Teacher turnover in relation to comparable professions: Evidence from a repeated cross-sectional design

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Abstract

An important issue in education policy is whether the national rate of teacher turnover in the U.S. is higher than expected. A study by Harris and Adams [Harris, D. N. and Adams, S. J. (2007). Understanding the level and causes of teacher turnover: A comparison with other professions. *Economics of Education Review*] compares teachers to arguably similar vocational professions, including nursing, social work, and accounting. In this paper I build upon Harris and Adams (2007) by conducting a repeated cross-sectional analysis of teacher turnover in relation to other professions. I find that the rate of teacher turnover has remained strikingly stable over time at around 8 percent and exhibits less variation than comparable professions. Teachers and nurses share similar rates of turnover. A decline in the labor force leaver rate among older teachers approaching retirement explains a small decrease in the overall turnover rate between 2001 and 2017.

Keywords: Teacher turnover; repeated cross-sectional design; descriptive statistics

JEL classification: I21; I28

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1 Introduction

High rates of teacher turnover impose considerable financial and educational costs on school districts. Substantial hiring costs (Milanowski and Odden 2007), an influx of novice teachers, and the potential attendant harm to student achievement (Ronfeldt et al. 2013) burden districts, although the costs may be mitigated somewhat if less effective teachers leave the teaching force (Adnot et al. 2017; Boyd et al. 2011; Goldhaber et al. 2011). Given the potential negative impacts, an important unresolved question is whether the rate of teacher turnover in the United States is higher than expected, particularly in relation to similar vocational professions.[1] Using pooled data from the Current Population Survey (CPS) between 1992 and 2001, Harris and Adams (2007) estimate that almost 8 percent of teachers leave their jobs each year, a figure comparable to the turnover rate for nurses. It is unclear, however, whether the similar turnover rate between teachers and nurses persisted after 2001.[2]

In what follows, I replicate and extend the analysis of teacher turnover in Harris and Adams (2007) using repeated cross-sectional data from the CPS. Specifically, I construct ten-year moving averages of turnover rates for teachers, nurses, social workers, and accountants using data from 1992 to 2017. Teacher turnover was 8.0 percent in 2001 and fell to 7.6 percent by 2017. I find that teacher turnover has remained strikingly stable over time and exhibits less variation than comparable professions.[3] This finding is robust to shortening the window of pooled data. Unemployment increased as a share of overall turnover, albeit from a small base, while exiting the labor force and switching to a new profession fell over time. I find that a well-established U-shaped relationship between teacher age and turnover persists over time, but becomes flatter at older ages as fewer teachers leave the labor force. The decline in the turnover rate among older teachers approaching retirement largely accounts for the 0.4 percentage point fall in overall turnover between 2001 and 2017.

[1] Studies comparing teacher turnover to other professions include Harris and Adams (2007), Ingersoll (2001a,b), Stinebrickner (2002), and Henke and Zahn (2001).

[2] I refer to pooled CPS samples by the final year of pooled data.

[3] Teacher turnover rates from the CPS are consistent with recent estimates from the Teacher Follow-Up Survey, which estimates the rate of teachers who leave the profession as 8.4 percent in 2005 and 7.7 percent in 2013 (Goldring et al. 2014).

The paper is organized as follows: Section 2 describes the data and methodology used in this study, Section 3 presents and discusses the results, and Section 4 concludes.

2 Data and Methodology

I use data from the Annual Social and Economic Supplement (ASEC) of the Current Population Survey, a nationally representative survey of the U.S. population, from 1992 to 2017.[4] In addition to basic demographic information, ASEC respondents are asked for their job/occupation last week and the longest job held in the prior year. I use occupation last year to identify teachers, nurses, social workers, and accountants, and identify turnover through differences in last year's and last week's stated occupation (Harris and Adams 2007).[5] Nurses, social workers, and accountants are selected as comparison professions because they share certain characteristics with teaching; nursing and social work, for example, are, like teaching, vocational professions with a caregiving aspect to the job. Moreover, the same professions are used by Harris and Adams (2007), permitting a longitudinal comparison with their earlier results.

I pool CPS samples over 10 years to create a sample of sufficient size to construct turnover rates for specific occupations. Overall turnover may be separated into three distinct types: (i) teachers who leave for a job in a different occupation, (ii) teachers who become unemployed, or (iii) teachers who leave the labor force. To calculate moving averages, repeated cross-sectional samples are constructed by dropping the first year of the pooled sample and adding a subsequent year of data, maintaining a 10-year sample window. I restrict samples to college graduates between 21 and 64 years old and apply individual weights to make nationally representative inferences.[6]

Table 1 presents descriptive statistics by profession for the earliest pooled sample, which uses data from 1992 to 2001, and the most recent sample, with data from 2008-2017.[7]

[4] I use data from IPUMS CPS (Flood et al. 2017).

[5] Appendix Table A1 shows the CPS occupation code definitions of all four professions over time.

[6] College graduates differ from non-graduates by their outside option for employment, which may affect the turnover rate.

[7] Descriptive statistics for the pooled sample from 1992 to 2001 essentially replicates Table 1 in Harris and Adams (2007). The increase in the sample size compared to Harris and Adams (2007) is due to the inclusion of the SCHIP oversample in 2001; there is no difference in the overall pattern of results.

Two trends stand out. First, teacher turnover fell from 8.0 percent in the earliest sample to 7.6 percent in the most recent sample, but turnover fell by over one percentage point in the three comparison professions. Second, nurses and social workers remain germane comparison professions, sharing similar demographic and job-related characteristics in the most recent sample. Accountants are less female, tend to work in smaller organizations, and are less likely to be enrolled in a pension plan than teachers.

3 Results

Figure 1 shows turnover rates (all separators) for teachers and other professionals.[8] The point estimates are moving averages from CPS samples pooled over 10 years. The rate of teacher turnover is strikingly stable over time at around 8 percent, peaking at 8.2 percent in 2006 and thereafter trending downward to 7.6 percent in 2017. Appendix Figure A1 shows that pooling samples over a shorter, five-year window introduces additional noise into the estimates of teacher turnover but the overall trend remains flat with little variation. Turnover rates for teachers, nurses, and accountants are almost identical in 2001 but the rate of turnover for nurses and then accountants diverge from teachers by 1 to 2 percentage points; in the most recent sample, turnover for nurses and accountants is just under a percentage point lower than teachers. Turnover for social workers is higher than the other comparison professions and exhibits considerably more variation over time, falling by over 3 percentage points through 2012 before rising in recent years.

Figure 2 shows moving averages over time by separation type: leaving the labor force, switching to a new profession, or becoming unemployed. The black line, which shows the turnover rate for all separators, replicates the teacher turnover rate shown in Figure 1. Among separation types in 2017, a little over half of overall turnover (56 percent) is due to teachers leaving the labor force, which includes retirement. Around a quarter of turnover (28 percent) is due to teachers switching to a new profession, and the remaining teachers become unemployed. As a share of overall turnover, leaving the labor force fell by 3 percentage points from 2001 to 2017 and switching to a new profession fell by 4

[8]Graphs use the blindschemes package in Stata by Bischof (2017).

percentage points, while unemployment doubled from 8 percent to 16 percent.

It is informative to consider which of the demographic and job-related characteristics in Table 1 are significantly associated with teacher turnover, and within that group, which characteristics are larger in magnitude relative to the comparison professions. Letting X_i be a vector of the demographic and job-related covariates shown in Table 1 for person i, I estimate the folllowing linear probability model using data for the full pooled sample (1992 to 2017):

$$Turnover_i = \alpha + \rho Teacher_i + X_i^{'}\lambda + (Teacher_i X_i)^{'}\delta + \epsilon_i, \tag{1}$$

where $Turnover_i$ is an indicator for leaving an occupation, $Teacher_i$ is an indicator for being a teacher, $Teacher_i X_i$ is an interaction term, and ϵ_i is an idiosyncratic error term. I estimate the model separately by the comparison professions, with teachers included in all models.

The coefficients in Table 2, $\hat{\lambda}$, measure the association between the covariates and turnover. The asterisks show the statistical significance of the estimated coefficients in $\hat{\delta}$, the difference between the estimated effects for teachers and the comparison professions. Teacher age and enrollment in a pension plan are associated with turnover with a larger magnitude than comparable professions, replicating the prior findings of Harris and Adams (2007) but over a longer time period.

Figure 3 analyzes the age-turnover relationship for teachers by plotting turnover by age groups for two time periods: 1992-2001 and 2008-2017. There is a U-shaped relationship between age group and turnover, with those approaching retirement age most likely to leave the teaching profession.[9] The steep turnover gradient among older teachers is driven by those leaving the labor force (see Panel B), including retirements, while younger teachers who leave the profession tend to switch to a new occupation (Panel C).

The decline in the turnover rate for all separators from 8.0 percent in 2001 to 7.6 percent in 2017 is accounted for by falling rates of turnover for older teachers (those above 55 years old) and a smaller drop among early-career teachers aged between 30 and 34, displayed in Figure 3, Panel A. Other age groups show no change in the overall turnover

[9]The U-shaped relationship between age and teacher turnover is well-established; see, for example, Harris and Adams (2007), Ingersoll (2001a), and Grissmer and Kirby (1992).

rate over time.[10] I further investigate the declining rate of turnover for older teachers in Figure 4, which breaks out by gender the turnover rate for all seperators (Panels A and B) and turnover caused by leaving the labor force (Panels C and D). The graph in Panel D shows that the turnover rate for male teachers aged 60-64 fell by over 16 percentage points between 2001 and 2017; for women, the drop was only 6 percentage points (Panel C).[11] The combined effects were 9 percentage point decreases both in teachers leaving the labor force and those leaving the profession for any reason (shown in Figure 3, Panels B and A respectively).[12]

The estimated coefficients in Table 2 show an association between age and turnover not only for teachers but also for the other professions. In Figure 5 I analyze whether nurses, social workers, and accountants share a similar age-turnover relationship to teachers. None of the comparison professions exhibit the U-shaped relationship between age group and turnover with teachers. Higher turnover rates for the youngest age groups is common to teachers and social workers, but not for nurses and accountants. Nurses, however, share with teachers declining turnover rates among older workers, whereas there is no statistically significant change over time in the rate of turnover by age group for social workers or accountants.[13]

It is instructive to consider how the comparative evidence on the age-turnover relationship for teachers and nurses conforms to the existing literature. A recent study by Auerbach et al. (2014) finds that nurses are delaying retirement and Maestas and Zissimopoulos (2010) report Bureau of Labor Statistics projections showing marked rises in labor force participation rates over the last 30 years, particularly for women aged 55-64.

[10]To determine which age groups have a statistically significant change in turnover over time, I regress turnover on age group indicators and interaction terms between the age group indicators and an indicator for the most recent sample, with no intercept term. I restrict the analysis sample years to 1992 to 2001 and 2008 to 2017. There is a statistically significant decrease in the turnover rate between 2001 and 2017 for those aged 60-64 (p<0.01), 55-59 (p=0.011), and 30-34 (p<0.01). No other age group has significantly different turnover between 2001 and 2017 at the 5 percent level.

[11]The drop was statistically signficant for men (p<0.01) and women (p=0.015).

[12]Teachers were 77 percent female in the 2008-2017 pooled sample, so the 9 percentage point decrease overall is a weighted average of the declines for women and men.

[13]For nurses, the 7 percentage point decrease in the turnover rate for those aged 60-64 is significant only at the 10 percent level (p=0.058), likely because the sample size of social workers is considerably lower than the other three professions. However, the 4 percentage point decrease for nurses aged 55-59 is significant at the 5 percent level (p=0.038).

But, to date, there is little evidence that teachers specifically are remaining in the labor force longer. Fitzpatrick (2018) finds that older college-educated women who ever worked as teachers experience lower increases in labor force participation than women who never taught, primarily because defined-benefit pension schemes common to the teaching profession incentize teachers to retire earlier than Social Security. Her analysis is consistent with lower turnover over time in that older teachers aged 60-64 in the most recent birth cohorts (born 1946-1950) are employed at higher rates than earlier cohorts, although the increase is less than other college educated women.

4 Conclusion

The question of whether the national rate of teacher turnover in the U.S. is higher than expected is important for the design of teacher hiring and retention policies. In this paper I use a repeated cross-sectional design with data from the CPS to compare rates of turnover among teachers, nurses, social workers, and accountants. I find that (i) teacher turnover is strikingly stable over time at around 8 percent, (ii) nurses and accountants have similar rates of turnover albeit with additional variation over time, (iii) slightly fewer teachers are exiting the labor force or switching to a new profession, while unemployment is a larger fraction of overall turnover, and (iv) the U-shaped age-turnover relationship is becoming flatter at older ages as fewer teachers leave the labor force; a similar pattern holds for nurses. One limitation of using cross-sectional samples from the CPS is an inability to track teachers longitudinally, which curtails a comparative analysis of turnover by years of experience across professions. Turnover rates in this paper are similar to those from the Teacher Follow-Up Survey, which employs a longitudinal design, suggesting that estimates of turnover rates from the CPS are accurate.

There is little doubt that teacher turnover can have pernicious effects on student achievement and burden districts with substantial hiring costs. Yet at the aggregate level, the long-term stability of the turnover rate around 8 percent suggests that turnover may be a feature of the teacher labor market impervious to large-scale reform. A case in point is the No Child Left Behind Act: Despite widespread concern that a culture of

assessments and increased accountability may dissatisfy teachers to the point of leaving the profession, rigorous evidence finds no effect on voluntary teacher turnover (Sun et al. 2016). A more promising approach is to target resources towards cases of chronic turnover in districts with high numbers of high-needs students, those most likely to be negatively affected by teacher churn. Recent evidence from 16 urban school districts finds substantial cross-district variation in teacher retention rates (Papay et al. 2017), underscoring the need for context-dependent policies that adapt to localized teacher labor markets to reduce harmful teacher turnover.[14]

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[14]See Kraft et al. (2016) for an insightful discussion of how school organizational contexts, including school leadership, academic expectations, teacher relationships, and school safety, are causally associated with teacher turnover and student achievement in New York City.

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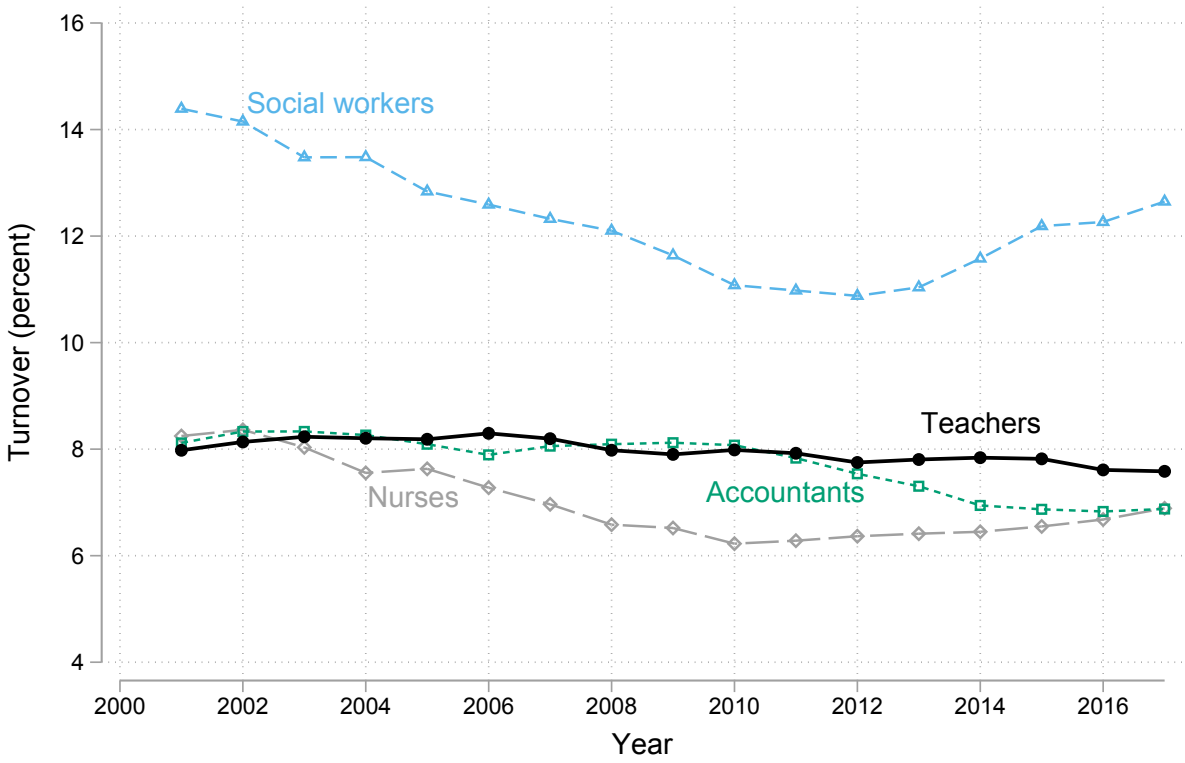
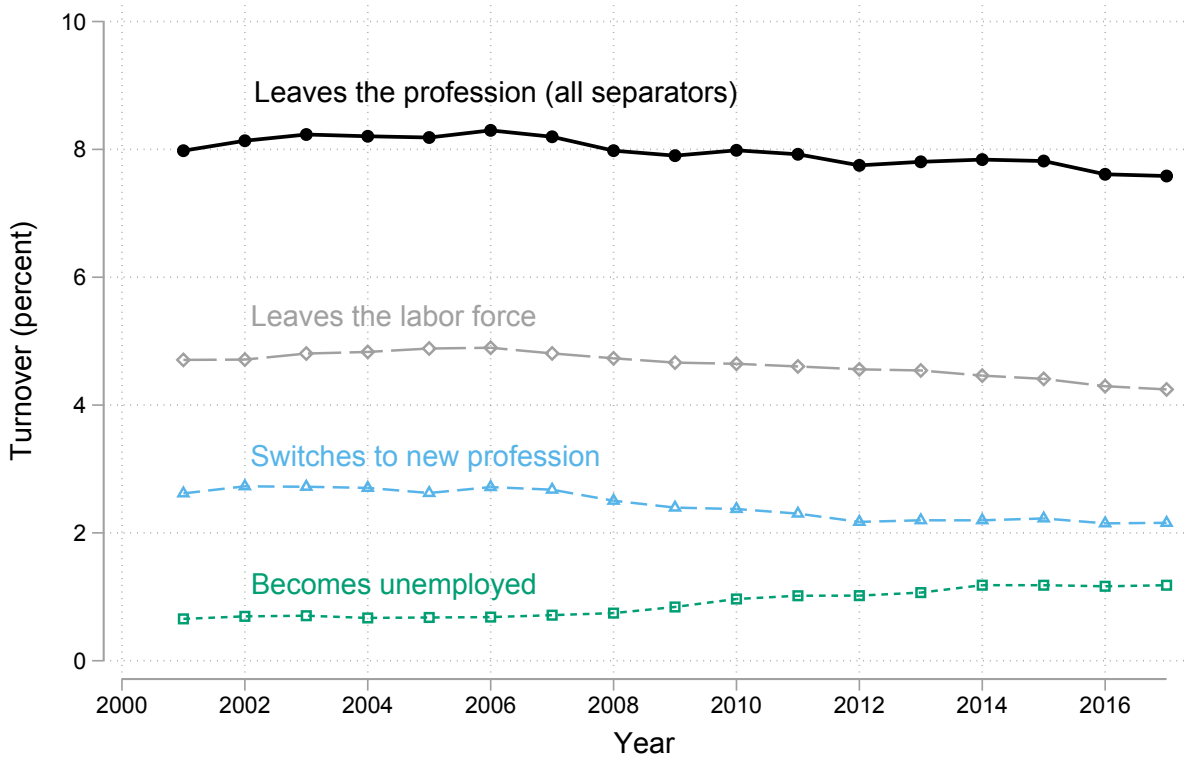
Figures & Tables

Figure 1: Turnover for teachers and other professionals, 2001-2017



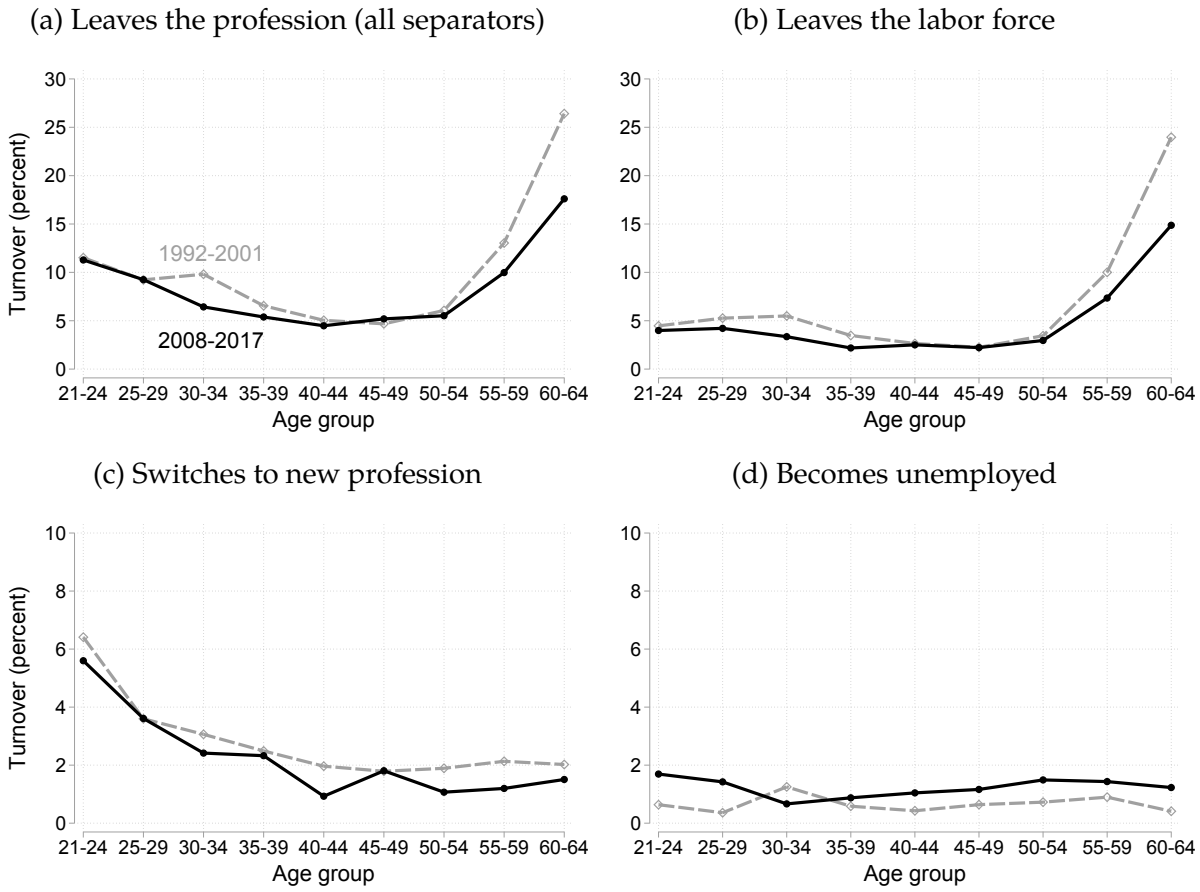
Notes: The graph uses ASEC (CPS) data from 1992 to 2017. Each point is a moving average using 10 years of pooled data. Turnover is defined as a difference between last year's and last week's stated occupation. Individual weights are applied to calculate means.

Figure 2: Teacher turnover by type of turnover, 2001-2017



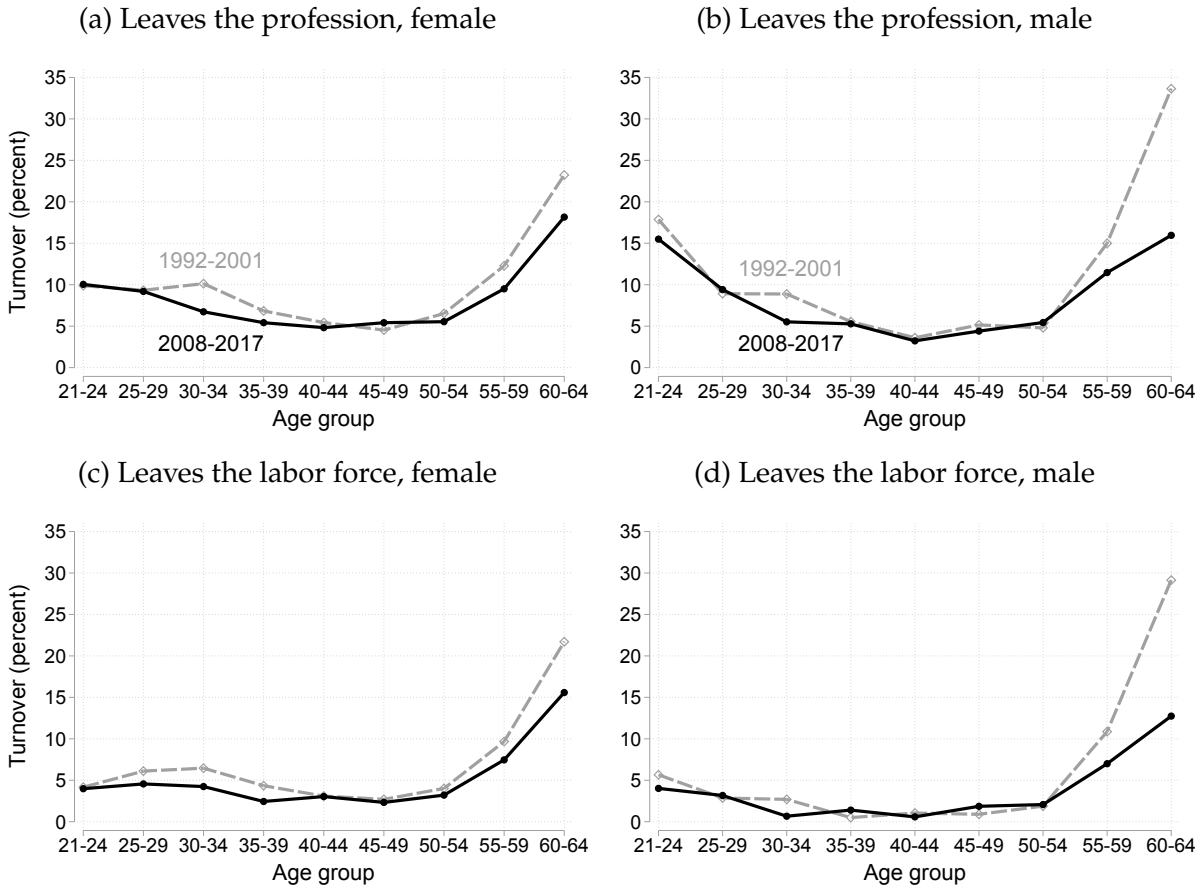
Notes: The graph uses ASEC (CPS) data from 1992 to 2017. Each point is a moving average using 10 years of pooled data. Turnover is defined as a difference between last year's and last week's stated occupation. Individual weights are applied to calculate means.

Figure 3: Teacher turnover by type of turnover and age group, 1992-2001 & 2008-2017



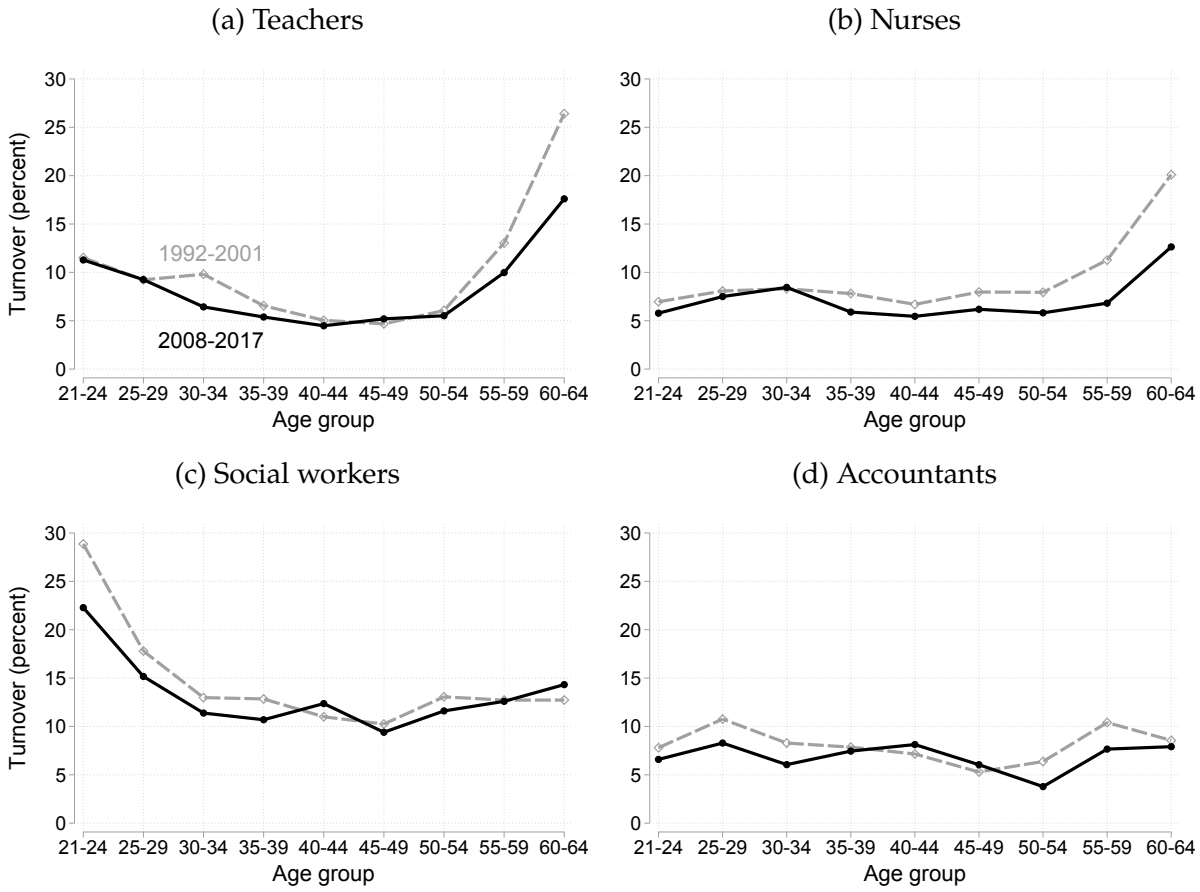
Notes: The light dashed line uses ASEC (CPS) data from 1992 to 2001 and the dark solid line from 2008 to 2017. Each point is the average turnover for the defined age group using 10 years of pooled data. Turnover is defined as a difference in last year's and last week's stated occupation. Individual weights are applied to calculate means.

Figure 4: Teacher turnover by type of turnover, gender, and age group, 1992-2001 & 2008-2017



Notes: The light dashed line uses ASEC (CPS) data from 1992 to 2001 and the dark solid line from 2008 to 2017. Each point is the average turnover for the defined age group using 10 years of pooled data. Turnover is defined as a difference between last year's and last week's stated occupation. Individual weights are applied to calculate means.

Figure 5: Turnover (all separators) by profession and age group, 1992-2001 & 2008-2017



Notes: The light dashed line uses ASEC (CPS) data from 1992 to 2001 and the dark solid line from 2008 to 2017. Each point is the average turnover for the defined age group using 10 years of pooled data. Turnover is defined as a difference between last year's and last week's stated occupation. Individual weights are applied to calculate means.

Table 1: Descriptive statistics, 1992-2001 & 2008-2017

Variable	1992-2001				2008-2017			
	Teachers	Nurses	Social workers	Account-ants	Teachers	Nurses	Social workers	Account-ants
Turnover	8.0	8.2	14.4	8.1	7.6	6.9	12.6	6.9
Age	41.8	40.4	39.6	38.1	42.4	42.7	41.8	41.4
Female	75.5	93.0	71.3	46.0	76.4	90.2	83.2	57.6
Black	8.0	8.7	18.8	6.9	8.4	11.4	22.0	9.2
Married	71.1	68.6	56.7	65.4	68.8	65.6	57.0	63.6
Separated or divorced	10.2	13.7	14.6	8.2	9.8	13.2	14.1	9.6
Widowed	1.4	1.6	1.3	0.8	1.3	2.0	1.8	0.9
Advanced degree	41.2	16.9	38.8	19.2	49.3	17.7	45.9	26.1
Young child in household	14.1	20.0	14.5	18.7	16.9	16.4	17.0	15.5
<10 employees	4.2	3.6	5.7	17.4	4.4	2.4	5.3	15.4
10-99 employees	15.4	10.7	16.7	19.5	14.6	9.8	18.5	21.5
100-499 employees	20.8	17.6	17.5	11.6	17.5	13.7	18.1	13.2
500-999 employees	10.8	14.0	6.7	4.5	9.4	10.6	6.1	5.4
1000 or more employees	48.7	54.1	53.4	47.0	54.1	63.4	51.9	44.6
Average weekly earnings	488.1	575.2	463.9	678.3	492.3	637.8	469.8	765.3
Has health insurance	96.2	96.6	96.2	95.7	95.3	96.0	95.6	94.4
Insurance from employer	90.5	91.3	91.1	88.3	88.3	89.4	89.7	86.7
Enrolled in pension plan	75.8	66.3	67.8	63.2	68.6	63.3	61.7	56.9
Sample size	22,727	5,932	2,922	5,574	33,002	11,720	3,916	8,153

Notes: Samples are pooled from the Annual Social and Economic Supplement of the Current Population Survey. Occupation code definitions are given in Appendix Table A1. Turnover is defined as an individual either (i) leaving their job for a position in a different industry, (ii) becoming unemployed, or (iii) leaving the labor force. A young child is defined to be under 6 years old. Earnings are in 2016 dollars. Individual weights are used to calculate means.

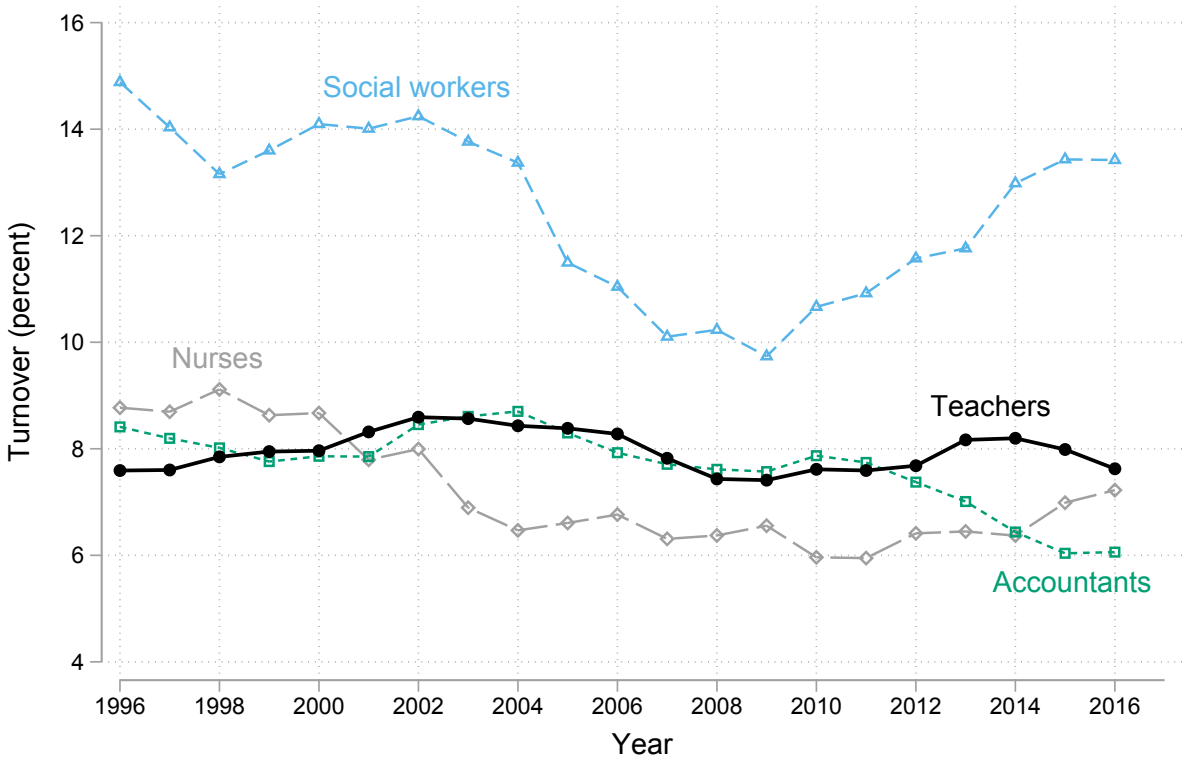
Table 2: Covariate associations with turnover, 1992-2017

Variable	Teachers	Nurses	Social workers	Accountants
Age	−1.72	−0.60***	−0.85**	−0.38**
	(0.10)	(0.18)	(0.35)	(0.18)
Age-squared	0.02	0.01***	0.01**	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
Female	−1.99	−2.97***	−1.30	−1.68***
	(0.28)	(0.78)	(1.04)	(0.48)
Black	0.92	0.35	1.16	1.49
	(0.44)	(0.69)	(1.13)	(1.00)
Married	0.01	0.34	0.18	0.88
	(0.36)	(0.60)	(1.20)	(0.67)
Separated or divorced	0.07	1.88**	0.04	1.77*
	(0.50)	(0.81)	(1.49)	(1.02)
Widowed	3.16	4.46*	3.32	−1.24
	(1.29)	(2.29)	(3.93)	(1.87)
Advanced degree	1.18	6.52***	−0.25	−0.13
	(0.25)	(0.69)	(0.88)	(0.55)
Young child	3.38	0.62	−3.28***	2.04***
	(0.35)	(0.57)	(1.19)	(0.67)
Log weekly earnings	−6.73	−6.86***	−6.14***	−4.04***
	(0.26)	(0.49)	(1.05)	(0.45)
Has health insurance	1.38	−2.69	−4.55	−1.79
	(1.04)	(1.75)	(3.77)	(2.02)
Insurance from employer	−5.41	−4.18***	−10.78***	−5.08***
	(0.71)	(1.20)	(2.45)	(1.31)
Enrolled in pension plan	−5.08	−1.98***	−4.47***	−3.35***
	(0.35)	(0.47)	(1.00)	(0.51)

Notes: Samples are pooled from the Annual Social and Economic Supplement of the Current Population Survey. Occupation code definitions are given in Appendix Table A1. A young child is defined to be under 6 years old. Earnings are in 2016 dollars. Asterisks refer to the difference between a coefficient for a given profession and the coefficient for teachers. Individual weights are used to calculate means.
*** $p<0.01$; ** $p<0.05$; * $p<0.10$

A Appendix

Figure A1: Turnover for teachers and other professionals, 1996-2017



Notes: The graph uses ASEC (CPS) data from 1992 to 2017. Each point is a moving average using 5 years of pooled data. Turnover is defined as a difference between last year's and last week's stated occupation. Individual weights are applied to calculate means.

Table A1: ASEC (CPS) occupation definitions over time

Occupation	Years	Code	Definition
Teacher	1992-2002	155	Teachers, prekindergarten and kindergarten
		156	Teachers, elementary school
		157	Teachers, secondary school
		158	Teachers, special education
		159	Teachers, not elsewhere classified
	2003-2016	2300	Preschool and kindergarten teachers
		2310	Elementary and middle school teachers
		2320	Secondary school teachers
		2330	Special education teachers
		2340	Other teachers and instructors
Nurse	1992-2002	95	Registered nurses
		207	Licensed practical nurses
	2003-2010	3130	Registered nurses
		3500	Licensed practical and licensed vocational nurses
	2011-2016	3255	Registered nurses
		3500	Licensed practical and licensed vocational nurses
Social worker	1992-2002	174	Social workers
	2003-2016	2010	Social workers
Accountant	1992-2002	23	Accountants and auditors
	2003-2016	800	Accountants and auditors