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Effects of Administrator Evaluation Policy on Teacher Working Conditions and Turnover Regression

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Abstract
In 2010, North Carolina implemented a revised school executive evaluation instrument requiring school principals to utilize Teacher Working Conditions (TWC) as a component of the school improvement process which, prior to 2010, was optional. Teacher Working Conditions had been heralded as a way to improve student outcomes as well as address those conditions which caused teachers to leave a school. This study used data from 2004-2016 in piecewise regression and found that 1) teachers reported higher satisfaction beginning in 2010, 2) impact on turnover was less clear, and 3) according to teachers, use of the survey results to improve schools is inconsistent.

Keywords: *Teacher Working Conditions, School Administrators, Policy, Evaluation*

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Introduction

The most recent data on teacher turnover claims that it remains around 8% in North Carolina; concomitantly, educator preparation programs have experienced a significant decline in enrollment and production, with some down 25% since 2010 (Hinchcliffe, February 8, 2019). Historically, turnover has remained steady at approximately 12-14%. This recent one-year change is welcomed, but it remains to be seen if this change is a trend or a onetime aberration. Additionally, Hinchcliffe states that currently many North Carolina school systems face a shortage of elementary educators along with other high need areas such as secondary math and science teachers. As has been well documented, the shortage of teachers is not isolated to North Carolina. A recent article by Sutcher, Darling-Hammond, and Carver-Thomas (2019) provided a realistic, but grim, forecast of the supply of teachers in the United States, as they claim that in 2017-18 there will be a shortage of approximately 112,000 teachers. A multitude of efforts have been presented to address these issues nationally (see below) and, in particularly, in North Carolina. To address the conditions in which teachers work, beginning in 2010, North Carolina administrators were required to use Teacher Working Condition (TWC) survey results in school improvement (North Carolina Department of Public Instruction [NCDPI], 2019). The impetus behind the original implementation of the TWC in North Carolina was, among other motivations, an attempt to better understand how teachers see their working conditions to improve said conditions and ultimately affect turnover and teacher shortages (Hirsch, 2005). The purpose of this paper is to estimate the effects of state policy on school-level performance indicators to address, in part, the gap which exists between research and practice as posited by Cohen and colleagues (2009).

Policy and Teacher Turnover

The association between TWC and teacher attrition (turnover) appears well established. In general, as working conditions decline, or at least are perceived as unsupportive, teachers tend to leave for schools where they can be more successful, believe that they will receive greater administrative support, and/or have improved relations and collaboration with peers, school safety, and empowerment (Borman & Dowling, 2008; Boyd, Grossman, Ing, Lankford, Loeb, & Wyckoff, 2011; Hirsch & Church, 2009; Johnson, Kraft, & Papay, 2012; Kraft & Papay, 2014; Kraft, Marinell, & Yee, 2015; Ladd, 2011; Loeb, Hammond, & Luczak, 2005; New Teacher Center, 2014). Considering such working conditions from a practical perspective, recent reports point to a need to focus on working conditions to address teacher turnover and the difficulty, particularly in North Carolina, in hiring either replacement or new teachers (Hinchcliffe, February 8, 2019; Learning Policy Institute, August 24, 2017; NCDPI, 2019).

More recent studies have shown that assessing school leadership as a component of TWC is imperative given the influence of school principals on teacher turnover (Kraft, Marinell, & Shen-Wei Yee, 2016; Learning Policy Institute, 2017). Taking this further, Carver-Thomas and Darling-Hammond (2019) suggest that to address attrition and shortages, school districts should assist school administrators in providing teachers with supportive and nurturing school environments. They point to research demonstrating that such efforts can yield positive outcomes for both students and teachers (Darling-Hammond, LaPointe, Meyerson, Orr, & Cohen, 2007; Sutcher, Podolsky, & Espinoza, 2017). In addition to focusing on the work school administrators do to foster more

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supportive school environments, it has also been suggested that such shortages and attrition could be ameliorated by increasing compensation and develop a recruitment process that targets potential new teachers (Carver-Thomas and Darling-Hammond, 2019).

In North Carolina at least, it is clear that the voice of the teacher has been heard. Policymakers have adjusted certain aspects of the system that indicate the importance of teacher opinions, as early TWC analysis indicated that teacher perceptions of their schools were associated with student performance (Hirsch, 2005). The importance of the voice of the teacher is reflected in the 2010 revision of the school executive annual evaluation instrument used in North Carolina (NCDPI, 2015). The intent is clear, as in the revised evaluation manual it clearly states that the principal "Utilizes data from the NC Teacher Working Conditions Survey in developing the framework for continual improvement in the School Improvement Plan" (p. 12). Evaluating policy has been, and continues to be, considered vitally important in understanding how legislation at the national, state, and/or local levels can influence educational outcomes (see Vedung, 2017).

Given that policy evaluation is a critical element in overall program improvement (Slavin, 2002), this paper examines the association between implementation of the revised school executive evaluation requirements and certain school-level indicators. School-level covariates that were included were school achievement, poverty (defined by federal school lunch participation rates), and the grade span for each school. Ladd (2011) found that these school characteristics were significantly related to how teachers perceived the working conditions in their schools. Additionally, in a study that expanded on Ladd's earlier work, Johnson, Kraft, and Papay (2012) also found that teachers do tend to leave low performing and high poverty schools at a greater frequency as compared to schools not displaying these characteristics. Specifically, this study addressed the following research questions:

RQ1 –Is there a relationship between the implementation of the revised North Carolina School Administrator Evaluation Standards and teacher turnover?
RQ2 - Is there a relationship between the implementation of the revised North Carolina School Administrator Evaluation Standards and Teacher Working Conditions?
RQ3 – To what extent do teachers perceive that the results from the Teacher Working Conditions survey are utilized by school administrators for improvement?

Methods

Piecewise regression was used to estimate the effects of the implementation of the revised evaluation policy. Piecewise regression was chosen to determine if at the point of policy implementation and thereafter there were two distinct curves to the data, including intercepts. To determine a starting point for the possible break in the data, graphical analysis was done to visually inspect the data. Once this was done, the data were coded into two periods indicating pre- and post- policy implementation dates. This study used the approach suggested on the UCLA site (UCLA, July 8, 2019). The estimated regression coefficients were tested (Chow, 1960) to establish if the estimate coefficients were different.

Data

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Bi-annually North Carolina administers the Teacher Working Conditions survey to all teachers and administrators. The survey includes seven categories that address conditions in a school. This sample includes responses from 2004-2016 as shown in Table 1.

Table 1
Teacher Working Conditions Constructs and Focus

Constructs
Use of Time— Available time to plan, to collaborate, to provide instruction, and to eliminate barriers in order to maximize instructional time during the school day
Facilities and Resources— Availability of instructional, technology, office, communication, and school resources to teachers
Community Support & Involvement— Community and parent/ guardian communication and influence in the school
Managing Student Conduct— Policies and practices to address student conduct issues and ensure a safe school environment
Teacher Leadership— Teacher involvement in decisions that impact classroom and school practices
School Leadership— The ability of school leader- ship to create trusting, supportive environments and address teacher concerns
Professional Development— Availability and quality of learning opportunities for educators to enhance their teaching

Charter, alternative, and other special schools have been excluded from the data set. This reduction in schools accounts for less than approximately 5,000 educators, leaving on average about 85,000 educators' perceptions to be heard. The survey is anonymous, and it is therefore impossible to evaluate the effects at the individual teacher level. Thus, all data were aggregated

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Table 2
Variables Used in the Regressions

Variables	Description	Measure
Pre-Policy Mean	The predicted mean for teacher satisfaction close to policy implementation year	Continuous 0-100%
Policy Mean	The predicted mean for teacher satisfaction for policy implementation year	Continuous 0-100%
Pre-Policy Slope	Slope for teacher satisfaction prior to implementation year	Continuous 0-100%
Policy Slope	Slope for teacher satisfaction post to implementation year	Continuous 0-100%
School Performance	Percent of students meeting state proficiency requirements for state accountability tests	Continuous 0-100%
School Poverty	Percent of students in a school that qualify for either free or reduced-price lunch services	Continuous 0-100%
School Type	Categorical variable classifying schools as either elementary, middle or high	Categorical (1, 2, or 3) with elementary as the reference group

at the school level, resulting in approximately 2,200 schools in the sample. The scales were changed in 2008; therefore, to allow for inclusion, all data were recoded so the data represent the percentage of teachers in each school who reported either satisfied or very satisfied. As mentioned earlier, school performance, poverty, and type (grade level) are included as controls as found in previous research these variables have been associated with both TWC and turnover (Ladd, 2011). Table 2 describes the variables used in the study.

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Results

The descriptive statistics are reported in Table 3, showing a relative steady rate of teacher
Table 3
Descriptive Statistics of Study Variables 2004-2016

Year	TWC		Turnover		School Performance		School Poverty	
	M	SD	M	SD	M	SD	M	SD
2004	67.52	13.71	12.31	5.64	84.69	9.48	48.29	0.223
2005			12.96	5.98	84.2	9.31	51.85	23.1
2006	57.09	10.33	12.56	5.81	71.11	10.89	52.42	23.49
2007			12.29	5.66	71.95	11.36	52.37	23.27
2008	61.28	9.46	13.01	6.77	64.85	12.81	52.47	23.21
2009			12.55	6.81	72.13	11.54	57.66	23.02
2010	77.71	8.84	11.91	6.94	75.78	11.54	57.66	23.08
2011			11.25	7.15	76.64	11.11	58.43	23.16
2012	76.76	8.58	12.45	7.41	77.67	11.04	60.54	23.09
2013			14.22	8.18	43.35	15.04	61.11	23.31
2014	79.45	9.93	13.95	8.26	57.86	15.46	62.08	23.27
2015			14.61	8.41	55.73	15.79	57.38	20.45
2016	79.29	4.21	14.02	8.16	57.65	15.64	56.47	20.01

turnover from 2004 to 2016, concurrently, while there are some fluctuations from year to year, overall, the TWC showed an increase of slightly less than 12% over the same time period. It appears that teacher turnover was stable and seemingly invariant over this twelve-year period. Below in Table 4 reports the pairwise correlations for the continuous predictors, with all showing highly significant coefficients. Consistent with previous research (Ladd, 2011) the controls behave as expected, with negative correlations between school performance and poverty and turnover, had a positive correlation with TWC. Poverty and turnover show significant relationships, with higher poverty schools reporting higher turnover. The relation between TWC and poverty seemingly runs

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counter intuitively, as higher poverty schools report better TWC; again, the coefficient is very small.

Table 4
Pairwise Correlations Among Study Variables

Variables	School Performance	School Poverty	TWC
School Poverty	-0.547		
TWC	0.062	0.036	
Turnover	-0.276	0.189	-0.084

Note: $p<0.001$ for all reported correlations

Research Question 1

The first regression reported in Table 5 is the estimated relationship between the implementation of the revised evaluation policy and teacher turnover. The model with the predictors was better than a constant only model with $F(7,25964) = 468.87$, $p < 0.001$, $r^2 = 0.11$. However, the model accounts for only 11% of the variance in turnover. The pre-policy means are the mean school turnover rate for the year just prior to policy implementation and post-policy means begin the implementation year of 2010. The Chow test for the difference in the means $F(2,25956) = 0.23$, $p = 0.629$ revealed that there is no significant difference in the means just for the year before and the implementation year.

Table 5
Piecewise Regression Results for Policy Implementation Year and Teacher Turnover

Variables	Coefficient	SE	*t*	95% Confidence Interval	
				LCI	UCI
Pre-Policy Mean	0.154	0.004	41.43*	0.146	0.161
Post-Policy Mean	0.153	0.004	37.41*	0.145	0.161
Pre-Policy Slope	-0.003	<0.001	-8.42*	-0.004	-0.002
Post-Policy Slope	0.002	<0.001	4.74*	<0.001	0.003
Controls					
School Performance	-0.001	<0.001	-25.43*	<-0.001	<-0.001
School Poverty	0.037	0.002	15.18*	0.032	0.42
School Type					
High	0.028	0.002	24.37*	0.026	0.03
Middle	0.024	0.001	22.13*	0.022	0.025

Note: * $p<0.001$

However, the same cannot be said for the slopes, $F(2,25956) = 102.32$, $p < 0.001$, implying that the increase in the teacher turnover rate after the policy was implemented was positive and significant. The controls appear to behave as expected, with middle and

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high schools predicted to have higher turnover than elementary schools. Figure 1 shows the fitted values from the piecewise regression for teacher turnover. It is seen that in some years there are schools with very large turnover rates. These schools were kept in the analysis, as subsequent follow up did show that these data are accurate. In addition, figure 1 shows that there was no appreciable

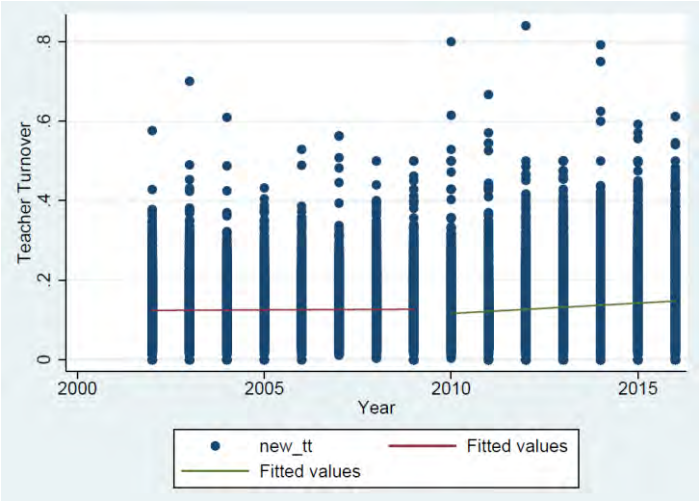

Figure 1. *Fitted Values for Regression on Teacher Turnover*

change in the mean turnover rate pre-policy and from the year it was implemented. In fact, the illustration does show a slight positive trend in turnover.

Research Question 2

The results for the second regression reported that the model (Table 6) was significant $F(7,14028) = 1836.65$, $p<0.001$, $r^2 = 0.478$, accounting for nearly 48% of the variance in TWC. The difference in means of 0.154 was found to be significant $F(2,14020) = 1323.81$, $p< 0.001$, implying that the year of implementation resulted in a large jump in overall reported teacher satisfaction. Similarly for the slopes, we see that the difference of 0.015 or 1.5% was significant $F(2,14020) = 286.03$, $p < 0.001$. The results show that the mean satisfaction of teachers increased at the onset of the revised administrator evaluation requirements and that over the next six years, teacher satisfaction did show a small but positive increase.

With regard to the controls, it is seen that both middle and high schools have lower TWC results and, despite the fluctuations in poverty and performance as reported in Table 3, when examined over the span of the study, they are estimated to positively predict increases in TWC. The drops in poverty in 2015 and 2016 may reflect an improving economy as effects of the great recession. The changes in test scores reflect state changes in reporting test scores (Technical Bulletin, NCDPI. 2016) due to the elimination of some alternative assessments for students with disabilities.

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Table 6
Piecewise Regression Results for Policy Implementation Year and Teacher Working Conditions

Variables	Coefficient	SE	*t*	95% Confidence Interval LCI	UCI
Pre-Policy Mean	0.441	0.007	59.38*	0.427	0.455
Post-Policy Mean	0.595	0.009	66.75*	0.578	0.612
Pre-Policy Slope	-0.003	<0.001	-3.66*	-0.005	-0.001
Post-Policy Slope	0.012	<0.001	22.12*	0.002	0.003
Controls					
School Performance	0.002	<0.001	27.47*	0.002	0.002
School Poverty	0.028	0.005	5.69*	0.018	0.37
School Type					
High	-0.039	0.002	-18.42*	-0.044	-0.035
Middle	-0.024	0.002	-11.91*	-0.028	-0.019

Note: * $p<0.001$

Figure 2 shows the fitted values for the piecewise regression. This illustration clearly shows the drastic shift in mean TWC results and the slight positive slope post-policy change.

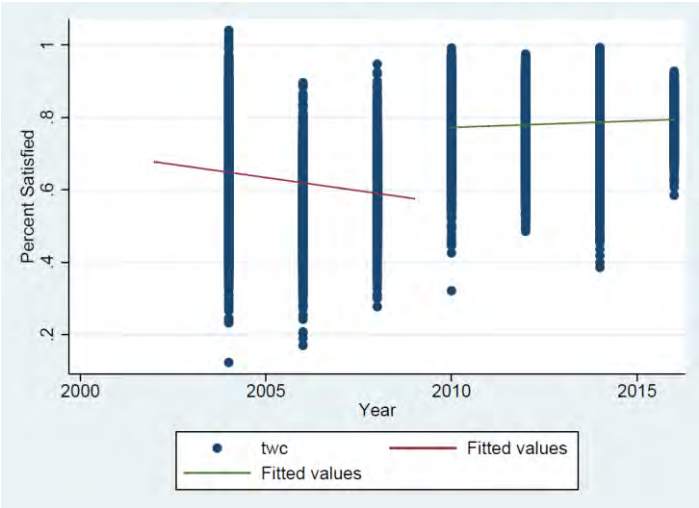

Figure 2. *Fitted Values for Regression on Teacher Working Conditions*

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Figure 2 illustrates the pre-policy years' teacher satisfaction results and trends for the subsequent time periods, such that the jump in satisfaction occurred when policy was implemented and that there was a positive albeit shallow trend in teacher satisfaction.

Research Question 3

TWC surveys starting in 2012 added a new question "At this school, we utilize the results from the 2010 North Carolina Teacher Working Conditions Survey as a tool for school improvement." This question has been retained in subsequent versions of the survey with just a year change. Examining the results for this question over the three administrations of the survey shows that in 2012, 53% of the teachers reported either agree or strongly agree, while 32% said they don't know. For 2014 and 2016, the results were 58% and 59% for agree and strongly agree respectively. As for the do not know, it was reported 29% for both years. Put differently, over 25,000 teachers selected "I do not know" in 2014 and 2016. Average school size in North Carolina is approximately 40 teachers, so on average about 12-13 teachers at each school report they do not know if TWC results are used for school improvement purposes. Coupled with strongly disagree and disagree, the percentages and numbers become even more significant.

Discussion, Conclusion, and Recommendations

There appears to be a void in research and evaluation of education policy and an even larger gap in the utilization of existing evaluations in the revision or formation of such policy (Vedubg, 2017). This paper is significant on several fronts. First, the data uses results over a 12-year period for over 2,200 schools and nearly 85,000 teachers for each year. This data set therefore includes the overwhelming majority of classroom teachers in North Carolina. Second, the study estimates the effects of policy on important educational and associated fiscal issues. Hirsch (2005) found that teachers' perceptions influenced student achievement, indicating that TWC are positively correlated with student achievement. Consistent with Hirsch (2005), using data in Massachusetts, Johnson et al. (2012) found that as teachers' perceptions of their working conditions were higher, so was student achievement. Furthermore, Geiger and Pivovarova (2018) found that teachers in Arizona who reported better working conditions tended to stay in the profession at higher rates than those that did not. As well, Ladd (2011) found that teacher working conditions are a reliable predictor of teachers' intent to stay (weaker associations with actual movement were found) and that administrative leadership is an important aspect in defining teacher working conditions.

The implementation on the school administrator evaluation policy appears to have had no effect on teacher turnover. The intercepts and slopes were not found to be significantly different, indicating that turnover remained stable with respect to policy effects. This supports the findings of Ladd (2011) in which TWC was weakly associated with both actual and indicated turnover, implying that turnover is influenced by other factors. Looking at the control variables, it is seen that lower performing schools are predicted to have lower turnover (coefficient is very small). In fact, the estimated coefficient for school achievement is slightly larger than zero, indicating a minimal, if not consequential, effect on turnover. However, the poverty-turnover linkage was significant, with a one-unit change in a school's poverty rate increasing turnover by 3.7%. Elementary schools

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(being the unit of comparison) were found to have lower rates of turnover than either middle or high schools with high schools having a slightly greater turnover rate.

Results indicate that once school administrators were held accountable for utilizing TWC results as part of the school improvement process, there was a significant increase in overall teacher satisfaction with the working conditions in their schools. Specifically, there was a change in the intercept of 15.4, indicating that pre-policy, the predicted mean was considerably lower than the mean for the year of policy implementation. The slopes were also different, indicating the rates of change were found to be different as well. The rates of change are small in size which reflects the relatively stable TWC satisfaction scores. Furthermore, it is seen that both teacher turnover and TWC scores fluctuated during the time period studied. When examined for correlation, it was found that TWC accounted for less than 1% of the variance in turnover – clearly implying that turnover appears to be fairly resistant to the effects of changes in teacher working conditions.

An explanation for lower TWC scores in the earlier years (prior to the policy) may be a function of sample bias. As reported in other studies (see Boyd et al., 2011), it was posited that teachers who were unsatisfied could be motivated to participate at greater rates than those who were, therefore reporting a picture accurate for dissatisfied teachers but not for the population as a whole. Thus, it may not be a function of administrators utilizing the TWC results for improvement, but rather larger sample sizes that were more representative of the population causing a shift in satisfaction scores.

As mentioned above, during the life of this survey, teacher participation increased dramatically. In 2004, approximately 40,000 teachers responded, while in 2008 over 120,000 responded (86% participation rate). In 2010, the numbers were 119,000 and 88% respectively. These participation numbers could be considered a limitation; however, the year just prior to and the year of implementation are so similar that it is argued that the only change is that of the policy and heightened school administrator interest in the survey. If so, this might explain the weak associations found between the implementation of the policy and little to no significant change occurring for turnover.

The preceding explanation may have a degree of plausibility when examining the results for research question three. Although this data is all post-policy change, it does cast some suspicion on the effect of this policy on teachers' perspectives. Nearly 30% of teachers state that they do not know if the results from the TWC are being used to improve their schools, indicating either the results are not being used at all or that teachers are unaware of the efforts. This suggests that teacher knowledge of the work being done as a function of the TWC results is weak and leaves a large gap in drawing effect conclusions as to the actual consequences of the policy change.

It must be mentioned that it is assumed that teachers are being truthful and feel free to answer honestly – a critical assumption – and given the number of teachers reporting "I don't know," this author believes this to be the case. If these responses are to be considered valid and representative, they call into question the pervasiveness of actual work being done to improve the school environment. As shown above, the high percentage of this response appears to indicate that there is a lack of systemic effort to utilize these results to improve the school environment.

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Policy Interventions

While this study does appear to support the assertion that the policy which requires school administrators to utilize teacher perceptions can affect school climate or working conditions, influence on turnover seems less clear. Since 2010, teachers have reported significantly higher ratings for their working conditions; however, the small amount of the variance explained is a serious limitation to any conclusions on its effects on turnover (see Ladd, 2011). This may not be dire, as all organizations have a core rate of turnover or attrition. Each year employees retire, move, or make a career change and not all turnover has negative consequences for organizations (Abelson & Baysinger, 1984; Meier & Hicklin, 2007).

In respect to the effects on turnover, the saying "weighing the cow does not increase its weight" comes to mind. Clearly in this case, satisfaction and participation have shown increases linked to the changes in administrator evaluation; however, to be deemed an effective tool, a causal relationship must be established. Was the increase in reported satisfaction a function of the work school administration has done, or that consequences of sample bias were somewhat ameliorated? This is a fundamental policy question with implications for policy development. It must be established during the development of policy what aims or goals are wanting to be achieved and once this has been decided on, creating a system with which to gather the necessary data for effect evaluation must be included in said work. Failure to consider these salient aspects leads policy makers to the very disturbing conclusion – which is we just don't know why this happened. Indeed, academic satisfaction improved, with the policy initially demonstrating a large and significant impact; however, as a continuous improvement tool, the policy has yielded limited benefit as teacher satisfaction has remained relatively constant, and teacher turnover has not improved. Perhaps there is an upper limit to teacher satisfaction and, once met by schools, little can be done to effect change.

In pursuing improvements to teacher satisfaction, alternative approaches warrant attention. Given teacher shortages and the limited success of historical efforts to reduce attrition, it is critical to develop a system of interventions to address the wide ranging and diverse causes of these issues (Carver-Thomas & Darling-Hammond, 2019). According to these authors, improving the conditions in which teachers work has shown promise. Focusing on school administrators may offer utility, as recent research shows that states and local school districts can positively affect school environments and teacher attrition by implementing policies and procedures (see Burkhauser, 2017; Kraft, Marinell, & Shen-Wei Yee, 2016). Despite this, from a policy perspective, this study shows that either attrition appears to be resistant to changes in teacher satisfaction, or that other factors influence attrition more than how teachers view their working environments.

Recommendations

This study clearly shows that policy designed to affect what school administrators do and pay attention to can matter. This may be a result of asking good questions, but not the ones that matter most to teachers in terms of improving their longevity as teachers. Therefore, it is imperative that additional research on similar policies designed to target teacher-related issues is conducted with a keen focus on the degree to which actual efforts are being employed by key stakeholders and if such efforts can be linked with change.

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Kaniuka and Kaniuka (2019) conducted a narrow multi-year analysis of the associations of teacher turnover, working conditions, and student achievement, finding that current-year TWC have direct effects on teacher turnover and on student performance and that current or previous-year teacher turnover have no direct effects on student performance. Their research indicates that it is possible, and arguably even necessary, to assess the current and long-term effects of the associations presented in the current study, as these lagged effects have serious implications for policy development. However, this study could not use annual student testing results, as during the time periods of the study numerous changes to standards used to assess student achievement and the data collected by North Carolina changed. For policy researchers interested in the long-term consequences of policy, such limitations are serious, and these limitations have equally serious implications for understanding how the effects of policy are diffused over time and location. Therefore, it is recommended that policy makers consider the long-term implications of making substantive changes to data systems that stifle longitudinal analysis. It is understood that short-term perspectives and near immediate change drive many socio-political actions. It is argued that with such short-term perspectives, real continuous change is difficult, as the actions of the past may have real consequences for the present and near future.

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