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RESEARCH BRIEF:

# Attrition of Newly Recruited K-12 Teachers in Pennsylvania: From 2011/2012 to 2017/2018

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Research and  
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# Abstract

The following study uses survival analysis and longitudinal administrative records from the Pennsylvania Department of Education to investigate the attrition of K-12 teachers in the state's public schools, including charter schools. Survival curves were plotted across time to show the percentage of teachers that still taught full-time at the school where they were first hired, and the Cox proportional hazard model was used to identify risk and protective factors associated with teacher attrition. After 4.8 years, approximately half of newly hired teachers ceased to teach full-time at the school where they were first hired. In addition, salary, professional development, and school size were found to be protective factors, while having a doctoral/specialist degree and teaching in a school with more minority students were found to be risk factors associated with teacher attrition.



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## Research and Evaluation

**Inform policy. Improve practice.**

The Pennsylvania Department of Education (PDE) Evaluation and Research project is an effort that was established through a State Longitudinal Data System (SLDS) Grant from the Institute of Education Sciences (IES), National Center for Education Statistics (NCES), awarded in October 2015. The Research and Evaluation project is an initiative to make full use of the P-16+ system data and other data sources to answer priority questions from the PDE research agenda, to form collaborative research partnerships, and to increase PDE's capacity to conduct research. Our mission is to evaluate and analyze data to provide insight that can be used to positively impact policy, inform decision making and lead to improved student outcomes.

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The mission of the Department of Education is to ensure that every learner has access to a world-class education system that academically prepares children and adults to succeed as productive citizens. Further, the Department seeks to establish a culture that is committed to improving opportunities throughout the commonwealth by ensuring that technical support, resources, and optimal learning environments are available for all students, whether children or adults.

## Major Findings: Policy and Practice Considerations

- After 4.8 years, approximately half of newly hired teachers ceased to teach full-time at the school where they were first hired.
- Salary, professional development, and school size were found to be protective factors.
- Having a doctoral/specialist degree and teaching in a school with more minority students were found to be risk factors.



**Access the full report on “Attrition of Newly Recruited K-12 Teachers in Pennsylvania: From 2011/2012 to 2017/2018” and additional Research Project reports on PDE’s website. >**

## Executive Summary

Research suggests that instability in public schools is associated with adverse student outcomes. One index of instability in schools is the proportion of teachers who leave their school each year, departing for another school, district or state, or departing for another profession altogether. The following study, conducted in fulfillment of a Pennsylvania Department of Education Research and Evaluation Scholar Award, investigates the school-level retention of K-12 teachers in public schools in Pennsylvania by identifying, over time, the proportion of teachers who no longer teach full-time in the school where they were first hired. The study employs survival analysis, a statistical method used to analyze factors associated with a higher or lower risk of an event happening (Allison, 2010), with an event defined here as a teacher ceasing to teach full-time in the school where he or she was first hired. Two research questions direct the analysis:

1. What is the median length of time a teacher is employed in the same school?
2. Is there a relationship between professional development and teacher retention? What factors lead to increased retention for teachers?

## Data Sources

The study made use of longitudinal administrative records on teacher staffing from the Pennsylvania Department of Education (PDE), including:

- Pennsylvania Information Management System (PIMS) Staff dataset
- Pennsylvania Information Management System (PIMS) Assignment dataset\*
- Professional Education Record Management System (PERMS)\*

The PDE datasets comprised seven academic years, 2011-2012 to 2017-2018, and had been updated on June 30th of each year. Every teacher was assigned a unique ID number, making it possible to link data across different sources as well as across time. Teachers were included in the base cohort for the survival analysis if they were newly hired by a K-12 public school (including charter schools) in Pennsylvania during the 2011-2012 academic year and taught full-time in only one school that year ( $N = 3,947$ ).

The study additionally used publicly available, school-level datasets from PDE and from the U.S. Department of Education National Center for Education Statistics (NCES) Common Core of Data (CCD). These included school characteristics such as student demographics and the urbanicity of a school’s location.

\* These are restricted datasets.

# Key Findings

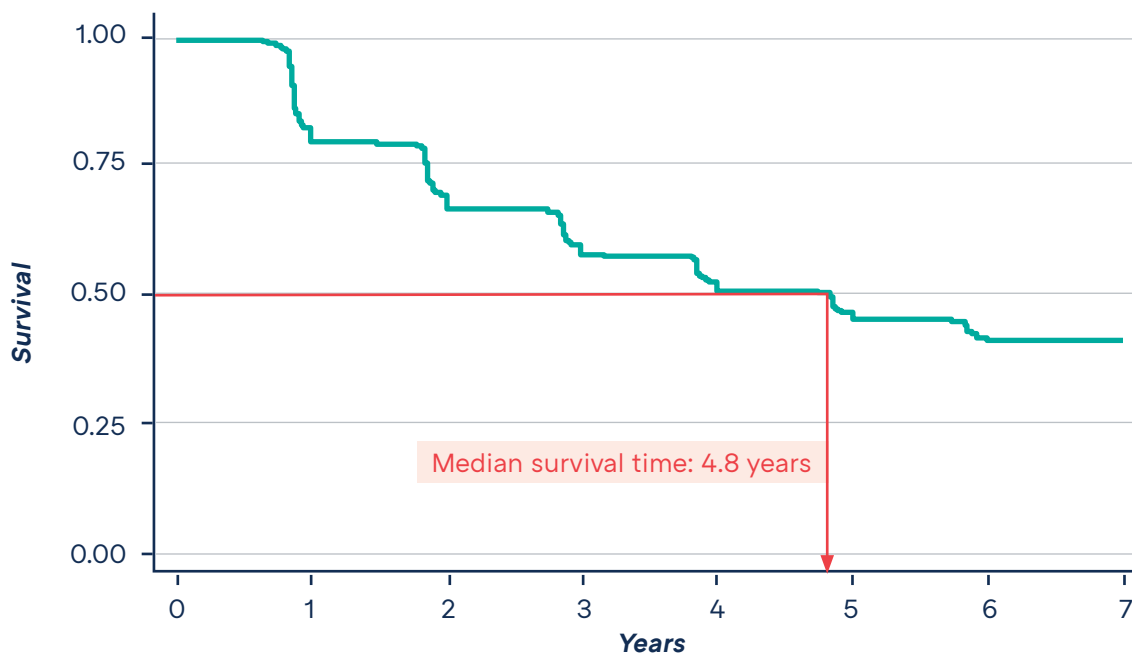
## Research Question 1:

What is the median length of time a teacher is employed in the same school?

The study calculated the survival time for each teacher in the base cohort, defined as the number of days during which a teacher taught full-time in the school where he or she was first hired.

- The median survival time was 4.8 years, which means that half of the teachers in the base cohort had survival times longer than 4.8 years, while the other half had survival times shorter than 4.8 years. It also means that after 4.8 years since the date of employment, only half of the teachers in the base cohort were still teaching full-time in the school where they were first hired.
- By the end of the seven years included in the study, only 41% of the teachers in the base cohort were still teaching full-time in the school where they were first hired.

**FIGURE 1. Survival curve of the entire base cohort. N = 3,947**



Number at risk:

3947	3241	2734	2351	2057	1823	1432
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## Research Question 2:

### Is there a relationship between professional development and teacher retention? What factors lead to increased retention for teachers?

Cox proportional hazard models were used to identify factors associated with the risk of a teacher ceasing to teach full-time in the school where he or she was first hired. Eleven variables were considered in the final model, including six teacher-level variables (gender, race/ethnicity, years of work experience, highest educational level, annual salary, and cumulative hours of professional development) and five school-level variables (urbanicity, school size, Title 1 eligibility, school type, and percent of minority students). Each factor was either associated with a lowered risk of attrition (i.e., it is a protective factor), a higher risk of attrition (i.e., it is a risk factor), or no change in the risk of attrition, controlling for all other variables in the model. The results below are based on Cox proportional hazard models disaggregated by teachers' age.

- Teachers' gender neither increased nor decreased the risk of a teacher ceasing to teach full-time at the school where he or she was first hired, controlling for all other variables in the model. Also, reporting a race/ethnicity of Black, Hispanic, Asian, or other (versus White) neither increased nor decreased the risk of a teacher ceasing to teach full-time at the school where he or she was first hired, controlling for all other variables in the model. The exception was older teachers, for whom Hispanic race/ethnicity was associated with a higher risk of ceasing to teach.
- Likewise, schools' urbanicity, Title I eligibility and charter school status neither increased nor decreased the risk of a teacher ceasing to teach full-time at the school where he or she was first hired, controlling for all other variables in the model.
- Teachers' annual salary and cumulative hours of professional development were revealed to be protective factors that lowered the risk of a teacher ceasing to teach full-time in the school where he or she was first hired, controlling for all other variables in the model. The magnitude of the protective factor of annual salary decreased with teachers' age, whereas the magnitude of the protective factor of professional development hours increased with teachers' age, controlling for all other variables in the model.
- Teaching in a larger school in Pennsylvania (with 1,000 or more students) was associated with a lower risk of ceasing to teach full-time at the school where a teacher was first hired, controlling for all other variables in the model.
- Several risk factors were dependent upon teachers' age. An increase in the percent of minority students in school was a risk factor for younger and middle-age teachers. The possession of a master's degree (versus a bachelor's degree) as the highest degree earned was a risk factor for middle-age teachers, and the possession of a doctoral/specialist degree (versus a bachelor's degree) as the highest degree earned was a risk factor for both middle-age and older teachers. Also, an increase in the years of work experience was a risk factor for older teachers. In other words, these factors were associated with a higher risk of ceasing to teach full-time at the school where a teacher was first hired, controlling for all other variables in the model.

This study contributes to the literature examining instability in the teacher workforce by describing and analyzing factors associated with the attrition of newly hired K-12 teachers in public schools in Pennsylvania, including charter schools. By considering the protective factors and risk factors associated with teachers' attrition, PDE can provide better support to teachers, schools, and districts to strategically increase the retention of K-12 teachers in the state.

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Allison, P.D. (2010). Survival analysis. In G.R. Hancock & R.O. Mueller (Eds.), *The Reviewer's Guide to Quantitative Methods in the Social Sciences* (pp. 413-425). Routledge.

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