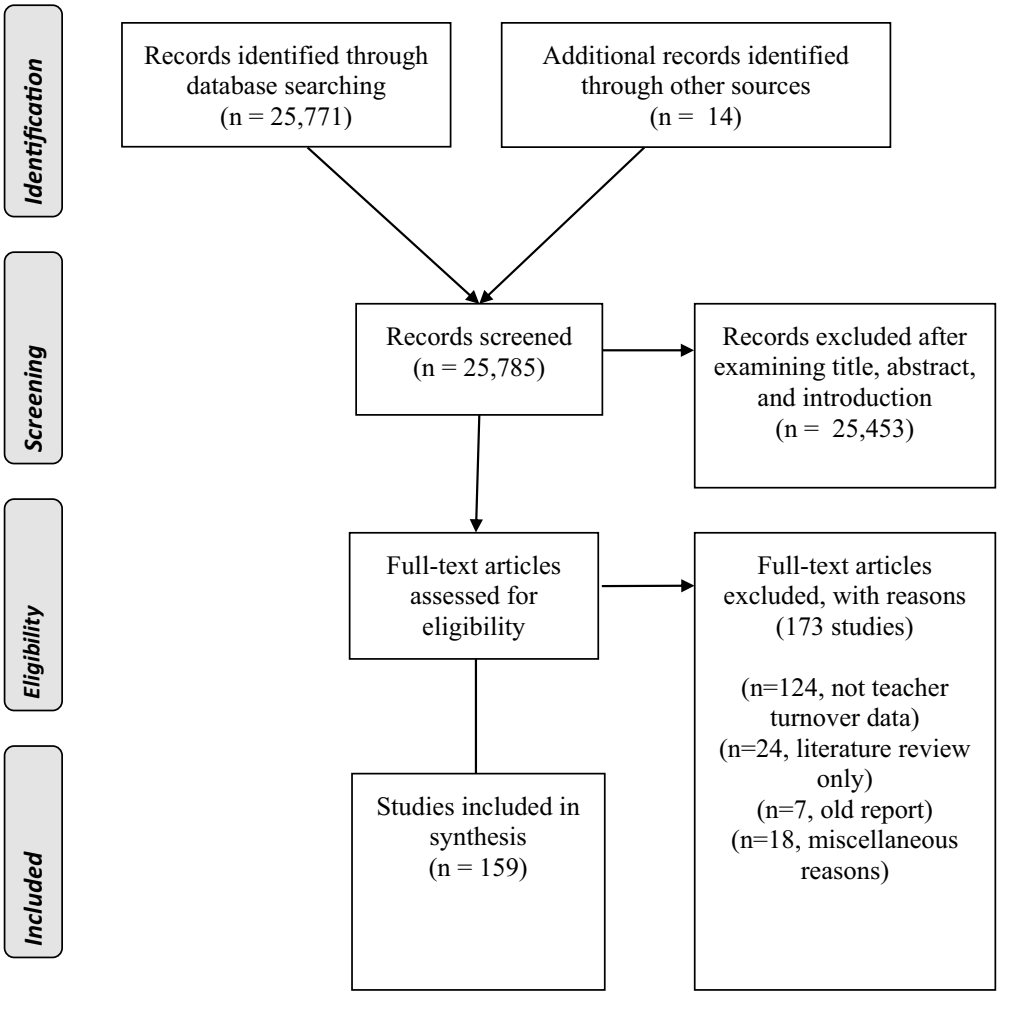

Figure 3. Flow diagram. This diagram depicts the literature screening process resulting in the final sample of primary studies included in the systematic review. Adapted from Moher et al. (2009).

employees and the workplace matter for individual turnover decisions. The School Correlates category encompasses both the physical conditions and the perceived social dynamics of the workplace. Our third category, External Correlates, with the subcategories Accountability, School Improvement, and Workforce, includes events or factors outside the individual and the workplace, like the broader job market or evaluation regime, which influence whether teachers will leave the profession. Our categories, and the subcategories and factors contained within them, capture correlates of teacher turnover that are theoretically relevant or empirically tested.

Figure 2 provides a visual representation of our conceptual framework for teacher turnover, with all factors not examined in prior works in italics. Table 2 elaborates on each factor within a category. Five of the nine subcategories are based on Borman and Dowling (2008) with four new categories, relational demography, accountability, school improvement, and workforce characteristic, that were discussed previously. While these four new categories are developed during the Research, Practice, and Policy phase, we refer to them as external/policy factors to reflect how these new factors are conceptualised and studied as levers to positively influence the teacher workforce. These external policy factors may directly influence teacher turnover since many accountability-based policies, such as merit pay and retention bonuses, explicitly aim to change the composition of the instructional staff in targeted schools (Rubenstein et al., 2017).

Moreover, Figure 2 depicts an innovation in the literature with arrows going from external factors to both personal and school factors. These arrows indicate how external conditions and policies can potentially influence teacher turnover by impacting both individual teachers and schools. For example, accountability-based teacher evaluation systems (Rodriguez et al., 2020) and school improvement efforts (Heissel & Ladd, 2018) will likely affect (1) the composition of teachers working in schools implementing these reforms and (2) the school's working conditions. Relatedly, bidirectional arrows between personal factors and school factors reflect the recognition that the fit between teachers and their schools is important (Jackson, 2013). Player et al. (2017) examine how principal leadership and person-job fit are both associated with lower odds of leaving the profession. Relatedly, racial/ethnic or gender congruence between teachers and principals may have positive effects on teacher attitudes and retention (Grissom & Keiser, 2011). Recent research also shows that, when it comes to teachers' decisions to work in low-performing schools, teachers express stronger preference for malleable school-level factors, namely administrative support and discipline enforcement, relative to fixed school characteristics such as prior achievement (Viano et al., 2020), even as teachers tend to prefer higher performing schools serving more affluent students (Feng & Sass, 2017; Jones & Hartney, 2017). To this point, however, strategic recruitment incentives can alter this negative sorting (Swain et al., 2019). This growing awareness of fit between teachers and schools has important implications for the equitable distribution of teacher workforce.

In short, our proposed conceptual framework reflects the evolution of the scholarly study of teacher turnover by capturing how personal correlates, school correlates, and external correlates are related to teacher turnover and how they may influence each other. We use this conceptual framework to synthesise and guide our discussion of updated results and novel results from the teacher turnover literature as well as to provide guideposts for future research.

Table 1. Results by database.

Database	Results
ERIC	5,667
WorldCat	4,909
NBER	4,270
ProQuest	4,634
DOAJ	3,491
JSTOR	1,111
Google scholar	1,000
Taylor and Francis online	689
Total	25,771

Search string: Teacher AND (attrition OR turnover OR retention OR leav* OR suppl* OR career OR attitudes OR mobility OR commit OR persist)

Data and method

In this study, we examine the determinants of teacher retention and attrition, or the factors that best explain why teachers persist or choose to leave the profession. To define the eligibility criteria, literature search, data analysis, and reporting conventions, we follow the Preferred Reporting Items for Systematic Reviews and Meta-Analysis standards as defined by Moher et al. (2009) (see Figure 3).

Eligibility criteria

Following Guarino et al. (2006) and Borman and Dowling (2008) and expanding on their inclusion criteria, the primary studies eligible for inclusion in this systematic review need to meet two criteria: first, the sample is comprised of teachers in K-12 education; and second, they must include one of the following criteria (a) characteristics of individuals who leave or remain in the teaching profession; (b) characteristics of schools and districts related to teacher turnover; (c) compensation policies such as teacher merit pay programmes that may affect teacher retention and attrition; (d) pre-service and in-service policies that affect teacher retention; or (e) other characteristics or factors that are related to teacher retention and attrition.

This review also takes advantage of new studies relying on longitudinal data that can capture dynamic teacher career trajectories, as well as studies that evaluate state and federal programmes and initiatives that impact teacher labour markets. Our review also separates factors that influence whether teachers stay or leave the professional entirely, distinguishing them from factors that may influence teachers to switch schools. One limitation of this work is that we do not assess the quality of the individual studies, which means some evidence is not as rigorous as others. The one area of research that is consistently more rigorous and more likely to provide causal estimates is the External correlates. These studies often rely on randomised controlled trials and quasi-experimental designs such as regression discontinuity and difference-in-differences. As such, the findings from external factors should be given more weight in scholarly work as well as policy implications.

Table 2. Coding and descriptions of determinants.

Determinant	Description
Teacher characteristics	
Age	Teacher's age expressed as continuous or less than 28/30 years old
Gender	Male vs. Female
Race/ethnicity	Black, Hispanic, non-White vs. White
Marital status	Married vs. non-married
Children	New child vs. no new child; number of children
Satisfaction	Teacher's satisfaction with their job
Full time teaching	Full time vs. part time teaching
Distance to school	Distance from teacher's house to school
Teacher qualifications	
Ability (test scores)	Teacher's ability or achievement as measured by standardised tests and grades (SAT/ACT/rank quartile)
Education selectivity	The selectivity of undergraduate education
Graduate degree	Degree (MA/PhD) vs. non-graduate degree/BA
Certification	Certification (traditional/regular) vs. no cert.
Highly qualified	Designated as highly qualified by NCLB/ESSA
Internship	Participated in teaching internship or field placement prior to teaching
Speciality area	STEM/special ed vs. regular
Experience	Teaching experience (continuous measure); Less than 3 years of exp v. 3 or more years
Prior experience	Prior non-teaching career experience vs. none
School organisational characteristics	
School size	Large vs. small schools; school enrolment size
Urbanicity	Urban vs. rural schools
School level	Secondary vs. elementary; high school/middle schools vs. elementary schools
School sector	Charter/private vs. traditional public
Work environment	Facilities, teaching assignments; school problems; teacher victimisation; student disciplinary problems
Administrative support	Measures of administrative support; teachers have regular supportive communication with administrators
Collaboration	Teacher collaboration; network of teachers
Leadership	Levels of teacher leadership or influence; teacher responsibility
Professional development	Measures of professional development; quality of professional development
Induction/Mentoring	Participation in induction/mentoring programme
Classroom autonomy	Levels of classroom autonomy
Stay ratio	Teacher retention rate at the school
School resources	
Expenditure	Expenditure for support per teachers (in dollar amount)
Class size	Teacher's average class size
Classroom assistant	Has a teacher aid/assistant vs. none
Teaching materials	Has adequate teaching materials
Student body characteristics	
Student achievement	Measures of average student achievement
Percent minority students	School-level percent of Black, Hispanic, or minority
Poverty	Majority of school is in low socioeconomic status; school-level percent of free and reduced price lunch
Percent IEP/LEP	School-level percent of individualised education programme (IEP) or limited English proficiency (LEP)
Relational demography	
Teacher-principal race/gender matching	Race and gender matching between teacher and principal
Teacher-teacher race match	Race matching between the teacher and other teachers in the school
Teacher-student race matching	Race matching between students and teacher
Accountability	
Assessment impact	Effect of assessment impact, classroom observation and other evaluations
Teacher effectiveness score	Teacher effectiveness score from value-added measures; high vs. low teacher effectiveness
Merit pay	Impact of merit pay programmes
Federal policies	Effects of federal policies such as NCLB or ESSA

(*Continued*)

Table 2. (Continued).

Determinant	Description
Principal effectiveness score	Principal effectiveness from school-level value-added measures; other measures of principal effectiveness such as factor scores (e.g. Redding & Smith, 2016)
School improvement	
School reform	Participation in some school reform such as Success for All
Research-practice partnership	Participation in a research-practice partnership
Workforce	
Employment rate	Overall employment rate in the state or district
Late hiring	Teachers hired late in the academic year
Teacher salary	Salary (in dollar amount); high vs. low
Retention bonus	Bonus given to teachers who stay in hard-to-staff schools or speciality subjects
Non-teacher salary	The salary of administrators and other opportunities
Union	Teacher has teacher union membership
Tenure	Effects of having tenure or tenure reform
Pension	Changes to pension plans

Literature search

We obtained primary studies by searching commonly used economic and general social science databases, including ERIC, WorldCat, ProQuest, JSTOR, NBER and EconLit. Through an iterative process, we created the following search string: teacher AND (attrition OR turnover OR retention OR leav* OR suppl* OR career OR attitudes OR mobility OR commit OR persist). We also searched for "grey" literature using Dissertation and Thesis Repositories in ProQuest. In addition to mining databases, our literature search included an examination of reference lists and previous reviews of the teacher retention and attrition literature (Borman & Dowling, 2008; Guarino et al., 2006; Johnson et al., 2005; Wilson et al., 2001). Our search extended through the first week of July 2018.

Studies meeting eligibility criteria

Starting with the results returned from our search of databases and previous reviews, we used a two-phase process to screen for primary studies that met all eligibility criteria as illustrated in Figure 3. First, we read the title, abstract, and introduction for all studies obtained in the original search. We retained a study if the title, abstract, or introduction mentioned that the study contained empirical results pertaining to teacher retention and attrition. Empirical results on teacher turnover are largely quantitative, but there are some qualitative and mixed methods, all of which are eligible; we consider literature reviews or policy recommendations based on prior works to be non-empirical. Search results can be found in Table 1. We also found an additional 14 studies in discussion with other experts in teacher turnover. In total, we screened over 25,000 studies. In phase two, we were left with 332 studies for full-text reading, where we assessed whether each study fitted the eligibility criteria outlined above. From this collection, we further excluded studies due to lack of relevant teacher turnover outcomes, non-empirical results, and duplicate reports. For multiple reports from the same study (e.g. a dissertation and corresponding journal article or reports from multiple years for the same evaluation), we kept only the most current publication. After screening, we were left with a sample of 159 studies that met all eligibility criteria.

Coding reports

We coded relevant information for each of the eligible studies using an improved taxonomy based on Borman and Dowling (2008). Our coding method included new factors that are theoretically or empirically tied to teacher retention and attrition, such as teacher-principal race match. The coding schema and descriptions are provided in Table 2. Three coders independently coded relevant information for each eligible study using a common coding schema. One coder coded all the studies while the other two coders split the eligible studies. Treating each cell of our coding matrix as an input, our coder agreement was around 95%. Any discrepancy was resolved by consensus among the coders.

Results and discussion

The literature on teacher turnover has grown substantially since the seminal works of Guarino et al. (2006) and Borman and Dowling (2008). With more than 10 years of additional research, particularly internationally, improved systematic search, and the availability of more detailed longitudinal data, the number of studies has vastly increased, providing more reliable results and introducing new categories and determinants of turnover. In some areas, we are able to offer more nuanced findings, and in others, we find results that contrast with prior findings. We are also able to synthesise new knowledge about what drives teacher attrition, identifying gaps in empirical research and suggesting policy levers that may reduce attrition and improve the teacher workforce.

Personal correlates

Teacher characteristics

Across more than a dozen studies, older teachers are generally less likely to exit the profession than younger teachers (e.g. Donaldson & Johnson, 2010; Nah, 2015). Studies consistently find many young teachers leave the profession within a few years of entry (Imazeki, 2005; Ingersoll & May, 2012; C. T. Clotfelter et al., 2011). In contrast to prior works, we find female teachers are not more likely to leave the system, a finding reinforced by more recent studies and studies with longitudinal data (Barbieri et al., 2011; Boyd, Lankford et al., 2011; Grissom et al., 2012).

While previous reviews have found all minority teachers are less likely to leave teaching (Borman & Dowling, 2008; Guarino et al., 2006), we find minority teachers (broadly defined as non-White teachers) and Black teachers are not more likely to leave than White teachers (C. Clotfelter et al., 2008; Djonko-Moore, 2016; Harrell et al., 2004; Kelly & Northrop, 2015; Smith & Ingersoll, 2004). However, across many studies, Hispanic teachers are less likely to leave teaching than White teachers (Adams, 1996; Dagli, 2012; Kukla-Acevedo, 2009; Moore, 2011; Newton et al., 2011; Sass et al., 2012). These results indicate retention rates are similar across most racial/ethnic groups, with the exception for Hispanic teachers.

Married teachers are not more or less likely to leave teaching than non-married teachers (Harrell et al., 2004; Kukla-Acevedo, 2009; Rees, 1991; Stinebrickner, 2002). Teachers with young children are not more likely to leave teaching (Arnold et al., 1993; Boe et al., 1998; Harrell et al., 2004; Stinebrickner, 1998, 2002). Full-time teachers are

significantly less likely to leave teaching compared to part-time teachers (Arnold et al., 1993; Beaudin, 1993; Jones et al., 2011; Smith, 2006; Smith & Ingersoll, 2004). Unsurprisingly, the more satisfied teachers are with their teaching career, the less likely they are to leave the profession (Cannady, 2011; Dagli, 2012; Kelly & Northrop, 2015; Renzulli et al., 2011). Lastly, as the distance between where teachers live and where they teach increases, the more likely they are to leave the profession, although there are only two studies on which to base these conclusions (Barbieri et al., 2011; Steele et al., 2015).

Teacher qualifications

Teacher qualification is a well-studied area of teacher attrition. First, teachers with more academic ability (as measured by GPA or standardised test scores) are slightly more likely to leave than teachers with less academic ability (e.g. Goldhaber et al., 2011; Perda, 2013; C. T. Clotfelter et al., 2011). Similarly, teachers who come from more competitive colleges are more likely to leave teaching than those from less competitive colleges (Boyd, Grossman et al., 2011; Erickson, 2007; C. T. Clotfelter et al., 2011). There is some dispute about the strength of those findings (Kelly & Northrop, 2015; Rickman & Parker, 1990), but our review suggests otherwise. There are many mixed and insignificant findings for teachers with graduate degrees compared to those with only undergraduate degrees or without any degrees (Djonko-Moore, 2016; Imazeki, 2005; Kelly & Northrop, 2015; Ondrich et al., 2008). Similarly, there are mixed findings about the effect of being highly qualified as defined by NCLB and the effect of internship experience (Connelly & Graham, 2009; Goldhaber, Krieg et al., 2016; Luke, 2014; Moore, 2011).

Several studies find teachers with regular or standard certifications are much less likely to leave teaching than those who do not have such certifications (e.g. Harris-McIntyre, 2013; Helms-Lorenz et al., 2016; Ingle, 2009; Johnson & Birkeland, 2003; Kelly, 2004; Luke, 2014). But there is also evidence that teachers in some alternative training programmes such as Professional Development Schools may be more likely to stay in teaching than traditionally trained teachers (Latham et al., 2015; Latham & Vogt, 2007).

The results also indicate teachers in certain subjects are harder to retain. STEM and special education teachers are more likely to leave the profession than those who teach other academic subjects (Cowen et al., 2012; Ingersoll & May, 2012; Ogundimu, 2014; Stinebrickner, 1998, 1999), particularly in high-needs schools (Billingsley, 2004, 2007; Ingersoll & May, 2012; Nguyen & Redding, 2018; Sass et al., 2012). Studies consistently find teachers in the first three years of teaching are more likely to quit teaching than veteran teachers (Boe et al., 1998; C. Clotfelter et al., 2008; Djonko-Moore, 2016; Jackson, 2012; Steele et al., 2015).

School correlates

School organisational characteristics

Studies generally find school size is not an important factor in teacher attrition (Goldhaber et al., 2011; Imazeki, 2005; Kelly, 2004; Mont & Rees, 1996). In contrast to previous reviews, recent studies do not consistently find urban teachers are more likely to leave teaching than rural teachers (Bradley et al., 2006; Donaldson & Johnson, 2010; Imazeki, 2005;

Jackson, 2012; Kelly, 2004; Moore, 2011; Smith, 2006). Studies generally find high school and middle school teachers are more likely to leave teaching than elementary school teachers, although many results are insignificant (Marso & Pigge, 1997; Smith & Ingersoll, 2004; Stinebrickner, 1998). Private and charter school teachers are more likely to leave teaching than traditional public school teachers (Hahs-Vaughn & Scherff, 2008; Redding & Smith, 2016; Sass et al., 2012; Stinebrickner, 1998; Stuit & Smith, 2012). Teachers who teach at hard-to-staff schools or schools with low stay ratios may be more likely to leave the profession than those teaching at schools with high stay ratios (Goldhaber, Krieg et al., 2016; Ronfeldt, 2012).

Research generally finds teachers are more likely to leave schools with higher student disciplinary problems or teacher victimisation (Djonko-Moore, 2016; Ingersoll & May, 2012; Kelly, 2004; Kraft et al., 2016) and national research, practice, and policy agendas are being developed to address violence directed at teachers. Relatedly, schools with better work environments as characterised by better facilities and fewer school problems also see less teacher attrition (Buckley et al., 2005; Martin, 2011; Moore, 2011; Stuit & Smith, 2012). Teachers who have stable teaching assignments, i.e. same subjects/courses, are also more likely to stay (Ost & Schiman, 2015). Across several studies, teachers are less likely to leave teaching in schools with stronger administrative support (Brown & Wynn, 2008; Eller et al., 2000; Luke, 2014; Urick, 2016) or with higher levels of teacher collaboration or cohesion (Fuller et al., 2016; Kraft et al., 2016). Comparable to administrative support, many studies find beginning teachers who participate in new teacher induction and/or mentoring are also less likely to leave teaching than those without (Cannady, 2011; Luke, 2014; Mihaly et al., 2015; Smith, 2006). This is particularly true for teachers whose mentors have previous experience working in the same school (Rockoff, 2008). However, a well-known randomized controlled trial finds that a comprehensive induction programme had no effects on teacher retention in the first four years of their careers (Glazerman et al., 2010). On the other hand, others have found urban mentoring programmes could drastically cut down teacher attrition (Papay et al., 2012). Relatedly, teachers who indicate they have good in-service professional development are less likely to leave (Coldwell, 2017; DiGaudio, 2017; Erickson, 2007). To this point, Allen and Sims (2017) find that continuing professional development substantially improves teacher retention.

Teachers with higher classroom autonomy are also less likely to leave than those without (Dagli, 2012; Ingersoll & May, 2012). Surprisingly, there are mixed reports of the influence of leadership on teacher attrition. Some studies find teachers' reports of high levels of principal leadership or influence reduces the likelihood of leaving (Jackson, 2012; Kraft et al., 2016; Ladd, 2011). Other researchers find that teachers' reports of high levels of teacher leadership and influence increases likelihood of leaving (Boyd, Lankford et al., 2011; and Dagli, 2012). And still others find that teachers who participate in a teacher leadership programme or are given the opportunity for more responsibilities and leadership may be more likely to remain in the classroom (Larazev et al., 2017; Shaw, 2016; Sun & Wang, 2017).

These results suggest there are many school organisational characteristics that could be influenced to lower teacher attrition. In particular, lowering student disciplinary problems, improving work environment, increasing administrative support, providing better professional development and induction/mentoring for beginning teachers, and

affording teachers more classroom autonomy are all viable routes to reducing teacher attrition.

School resources

Though the relationship between school resources and student achievement has been well studied, the relationship between school resources and teacher attrition has not been so closely established. First, there are mixed findings on the relationship between the school expenditure for support per teacher, such as providing classroom assistants, and teacher attrition (Gritz & Theobald, 1996; Imazeki, 2005; Kirby et al., 1999). Specific investments like providing classroom assistants or teacher aides, or reducing classroom size, do not seem to reduce the likelihood of teachers leaving the profession (Barbieri et al., 2011; Feng, 2010; Gritz & Theobald, 1996). However, providing adequate teaching materials to teachers does seem to matter (Gritz & Theobald, 1996; Loeb et al., 2005; Smith, 2006; Stevens, 2010).

Student body characteristics

The most significant development in this area over the last decade is the study of how student achievement relates to teacher attrition. Scholars generally find teachers are less likely to leave teaching in schools with better student performance (Loeb et al., 2012; Newton et al., 2011; West & Chingos, 2009). While the result may not be surprising, it is surprisingly strong, closely tracking increases in average student test scores as well as comparisons between high- and low-performing schools.

A more intriguing finding is that while teachers in high-minority schools are more likely to leave the profession than those in low-minority schools, (Dagli, 2012; Hahs-Vaughn & Scherff, 2008), increases in the percentage of Black students, percentage of Hispanic students, or percentage of minority students overall in a given school are not consistently associated with increases in teacher attrition (Boyd, Grossman et al., 2011; Feng, 2009; Goldhaber et al., 2011; Imazeki, 2005; Ingle, 2009; Kelly & Northrop, 2015; Newton et al., 2011). These findings suggest that, as a percentage increase, the influence may be too small to detect or that the relationship between the percentage of minority students and teacher attrition is not a linear relationship. Relatedly, the percentage increase in students eligible for free- and reduced-price lunch (FRPL) does not seem to be highly correlated with teacher attrition (Feng, 2009; Gritz & Theobald, 1996; Hansen et al., 2016). It may be the case, however, that percentage increase in FRPL may not adequately capture the difference between schools in poverty conditions and affluent schools. When high-poverty schools are defined differently, such as the majority of students with low socio-economic status, some studies find teachers are slightly more likely to leave teaching in high-poverty schools than low-poverty schools, but almost all of the findings are statistically insignificant (Dagli, 2012; Eller et al., 2000; Fulbeck, 2014; Luke, 2014). Lastly, the percentage increase in students with special needs is not associated with changes in teacher attrition (Djonko-Moore, 2016; Falch & Rønning, 2007; Feng, 2010; Ingle, 2009; Moore, 2011). In short, there is only weak evidence that student body characteristics significantly influence attrition, except for student achievement.

Relational demography

Grissom and Keiser (2011) and Harris (2007) find teachers are less likely to leave teaching when they are of the same race as the principal. To a smaller extent, teachers are also less likely to leave teaching when they are of the same gender as the principal (Grissom et al., 2012). Teachers are also less likely to leave teaching when the majority of students that they teach are of the same race/ethnicity as them (Allensworth et al., 2009; Feng, 2009). Generally, these studies indicate race/ethnic and gender congruency may lower the likelihood of teacher attrition. This is a promising area that needs further research as the findings have implications for both teacher attrition and social equity. Moreover, thinking about outcomes as the result of interpersonal interactions explains the micro-level processes through which race-congruency affects student-teacher interactions, such as how teachers' perceptions of students differ by race (McGrady & Reynolds, 2013; Morris, 2005), teachers view students' behaviour as a function of race (Downey & Pribesh, 2004), and student-teacher relationships are affected by race (Cherng & Halpin, 2016; Crosnoe et al., 2004).

External Correlates

Accountability

The factors in this category – assessment impact, teacher effectiveness score, merit pay programme, and principal effectiveness score – present exciting developments in the literature on teacher attrition. Almost all of the studies addressing these accountability factors were published after (Borman & Dowling, 2008) review. We note the majority of the studies in this area employ RCTs and quasi-experimental designs to provide their estimates. As such, we consider the evidence in this area to be more rigorous than more correlational works that populate the personal and school correlates.

Assessment impact is defined as the influence of being assessed or evaluated, including for accountability purposes. Contrary to concerns that teacher evaluation would have deleterious effects on retaining teachers, researchers have provided causal evidence that, on average, teachers who are being assessed or evaluated, even for accountability purposes, are not more likely to leave teaching (Boyd, Lankford et al., 2008; Feng, 2010). Some studies even find teachers are less likely to leave when they are evaluated (Boyd, Grossman et al., 2008; Nah, 2015). Digging deeper, Feng (2010) finds teachers who experience a substantial increase to their accountability score, a "positive shock," are more likely to stay; those who experience a substantial decrease, a "negative shock," are more likely to leave. Overall, the effect of being evaluated does not appear to have drawbacks in terms of attrition and may even have positive effects for retaining more effective teachers and removing less effective teachers.

Related to teacher assessment and accountability is the quantification of teacher effectiveness as measured by a composite evaluation score or value-added scores. Numerous studies find more effective teachers are less likely to leave teaching (Beteille et al., 2009; Boyd, Lankford et al., 2008; Feng & Sass, 2018; Goldhaber et al., 2011; Ingle, 2009; Loeb et al., 2012; Steele et al., 2015). These findings hold across a range of different evaluation measures and policies related to such scores (Boyd, Lankford et al., 2008; Feng & Sass, 2018; Goldhaber et al., 2011; Loeb et al., 2012). Some researches even provide causal estimates related to evaluation scores (Beteille et al., 2009; Krieg, 2006; Feng & Sass,

2018; Loeb et al., 2012). Teachers are less likely to leave teaching in high-performing environments as their own performance or their peers' performance increases. Moreover, teachers may be more likely to be retained in the top scoring schools (Boyd, Grossman et al., 2008; Loeb et al., 2012), and two studies provide further evidence suggesting that poorly performing teachers – those in the bottom quartile or quintile in terms of value-added scores – are also more likely to leave (Goldhaber et al., 2011; Loeb et al., 2012). The overall results from these studies examining teacher effectiveness indicate that teacher effectiveness scores can potentially change the composition of the teacher workforce. Depending on how they're implemented, these scores could provide positive effects at both ends of the distribution, retaining the highly effective teachers while encouraging highly ineffective teachers to depart the profession.

A parallel trend to the use of teacher effectiveness scores is the proliferation of teacher merit pay programmes in the past decade. Merit pay programmes are intended to increase student outcomes such as test scores, and one possible mechanism of improving test scores is changing the composition of the teacher workforce (Pham et al., 2021). Across more than a dozen studies, most of the results indicate that merit pay programmes have positive effects on teacher attrition by retaining effective teachers (Bayonas & Barker, 2010; Choi, 2015; Cowan & Goldhaber, 2015; DiGaudio, 2017; Fulbeck, 2014; Glazerman et al., 2013; Glazerman & Seifullah, 2012; Shifrer et al., 2017; Springer et al., 2010, 2008). Moreover, these studies find merit pay can keep teachers in their current school and keep teachers from leaving the profession (e.g. Booker & Glazerman, 2009; C. Clotfelter et al., 2008; Fulbeck, 2014). However, some studies find the impact of merit pay may be short-lived or when they are taken away (e.g. Steele et al., 2010), and other studies find null effects, suggesting the need for further research (Dee & Wyckoff, 2015; Fryer, 2013; Springer et al., 2009; Steele et al., 2010). In a subgroup analysis, Hough (2012) finds that merit pay reduces the probability of attrition by nearly 15 percentage points in hard-to-staff schools. Most of these studies also provide causal estimates, in contrast to observational studies that are prone to omitted variable bias. Taken together, these results strongly suggest that merit pay has net positive effects on teacher retention.

Relatedly, three studies examine the effect of accountability from the No Child Left Behind (NCLB) Act. Sun, Saultz et al. (2017) report a slight increase in teacher attrition with NCLB in the early years and a slight decrease in the latter years. However, both of these findings are statistically insignificant and imprecisely estimated, making it impossible to draw firm conclusions from the study. Shirrell (2018) finds that only NCLB subgroup accountability – the requirement to measure and report student achievement disaggregated by race, income level, and special education status – may have affected attrition rates. In particular, Black teachers are less likely to leave teaching under the subgroup accountability. Relatedly, Sallman (2018) finds standards-based accountability under NCLB has differential effects for White, Black, and Hispanic teachers. The body of research thus far suggests that NCLB accountability may have had little to no effect on the overall attrition rate, but it may have had heterogeneous effects on various subgroups of teachers.

Finally, there has been progress in the study of principal effectiveness and teacher attrition. There are still only a few studies in this area, but Beteille et al. (2009) find that

higher principal effectiveness can decrease attrition for teachers with high value-added scores. Similarly, both Grissom (2011) and Redding and Smith (2016) report that higher principal effectiveness may be associated with decreased likelihood of teacher attrition, though both of their results are statistically insignificant. Most recently, researchers have found that more effective principals are able to retain more teachers, especially highly performing teachers (Grissom & Bartanen, 2019). The current evidence tentatively suggests principal effectiveness can decrease teacher attrition, but more studies are needed to bolster these findings.

School improvement

Even though school-wide reform efforts have been around for decades, there has been little rigorous evaluation of how they could influence teacher turnover. We were able to find only two studies in this area. However, both these studies are high-quality and provide causal estimates. Using a regression discontinuity design, Heissel and Ladd (2018) find there is some increase in teacher turnover during implementation of school turnaround effort in North Carolina and that this increase in turnover is partly attributed to increased administrative burdens. Sun, Penner et al. (2017) find that San Francisco Unified Schools that received School Improvement Grants – which focus on improving the lowest-performing schools through competitive incentives and prescriptive reform – are more likely to retain effective teachers and less likely to retain teachers based on seniority in a difference-in-differences design. Similar to student outcomes, these two studies illustrate that the programme characteristics and the implementation of school improvement efforts – not the substance of the reforms in and of themselves – may affect teacher turnover (Murphy, 2011).

Workforce

As researchers are only beginning to examine how external factors outside personal correlates and school correlates are associated with attrition, there are only a few studies in this category. The notable exception is around teacher salary, where there has been significant research. In terms of the percent employment rate in the area, two studies provide mixed findings, with no firm conclusion about what role local unemployment might have on teacher attrition (Goldhaber et al., 2011; C. T. Clotfelter et al., 2011). The practice of late hiring of teachers, however, is highly and significantly associated with more teachers leaving the profession (Jones et al., 2011).

Across nearly 30 studies, the general result is that increases in salary reduce the likelihood of teachers leaving the profession (e.g. Bradley et al., 2006; Dolton & Van Der Klaauw, 1999; Scafidi et al., 2007; Stinebrickner, 1998, 1999, 2002; C. T. Clotfelter et al., 2011). When salary is measured as an increase per 1,000, USD its influence on teacher attrition is small but still positive (Harris, 2007; Feng, 2010; Fulbeck, 2014; Kirby et al., 1999). When it is operationalised as high salary compared to low salary, the influence remains positive but modest (Boe et al., 1998; Harris, 2007; Garcia et al., 2009; Kelly, 2004; Shin, 1995). Researchers have generally found that retention bonuses can reduce teacher attrition (Feng & Sass, 2018; Springer et al., 2015). We note, however, that many salary compensations may be short-lived, low amount has little to no impact, and effects may dissipate as salary incentives are reduced or removed (Bueno & Sass, 2018; Clotfelter et al., 2008; Feng & Sass, 2018; See et al., 2020).

Competition from external opportunities presents a challenge to teacher retention. Not surprisingly, increases in non-teacher salary, meaning better paying opportunities outside of the teaching field, can make it harder to retain teachers (Dolton & Van Der Klaauw, 1999; Eller et al., 2000; Gilpin, 2011; C. T. Clotfelter et al., 2011). One robust finding in this category is the influence of union membership on attrition. Researchers have found that teachers are significantly less likely to leave teaching when they have union membership (Kelly & Northrop, 2015; Kukla-Acevedo, 2009; Moore, 2011; Redding & Smith, 2016). Laws such as Wisconsin's Act 10 in the U.S., a 2011 law that weakened teacher unions and capped wage growth, can significantly increase attrition (Biasi, 2017; Roth, 2017). However, while the rhetoric around laws like Act 10 is that they force low-performers to exit, research is still needed to understand if there is differential attrition particularly by levels of teacher effectiveness when union membership lags.

Lastly, a number of U.S. states have made changes to tenure laws within the last several years, with mixed findings on teacher attrition. Goldhaber, Hansen et al. (2016) find extended tenure reduced teacher absences in Washington, and teachers with more absences are more likely to leave the profession in North Carolina, but there is little evidence that teacher attrition is related to tenure extension. However, Loeb, Miller, and Wyckoff (2015) find tenure extension reform in New York induced teachers whose tenures were delayed by extension to leave their schools and be replaced by more effective teachers. Similarly, Strunk et al. (2017) find the elimination of teacher tenure in Louisiana increased teacher attrition by about 1.4 percentage points. Tenure reform remains a developing area in teacher turnover, so there is substantial room for more research to probe deeper and provide a more robust and nuanced picture of how these external forces can shape teacher attrition.

Contrasting findings

First, we highlight some findings that differ from previous reviews. New studies find that female teachers are not more likely to leave teaching than male teachers (Barbieri et al., 2011; Boyd, Lankford et al., 2011; Grissom et al., 2012), and that teachers with graduate degrees are not consistently more likely to leave teaching than those without graduate degrees (Djonko-Moore, 2016; Harrell et al., 2004; Imazeki, 2005; Kelly & Northrop, 2015; Newton et al., 2011). Recent studies also find urban teachers are not more likely to leave teaching than rural teachers (Donaldson & Johnson, 2010; Imazeki, 2005; Jackson, 2012; Kelly, 2004; Moore, 2011; Smith, 2006). Recent studies also consistently find teaching in speciality areas such as STEM or special education significantly increases the odds of attrition (Cowen et al., 2012; Grissmer & Kirby, 1992; Ingersoll & May, 2012; Kirby et al., 1999; Nguyen & Redding, 2018; Ogundimu, 2014; Stinebrickner, 1998, 1999). In these cases, there may be two possible reasons why there are contrasting findings: (1) better measure, meaning the additional studies provide a more accurate picture of what influences turnover; and (2) a shifting landscape, meaning the influence of these factors may have meaningfully changed over time.

More detailed findings

In several areas, our analysis is able to contribute more nuanced details to the established understanding of turnover. Recent studies find only Hispanic teachers have reduced odds of attrition relative to White teachers, at least in studies where researchers differentiate between Black, Hispanic, and any minority teachers (Adams, 1996; Dagli, 2012; Kukla-Acevedo, 2009; Moore, 2011; Newton et al., 2011; Sass et al., 2012). More recent studies also find stronger evidence that teacher satisfaction plays an important role in teacher decisions to leave or stay in teaching (Cannady, 2011; Dagli, 2012; Kelly & Northrop, 2015; Renzulli et al., 2011). Additionally, full-time teachers are less likely to leave teaching than part-time teachers (Arnold et al., 1993; Beaudin, 1993; Jones et al., 2011; Smith, 2006; Smith & Ingersoll, 2004). Studies continue to find that teachers with regular or standard certification are less likely to leave teaching than those without such certification, though there is inconclusive evidence regarding specific training programmes, National Board certification, and Teach For America (Harris-McIntyre, 2013; Helms-Lorenz et al., 2016; Ingle, 2009; Johnson & Birkeland, 2003; Kelly, 2004; Luke, 2014; Newton et al., 2011). We clearly need to know more about the long-term impact of these programmes on teacher retention, something that is just now feasible given statewide longitudinal data systems.

In terms of school correlates, studies consistently find that middle and high school teachers are more likely to leave teaching than elementary teachers (Marso & Pigge, 1997; Smith & Ingersoll, 2004; Stinebrickner, 1998). Over dozens of studies, various measures of school characteristics – namely student disciplinary problems, administrative support, professional development, and classroom autonomy – strongly influence whether teachers stay or leave teaching (Boyd, Grossman et al., 2011; Buckley et al., 2005; Djonko-Moore, 2016; Ingersoll & May, 2012; Kelly, 2004; Kraft et al., 2016; Loeb et al., 2005). In terms of school resources, providing adequate teaching materials seems to play an important role (Gritz & Theobald, 1996; Loeb et al., 2005; Smith, 2006; Stevens, 2010). Somewhat surprisingly, most student body characteristics do not seem to influence turnover, at least not to a significant degree (Boyd, Lankford et al., 2011; Feng, 2009; Goldhaber et al., 2011; Gritz & Theobald, 1996; Hanushek et al., 2004; Imazeki, 2005; Ingle, 2009; Kelly & Northrop, 2015; Loeb et al., 2005; Newton et al., 2011; Smith, 2006). And, as noted earlier, an important area for future study is better understanding the relationship between school-specific social structures, individual teachers' perceptions of the work environment, and subsequent turnover decisions. In terms of external correlates beyond teacher or school characteristics, we synthesise and present several additional factors (e.g. assessment impact, teacher effectiveness scores, merit pay) and show how they may influence teacher turnover.

Policy levers

In terms of policy levers, it is clear that some teachers need additional support or incentives to keep them in the teaching profession. Young teachers, new teachers, STEM teachers, and special education teachers are particularly at risk for leaving the profession. We have compelling evidence that there are school organisational characteristics, such as reducing student disciplinary infractions, administrative support,

teacher collaborations, targeted professional development, and classroom autonomy, which could substantially reduce the risk of attrition if properly addressed (e.g. Gonzalez et al., 2008; Sims, 2020). In particular, educators and policy-makers should consider working with schools to create and advance school environments where strong administrative support, consistent teacher collaboration, and meaningful professional development could make new and speciality teachers more likely to persist. While there are some efforts already underway (Podolsky et al., 2016), the field needs more experimentation and rigorous evaluations of these implementations.

Our review also found empirical evidence to suggest that teacher assessment does not necessarily increase attrition. On the contrary, it may provide teachers with the possibility of growth and direction of improvement, leading to an increase in self-efficacy and a corresponding decrease in attrition (Boyd, Lankford et al., 2008; Feng, 2010). When teacher evaluations are used for accountability or for merit pay, teachers are actually *less* likely to leave the profession. (Pham et al., 2021). Evaluation and accountability may improve the teacher workforce by keeping the most effective teachers and removing ineffective teachers. In other words, evaluation and accountability may have more positive effects for teachers than previous literature has suggested (P. L. Wells, 2011). There may be unintended negative consequences and valid concerns for evaluation and accountability measures (Darling-Hammond, 2013; Darling-Hammond et al., 2012), but as a policy tool, they represent a promising avenue for further exploration.

Empirical gaps

Even though there has been substantial research on teacher turnover, there are three critical areas in need of future research: (1) how teachers' emotional and mental health contribute to their turnover decisions; (2) the interplay between personal and school factors; and (3) rigorous examination of the mechanisms through which external factors and policies affect teacher turnover. First, though there has been substantial research on teachers' emotional and mental health and well-being (Chang, 2009; Gibbs & Miller, 2013; Schutz et al., 2009), there has been little research on how they are associated with teacher turnover. For instance, research has shown school conditions and student misbehaviour are associated with teacher dissatisfaction and burnout (Aloe et al., 2014; Conley & You, 2009; Horng, 2009) and how teacher dissatisfaction and burnout are associated with teachers' intention to leave but not actual teacher turnover (Kersaint et al., 2007; Sass et al., 2011; Skaalvik & Skaalvik, 2010). Teachers with increased dissatisfaction or burnout are more likely to intend to quit, but it is unknown whether this translates to actual turnover. Our synthesis reveals very little is known about how teachers' psychological and mental health may contribute to teacher turnover. Based on existing evidence, we hypothesise that increased burnout or dissatisfaction would lead to more turnover, holding all else constant.

Second and relatedly, researchers have begun to explore how teacher characteristics fit within their current school context and how teacher-school fit may influence turnover. Some studies have examined how the racial/ethnic and gender congruence between teachers and principals may reduce turnover (Grissom et al., 2012), but these studies are only providing preliminary and associational evidence. Moreover, person-in-school or cross-level effects that consider issues of cultural and demographic match and tokenism

(such as Kanter's performance pressures, boundary heightening, and role entrapment) should be examined. While there is a lot of research on how these issues relate to students (e.g. Nishina et al., 2019; Saft & Pianta, 2001), there is far less understanding about their impact on teachers and no known studies on subsequent exit decisions. Furthermore, the idea of fit extends beyond demographic matches, including opportunity for collaboration and leadership and expectations of school norms and values. While a recent paper has provided early evidence for teachers' preference for administrative support and discipline enforcement in deciding where they teach (Viano et al., Online first, 2020), future research should examine how teacher preferences may influence their turnover decisions from year to year.

Third, our synthesis suggests external and policy factors are likely to have effects on teacher turnover as well as the personal characteristics of teachers and working conditions in schools, but some factors have limited evidence and more importantly, the precise mechanism through which the policies affect turnover is largely unexplored. For instance, our systematic review reveals only two rigorous empirical studies of how school improvement efforts influence teacher turnover. Likewise, as the research community gain access to better longitudinal data, we can and should examine how mandated school reforms could affect the teacher labour market. In terms of mechanisms of turnover, even as studies provide more rigorous evidence that policies can affect turnover, little is known about the *how*. For instance, implementations of teacher merit pay programmes and teacher evaluation are both associated with reduced teacher turnover, but we are unaware of any rigorous quantitative studies that use mediation methods to formally test proposed mechanisms. We urge future research to rigorously examine how personal, school, and policy factors drive turnover. We are encouraged, however, that more contemporary studies are employing rigorous designs such as difference-in-differences to provide plausibly causal estimates for teacher turnover (e.g. Fuchsman et al., 2020; Kraft et al., 2020; Nguyen, 2021)

Conclusion

This review makes several contributions to the study of teacher turnover. We present a comprehensive conceptual framework of teacher turnover that is guided by broader employee turnover literature and supported by the empirical international literature. Using updated systematic review methods, leveraging the broader employee turnover literature, and drawing on more than a decade of additional worldwide research on the factors of teacher turnover (particularly useful given the proliferation of large, longitudinal datasets and data management systems), we categorised the determinants into nine subcategories grouped under three primary categories: *personal correlates, school correlates*, and *external correlates*. For each category, we discussed the empirical results and their implications for turnover, and we highlight the gaps in the empirical literature and the possible policy levers to positively influence the teacher workforce. Through the systematic review and synthesis of the literature, we have created a framework that can be used to study and advance the field's knowledge on teacher turnover, synthesise the results of nearly 40 years of research, and provide guideposts for future research in this area of scholarly study.

Notes

1. Other important reviews include Griffeth et al. (2000) and Rubenstein et al. (2017).
2. Salary was moved to the workforce category instead of school resources since salary is mostly set at the district level in the U.S. and principals have only minor influence on salary via additional job duties.

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