Teach For America Teachers' Careers:
Whether, When, and Why
They Leave Low-Income Schools and the Teaching Profession

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Gender, Race, and Roots: Which Teach For America Teachers Remain In Low-Income Public Schools And In The Teaching Profession?

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INTRODUCTION

Today more than ever, children living in poverty need to be taught by skilled teachers. However, research suggests that low-income children are often taught by the least qualified instructors. They tend to have scored lower on standardized tests, graduated from lower-tier colleges, and have fewer years of experience than teachers of higher-income children (Lankford, Loeb, & Wyckoff, 2002). Moreover, public schools serving large numbers of low-income children regularly experience elevated rates of teacher turnover (Ingersoll, 2001). The *Teach For America* (TFA) program was created to address these problems by placing graduates of the nation's most selective colleges in public schools serving low-income children and requiring them to teach for at least two years. Dubbing it "Teach for Awhile," critics charge that TFA teachers leave their placements so rapidly that their presence may exacerbate, not alleviate, the problems of low teacher quality and high teacher turnover in low-income schools (Azimi, 2007). Despite these claims, the retention of TFA teachers has never been studied rigorously and on a national scale.

In the face of challenging working conditions and an expectation that they teach for only a short while, it is also important to ask which TFA teachers remain in low-income schools or the teaching profession over time. In this study, I estimate the conditional probability – also known as the *hazard probability* or *risk* -- that TFA teachers will leave their initial, low-income school or the profession in each year of their career, given that they did not leave prior to that year. I further examine whether women

and people of color—groups who have traditionally staffed the nation's classrooms –

have a greater probability of remaining in low-income schools and the teaching

profession than men and White teachers.   Overall, I find that 44% of TFA teachers

remained in their initial, low-income placement school and 61% remained in the teaching

profession longer than 2 years. I further find that women, Blacks, and Latinos had a

higher probability than males, Whites, and Asians of staying in their initial, low-income

school and the teaching profession. However, Latino males had a greater probability of

staying in teaching than Latino females. Black respondents who were related to a teacher

also had a higher probability of remaining in the profession than Black respondents

without such a relative, or all other racial groups.

BACKGROUND AND CONTEXT OF THE RESEARCH

Since its founding in 1990, *Teach For America* (TFA) has grown from a small program

into a major recruiter of new public-school teachers from the nation's top colleges. A

reporter from the *New York Times* recently observed that:

> Seventeen years after its inception, Teach for America has become the
> gold standard of public service, proof that teaching in public schools can
> be prestigious, even glamorous. Teach for America seeks to rebrand public
> service more than four decades after the first group of college graduates
> rose up to meet John F. Kennedy's challenge to serve their country via the
> Peace Corps. But earnest as it is, T.F.A. is also shameless in its blue-chip
> ambitions. Its recruiters stand alongside Goldman Sachs at college job
> fairs, and its recruits — class presidents, varsity athletes, all with soaring
> G.P.A.'s — are part of a community marked by a unique blend of swagger
> and idealism. (Azimi, 2007)

In recent years, 10-20% of seniors at colleges like Yale and Dartmouth have applied to

TFA and the program has become increasingly selective, turning away approximately

80% of applicants for its 3000 positions in 2006 (Azimi, 2007). By 2011, TFA aims to

place 8000 teachers in low-income, public-school classrooms, without compromising its

selection standards. The program has also spawned numerous replicas, including the

New York Teaching Fellow Program, which absorbs individuals not selected by TFA and

attracts unique candidates in its own right.

Although TFA is responsible for placing fewer than 5% of the overall number of

new teachers entering teaching in the U.S. public schools each year, its influence in the

nation's poorest schools is undeniable[i].   Large, urban districts -- such as those in

Baltimore, Houston, and New Orleans -- routinely rely on TFA to supply many of their

new teachers. Moreover, TFA's leaders deftly cultivate political and private sector

connections, thus wielding influence in big city districts and the federal government.

But, to what effect? A recent evaluation has shown that TFA teachers produce

slightly larger gains than their non-TFA colleagues in mathematics achievement for

fourth-grade students (Decker, Mayer, & Glazerman, 2004). But, do these teachers stay

long enough in their low-income schools to make a real difference for more than just a

few students in more than just a few years? Do they remain in the profession itself?

And, which TFA teachers stay longer than the rest? My study is the first independent,

nationwide, rigorous research on these questions.

Prior research on teacher retention

Teacher retention, generally, and the retention of new teachers, in particular, have

garnered much attention in recent years (Guarino, Santibañez, Daley, & Brewer, 2004;

Johnson, Berg, & Donaldson, 2005; National Commission on Teaching and America's

Future, 2003). Educational leaders, policymakers, and researchers are concerned about

teachers' *attrition* from the profession overall. Numerous studies have demonstrated that

attrition of new teachers is high. By some estimates, approximately 39 % of teachers

leave the profession within 5 years of starting to teach (Ingersoll, 2002) and 50 % leave within 6 years (Kirby, Berends, & Naftel, 1999).

Concerned parties are also interested in teacher *migration* from school to school, especially movement away from schools serving lower-income students to schools with higher-income students. In many districts that enroll large numbers of low-income students, new teachers leave their schools at high rates. Nationwide, 15.2% of teachers at high-poverty schools leave their schools annually, compared to 10.5% for their counterparts at low-poverty schools (Ingersoll, 2001).

When promising teachers leave their schools, students and schools may suffer. The departing teachers are likely to be replaced by novices, leaving classes taught by a stream of first-year teachers who are, on average, less effective than their more experienced counterparts (Murnane & Phillips, 1981; Rockoff, 2004). When teachers leave, schools also lose the benefits of the professional development and other resources they have invested in the departing teachers (NCTAF, 2003). Moreover, routinely high levels of teacher turnover impede a school's efforts to coordinate curriculum and communicate important information about students from one year to the next. Lastly, the financial costs of teacher turnover are high. For example, the Boston Public Schools spent an estimated $3.3 million to replace 194 first-, second-, and third- year teachers in 2004-5 (Birkeland & Curtis, 2006). This estimate includes the costs of recruiting, hiring, and offering professional development to replacement teachers, and processing the job terminations of those who left. Noting these costs, districts and states have sought to reduce new teacher attrition and migration by instituting specialized induction programs and other supports for novices (Smith & Ingersoll, 2004).

Thus, there is a great need to understand why teacher turnover occurs in low-income schools and what educational leaders might do to decrease it. Large-scale retirements of veteran teachers add to this urgency (Dillon, 2007). In the past, schools could rely on women and people of color to staff their classrooms. Lacking access to other professions, these individuals provided schools what has been called a "hidden subsidy" (Troen & Boles, 2003).   Today, females and people of color enjoy a much broader range of career opportunities than did their counterparts in previous generations. This may be especially true for women and minorities, like those whom TFA selects, with high test scores and diplomas from the nation's most selective colleges. With this expanded access, are women and minority teachers currently more likely than men and White teachers to leave their schools and the profession?

Differences in Turnover by Teacher Gender and Race

In recent research on the general population, female teachers have been found to be more likely than male teachers to leave their schools (Ingersoll, 2001; Luekens, Lyter, Fox, & Chandler, 2004) and to resign from teaching (Ingersoll, 2001; Kirby, Berends, and Naftel, 1999; Luekens et al., 2004; Stinebrickner, 2001). Murnane et al. (1991) refined this finding, determining that young females (under age 30) were at greater risk of resigning from teaching than were young males, older males, and older females. Additional research suggests that females--like those in TFA, arguably-- whose ACT scores are above those of the other teachers in their school are at greater risk of resigning from teaching than are females in schools where their coworkers have similar scores (Podgursky, Monroe, & Watson, 2004).

Research indicates that minority teachers have a lower risk of leaving the teaching profession than do White teachers (Ingersoll, 2001; Murnane et al., 1991). Closer

examination of these trends suggests that Latinos are less likely than White or Black

teachers to leave teaching (Kirby, Berends, & Naftel, 1999). Studies of turnover at the

school level, as opposed to attrition from the profession, suggest that Latinos and Blacks

are at lower risk of leaving their schools than are Whites. Adams (1996) found this same

pattern for voluntary exits from a predominantly minority district. Black teachers are less

likely to move from low-income schools than are White teachers (Hanushek, Kain, &

Rivkin, 2004). However, Black male teachers with high ACT scores have been found to

be at much greater risk than White males with high scores of resigning from teaching

(Podgursky et al., 2004). High ability Black females' probability of resignation was not

significantly different from that of their White counterparts.

One additional factor may affect Black or African American teachers' probability

of exit. Research conducted on Black women has found that the presence of a teacher in

one's family exerts an especially strong influence on new teachers, convincing them to

enter and remain in the profession (Dingus, 2006: Dixson & Dingus, 2008).   In their

study of intergenerational traditions of teaching among Black females, Dixson and

Dingus (2008) found that having a mother or grandmother who had been a teacher

predisposed respondents to enter, and remain in, the teaching profession. They observe,

"African American women teachers come to teaching as part of a legacy of Black

feminist activism that has sought to maintain cultural practices, address racial and

economic inequity, and facilitate the development of youth" (p. 832).

RESEARCH QUESTIONS

In this study, I examined TFA teachers' conditional probabilities ("risk") of: a) leaving

their initial school, b) transferring, and c) resigning from teaching altogether in each year,

following their entry into teaching, given that they had not experienced these events up to that point. My specific research questions were:

1. *Are female Teach For America teachers at greater risk than male teachers of leaving their initial placement school, transferring, or resigning from the profession?*
2. *Are Black and Latino Teach For America teachers at greater risk than White and Asian teachers of leaving their initial placement school, transferring, or resigning from the profession?*
3. *Does the risk that Black and Latino Teach For America teachers will leave their initial placement school, transfer, or resign from the profession differ by their gender? Does their risk of experiencing these outcomes differ as a function of the presence of a teacher in their family?*

RESEARCH DESIGN

I used discrete-time survival analysis to investigate the "survival" of TFA teachers in their initial placement schools, and in the teaching profession more generally. This analytic method allowed me to incorporate information even-handedly from both teachers who experienced the event of interest -- leaving their school, transferring to another school, or resigning from the profession -- while they were being observed, *and* teachers who had not yet experienced the event by the time of data collection, but who may experience it in the future. Historically, researchers focused only on the group of teachers who had actually experienced an event (e.g. leaving teaching), asking when they experienced it. Alternatively, researchers abandoned the "when" question altogether and, instead, asked only "whether" individuals experienced the event during the observed time period (Singer & Willett, 2003). With survival analysis, I used information from *all* individuals, whether or not they had experienced the event in question, *and* answered the "when" question by estimating the conditional probability that teachers would experience the event of interest in each year, given that they had not experienced it up to that point.

Sample

The sample for my study is drawn from a census of all teachers enrolled in the

2000, 2001, and 2002 TFA cohorts. Because mine is a study of teachers' careers, I

followed each of these teachers over time. Most studies of teachers' careers indicate that

attrition from the teaching profession declines substantially after the fifth year (Kirby et

al., 1999; Murnane et al., 1991; Stinebrickner, 2001), which suggested I should follow

teachers for at least 5 years. However, because mine is a retrospective study, I wanted to

focus on relatively recent TFA cohorts to reduce recall errors (Taris, 2000) and take

advantage of TFA's more reliable contact information for members of the more recent

cohorts. Thus, my data collection consisted of surveying cohorts of TFA teachers who

would have accumulated four, five, or six years of teaching experience if they had taught

continuously[ii].

From 3283 TFA enrollees in these cohorts, 2029 – or 62% -- individuals

responded. Of these, 71.4% of respondents are female; 11.54% identified as

Black/African American, 6.73% identified as Latino/Hispanic, and 77.53% identified as

White/Caucasian. 57.3% of the respondents reported that they were related to a teacher.

See Appendix 1 for additional descriptive statistics on the sample.

The TFA organization provided me with information about the census of 3283

enrollees. Although TFA's records are somewhat incomplete, I compared the sample and

census and found few statistically significant differences. Each contained similar

proportions of females, Latinos, Asians, American Indians, members of each cohort, and

teachers assigned to elementary, middle, and high school. The two statistically

significant differences between sample and census were in the percentage of those who

identified as *only* Black/African American (14.53% of the census vs. 10.43% of the

sample) and those who identified as *only* White (67.59% of the census vs. 73.73% of the sample). However, only 90.6% of individuals in the census provided information about their race. By contrast, 97.4% of respondents reported their race on my survey. Thus, it is possible that the reported racial composition of the census is not a good standard against which to measure the representativeness of my sample. Nonetheless, my sample may not be representative for Blacks and Whites. Even though this is possible, it is important to focus on racial differences in turnover because of the absence of research on the retention of high-achieving teachers of color.

Procedures

I collected most of the data for my study during an on-line survey that I administered between January and March, 2007, to the census of teachers. In the survey, I requested information on teachers' individual characteristics (e.g., subject matter preparation and assignment; demographic information) and, where relevant, on the timing of their first departure from their school and the teaching profession. Into this dataset, I incorporated data from TFA placement records, which specify the districts in which individuals were placed.

Measures

For my data collection, I created a survey instrument, drawing on the *School and Staffing Survey*, earlier questionnaires designed by Kardos (2004) and Liu (2004), research into new teacher retention, and literature on survey question design (Dillman, 1978; Fowler, 1998, 2002; Payne, 1951) and reducing recall error (Sudman & Bradburn, 1982). Before administering this instrument, I piloted it with 30 TFA teachers drawn from cohorts who entered the profession immediately prior to 2000, or after 2002, and

tested specific survey questions and the online survey process with 812 teachers who were demographically similar to TFA.

Once I had collected the retrospective survey data, I constructed a "Teacher-Year" dataset to record important elements of the TFA teachers' experience in each year they taught. Because of the challenges of respondent recall in retrospective research, most of the measures whose values I collected were time-invariant (Kelly, 2004; Taris, 2000).

Outcomes

In this study, there are three related outcomes that describe the time-varying outcome behavior of each teacher. These variables document the teacher's: a) first voluntary exit from the initial placement school by transfer or resignation from teaching (*VEXITSCHL*); b) first voluntary transfer from the school (*VTRANSFER*); and c) first voluntary resignation from the teaching profession (*VEXIT*). I recorded the dichotomous values of each of these outcomes, in each year of the profession, in a separate row of the dataset for each teacher, up until the year in which she left teaching or was censored by the end of data-collection (1 = if event was experienced in this year, given that it had not been experienced in an earlier year; 0 = otherwise).

Question Predictors

My principal question predictors represent the effect of time. In my initial analyses, I represented time by its most general specification: six dichotomous predictors (*T1-T6*) , each of which represented one of the up to 6 years in which respondents could have taught (*T1*=1 in the respondent's first year in teaching, 0 otherwise, etc.). In subsequent models, I replaced this general specification by more parsimonious representations. For models with *VEXITSCHL* as the outcome, these specifications of time included *postT1*, a dichotomous predictor that distinguished whether the time period

in question was greater than or equal to *T2*, and *T2to6*, a continuous predictor that measured time linearly between the second and sixth time periods (0= if *T1*=1, 2=if *T2*=1, 3= if *T3*=1, etc.), as well as *T1* and *T4*, dichotomous predictors as described above. For models predicting *VTRANSFER*, I included *TIMEC*, a continuous representation of time centered on year 1 (i.e. 0= if *T1*=1), its square, *TIMEC2*, and its cube, *TIMEC3*. For models with *VEXIT* as the outcome, I included *lnTIME*, the natural logarithm of continuous time (not centered); and *T1* and *T5*, dichotomous predictors described as above.

In addition to the representation of time, my question predictors included a set of dichotomous, time-invariant variables that described selected demographic and background characteristics of the teacher. *FEMALE* recorded whether or not the respondent identified as female (=1; 0 otherwise). *BLACK* recorded whether or not the respondent identified as Black or African American (=1; 0 otherwise). *LATINO* indicated whether or not the respondent self-reported as Latino or Hispanic (=1; 0 otherwise). *FAMILY* recorded whether or not there is a teacher in a respondent's immediate family – i.e., among the respondent's parents, siblings, aunts, uncles, and grandparents (=1; 0 otherwise).

Control Predictors

In my discrete-time hazard models, I also controlled for selected design and substantive covariates. To account for the fact that the 2000-2002 TFA teachers entered teaching in three different cohorts, I included a system of three time-invariant, dichotomous variables distinguishing the cohorts, *C1* to *C3* (=1 if respondent is in that cohort; 0 otherwise). I also controlled for variables well known to make a difference to teacher turnover, including: (a) the age that a teacher entered teaching (*agestartC*; a

continuous, time-invariant variable centered on the sample mean age of 22), (b) their

college major (e.g. *SCImaj*; a dichotomous, time-invariant variable coded 1 if respondent

majored in science) and (c) whether their teaching assignment was at the elementary or

secondary level (e.g. *midhs_yr*; a dichotomous, time-varying variable coded 1 if

respondent taught at secondary level). See the Appendix 2 for a summary of the names

and definitions of all variables.

Data Analysis

RQ #1: Are female TFA teachers at greater risk than male teachers of leaving their

initial placement school, transferring, or resigning from the profession?

I used discrete time survival analysis to address this question by fitting logistic regression

models in the teacher-year dataset (Singer & Willett, 1993; Willett & Singer, 1991). A

typical model predicting voluntary exit from school is:

$$p(VEXITSCHL_{ij} = 1) = \frac{1}{1 + e^{-[(\alpha_1 T1_{ij} + \alpha_2 T2_{ij} + ...\alpha_6 T6_{ij}) + (\beta_1 FEMALE_i + \gamma_1 Z_i + \gamma_2 Z_{ij})]}} \qquad \textbf{(1)}$$

where *i* represents the individual teacher in year *j*, the α parameters are a set of intercept

parameters representing the "baseline" risk that a teacher whose values on all predictors

are zero will exit her school for the first time in each year, given that she had remained in

the school up to that year. Parameter β_1 represents the effect of being female on teachers'

risk of exit from their initial placement school, and addresses research question 1.

Parameters γ_1 and γ_2 are vectors of parameters that represent the impacts of time-invariant

(Z_i) and time-varying (Z_{ij}) controls, respectively. In my data analyses, I also tested

whether interactions between the question predictors and time, and between the question

predictors and selected covariates, were required, including them when they were and

removing them when they were not. I repeated this analysis with voluntary transfer
(*VTRANSFER*) and voluntary exit (*VEXIT*) as the outcomes.

*RQ #2: Are Black and Latino TFA teachers at greater risk than White and Asian[iii]
teachers of leaving their initial placement school, transferring, or resigning from the
profession?*

I followed this same approach in addressing my second research question concerning the
effect of *BLACK* and *LATINO* on the same outcomes.

*RQ #3: Does the risk that Black and Latino TFA teachers will leave their initial
placement school, transfer, or resign from the profession differ by their gender? Does
their risk of experiencing these outcomes differ as a function of the presence of a teacher
in their family?*

   To address this research question, I again fitted discrete-time hazard models. A
typical specification of such a model is:

$$p(VEXITSCHL_{ij} = 1) = \frac{1}{1 + e^{-[(\alpha_1 T1_{ij} + \alpha_2 T2_{ij} + \ldots \alpha_6 T6_{ij}) + (\beta_1 LATINO_i + \beta_2 FEMALE_i + \beta_3 LATINOXFEMALE_i + \gamma_1 Z_i + \gamma_2 Z_{ij})]}} \quad \textbf{(2)}$$

Here parameter, β_3 represents the effect of being Latino *and* female on teachers' risk of
exit from their initial placement school, and addresses research question 3. Parameter β_1
captures the effect of being a Latino male on teachers' risk of exit and parameter β_2
represents the effect of being a non-Latino female on this conditional probability. All
other parameters are as described in equation (1). I refit equation (2) with *VTRANSFER*
and *VEXIT* as outcomes and with *FAMILY* and the two-way interaction of *LATINO* by
FAMILY as predictors. I also refit these models using *BLACK* instead of *LATINO*.

Model-Fitting and Interpretation Strategies

For each outcome, I began the model-building process by fitting models in which the completely general specification of time, in equation (1), was replaced by more parsimonious specifications. With each outcome, I tested to confirm that the more parsimonious representations were preferable. I then added the main effect of each question predictor, and systematically tested whether it interacted with the other substantive predictors already in the model and with the time predictors. In fitting models, I made judgments about whether or not to retain predictors using post-hoc general linear hypothesis (GLH) tests based on -2 log likelihood goodness-of-fit statistics, comparing differences to a χ^2 distribution with the appropriate degrees of freedom. In Table 1, for each outcome, I present my *baseline* fitted model, which includes only the time specifications and the cohort controls, and my *final* fitted model, which includes these predictors as well as my question predictors and statistically significant covariates.

Because my final fitted models include many transformed and interacted predictors whose effects are difficult to interpret directly, I interpret my major findings by presenting fitted hazard and survivor plots for prototypical TFA teachers. These fitted hazard plots summarize a prototypical respondent's probability of experiencing the outcome in a given time period, provided she has not experienced it before. The fitted survivor plots accumulate these risks, and exhibit the respondent's probability of *not* experiencing the event of interest ("surviving") by the end of each time period. In graphing the fitted hazard and survival plots for these prototypical TFA teachers, I set all control variables to their sample grand means, unless otherwise specified.

FINDINGS

Overall, I found that women, Blacks, and Latinos were at lower risk of leaving their initial placement schools and resigning from the teaching profession than were men,

Asians, and Whites. These findings are notable; districts tend to lose females at higher rates than males and regularly experience shortages of Black and Latino teachers, especially those with excellent academic credentials. Among females, Blacks, and Latinos, I found considerable variation in turnover, however. In contrast to the relationship for all men and women, Latino males had a lower risk of resigning from the profession than did Latino females. I found that Black respondents who were themselves related to a teacher had an especially low risk of resigning from the profession. I begin by summarizing findings from fitting my baseline models for the entire sample, and then examine differences in these risks of turnover by gender and race.

How Long Do TFA Teachers Remain in their Initial Schools or the Profession?

In Table 1, I present baseline fitted models in which time and cohort predict the risk of leaving the initial school, transferring, and resigning from the profession entirely. Inspection of the parameter estimates associated with time suggests it has a complex, non-linear relationship with each outcome. To simplify interpretation, in Figure 1 (see Appendix 3 for all figures) I present fitted hazard and survivor functions from the baseline discrete-time hazard models.

In the upper panel, on the left, I present a fitted hazard function describing the conditional probability that teachers will voluntarily exit from their initial, low-income school in each year[iv], and, on the right, the corresponding fitted survivor function. The left plot indicates that these teachers' estimated probability of leaving their initial school is relatively low initially, around .10, but then rises rapidly to around .50 in year 2, indicating that approximately 50% of teachers who were still in their initial placement school left it in year 2. The teachers' risk of departure then declines with the passing years. The cumulative effect of these exits is illustrated in the fitted survivor function on

the right. Approximately 50% of TFA teachers left their initial school within a median

lifetime of 1.86 years, with 44% of TFA teachers remaining in their initial placement

school after 2 years, when their commitment to TFA ended.

Respondents left their initial placement school by transferring to a new school or

by resigning from teaching altogether. In the middle panel of Figure 1, I present the

fitted hazard and survivor functions that describe the occurrence of voluntary transfers.

The fitted hazard function on the left indicates that the predicted conditional probability

of transfer is low initially but peaks in year 3, at approximately 0.19. In other words,

19% of teachers who had not previously left their placement school are estimated to

transfer in this year. The fitted survivor function on the right indicates that 50% of

respondents who had not yet left their initial placement school are estimated to transfer

within 5.10 years.

Finally, the bottom panel of Figure 1 presents the fitted hazard and survival

functions describing the occurrence of voluntary resignation from teaching. The fitted

hazard function on the left indicates that the conditional risk of resigning from the

profession peaks at .35 in year 2, and then generally declines thereafter. Approximately

35% of teachers who remained in teaching at the beginning of year 2 were estimated to

have resigned by the beginning of year 3. The fitted survivor function on the right depicts

a steep decline in the probability of remaining in the profession in the first few years,

reflecting the high risk of resignation in years 2 and 3. Nonetheless, a relatively high

proportion--an estimated 61% of the sample-- remained in the teaching profession more

than 2 years and 50% stayed longer than 2.66 years.

Teach For America requires its corps members to teach in low-income schools for

2 years. Thus, it is important to ask to what extent my findings reflect TFA's 2-year

obligation. Inspecting the three fitted hazard functions in Figure 1 (on the left in each panel), notice that respondents are at greatest risk of changing their schools or occupations in year 2 or 3. This timing likely reflects the TFA programmatic structure. Are TFA teachers treating this 2-year commitment as a short-term volunteer experience and leaving in droves after two years? Or do they view TFA as a means of quick entry into a career they will cultivate longer term? The answer is mixed. Examining the three survivor functions on the right in each panel, it is clear that few people are estimated to remain in their initial placement schools or the profession beyond 5 or 6 years. However, 44% of respondents stayed in their initial school and 61% remained in the profession longer than the 2 years TFA required of them. Thus, it appears that teaching ends up being a very short-term job for about half of these TFA teachers, but for the rest of them it may be the beginning of a career in the classroom.

Is Women's Risk of Turnover Higher than that of Men?

As the parameter estimates in the final models of Table 1 suggest, female TFA teachers were at *lower* risk than their male counterparts of leaving their initial placement school or resigning from the profession, provided that they had not done so before. However, they were at greater risk for transfer, given that they had not previously transferred or resigned from the profession. These findings contrast with prior research, which found that young women were at greater risk of resigning from teaching than young men (Murnane et al., 1991) and high-ability women and men were at equal risk of leaving the profession (Podgursky et al., 2004).

In Figure 2, I plot fitted hazard functions for each of the three outcomes, by gender, based on the final fitted models in Table 1, with all predictors other than gender and time held at their sample means. In general, men were at higher risk of resigning

from the profession and leaving their initial placement schools, but women were at greater risk of transferring, conditional on not having experienced these events previously. In the left panel of Figure 2, for instance, I present the fitted hazard function describing males' and females' conditional probability of exit from their initial placement school in each year, provided they had not left previously. Females were at lower risk of leaving their schools than were males. In year 2, for example, 54.0% of males who had not yet left their school are estimated to do so, compared to 49.5% of the females. In fact, half of all males were estimated to leave their school within 1.82 years, compared to 1.92 years for females.

Women's risk of voluntarily resigning from teaching was also lower than that of men, on average. In the right panel, I present the fitted hazard function depicting males' and females' risk of resignation from the profession in each year. Note that the line depicting males' probability of resignation is consistently above that for females, reflecting their increased risk. In year 2, for example, 41.0% of males left the profession for the first time, compared to 33.5% of females. Overall, I estimated that 50% of males resigned from teaching within 2.34 years, while half of women are estimated to resign in 2.86 years. Thus, females remain in teaching about a half year longer than males, on average. While a half-year gap may appear small, research indicates that teachers improve substantially in their first few years in the classroom (Rockoff, 2004). Thus, small disparities in median career length could result in real differences in student achievement.

On average, women were at greater risk of voluntary transfer, compared to men, however. This pattern is depicted in the middle panel of Figure 2. In year 2, 16.6% of females were predicted to transfer, provided they had not previously transferred or

resigned from teaching. By comparison, only 13.0% of eligible males were estimated to do so. Overall, 50% of females transferred from their initial placement schools within a median lifetime of 4.76 years. 46.5% of males transferred from their initial schools within 6 years.

Is Black and Latino Teachers' Risk of Turnover Lower than that of Asian and White Teachers?

Prior research suggests that Black and Latino teachers are at lower risk of leaving low-income schools or resigning from the teaching profession altogether than their Asian or White counterparts. But, does this conclusion hold for TFA teachers, who have an increasing range of options by virtue of their strong academic backgrounds and expanding access to careers from which they were historically excluded? Consistent with much prior research, I found that Black and Latino TFA teachers' conditional probability of turnover was lower than that of Asian or White teachers.

In the final models of Table 1, there are complex relationships between the TFA teachers' racial backgrounds and the three outcomes. To aid interpretation of these effects, I present fitted hazard functions from discrete-time hazard models with the three outcomes of interest in Figure 3. Across the three panels of Figure 3, it is clear that -- in most time periods -- both Black and Latino teachers have a lower risk of leaving their initial placement school, transferring, and resigning from the profession than do White and Asian teachers, provided they have not experienced the event previously.

In the left panel of Figure 3, for instance, I present a fitted hazard function based on the final model for voluntary exit from the school, with all covariates held at their sample mean. Although Black teachers' risk of exit was slightly higher than that of Asians and Whites in year 1, thereafter the conditional probability that Black or Latino

teachers would exit their school was considerably lower than that of White or Asian teachers. For example, in year 2, when the TFA obligation ends, 39.4% of Black teachers and 47.9% of Latino teachers who were still in their initial placement schools were predicted to leave. In contrast, 53.5% of Whites and Asians still in these schools were predicted to exit. These sizable differences between attrition rates of Blacks and Latinos, on the one hand, and Asians and Whites, on the other, accumulate. Overall, I estimate that 50% of Black teachers exit their schools within a median lifetime of 2.19 years; half of Latino teachers are estimated to leave their initial schools within 1.96 years. 50% of White and Asian teachers are estimated to leave their schools within 1.84 years. Although these estimated median lifetimes are similar, they mask considerable variation. For example, 12.7% of White and Asian teachers are estimated to teach in their initial, low-income placement schools for more than 4 years, compared to nearly twice that proportion -- 25.0% -- of Black teachers and 17.6% of Latino teachers.

In most cases, White and Asian teachers were also more likely than Black or Latino teachers to resign from the profession. In the right panel of Figure 3, notice that the fitted risk profile depicting Whites and Asians' risk of resignation is far above those depicting Blacks and Latinos' conditional probability of resigning in year 2, when the TFA obligation concludes. In this year, 37.5% of White and Asian teachers are predicted to resign, compared to 32.0% of Latino teachers and only 24.4% of Black teachers. Whites' and Asians' elevated risk of resignation from teaching compounds over time. 50% of Whites and Asians are estimated to leave the profession within 2.60 years, compared to 3.08 years for Latinos, and 3.55 years for Black teachers. On average, compared to Whites and Asians, Latino teachers' careers are a half-year longer and Black teachers are nearly one year longer. As noted above, this additional one-half to one year

may be important, given the high returns to additional experience early in the teaching career.

The middle panel in Figure 3 depicts the fitted hazard function based on the final fitted discrete-time hazard model with voluntary transfer as the outcome. In this case, the fitted hazard function for Whites and Asian almost overlaps with that of Latinos, reflecting these two groups' similar conditional probabilities of transfer in each time period. The fitted hazard function depicting Black teachers' risk of transfer is slightly lower than those for the other two groups, however. For example, in year 3, 18.7% of Whites and Asians and 18.5% of Latinos who had not yet left their initial placement school were estimated to transfer. By comparison, only 16.4% of Blacks were predicted to do so. Overall, 50% of Asians, Whites, and Latinos still in their initial schools were estimated to transfer out of those schools within 5.16 and 5.29 years, respectively. 50% of eligible Blacks had not yet transferred at the end of 6 years.

Thus, Blacks and Latinos tended to leave their schools and the profession at lower rates than Whites and Asians. Given the TFA program structure, it is especially noteworthy that their year-2 exit and resignation rates were so much lower than their counterparts'. This may suggest that Black and Latino respondents view participating in the TFA program as a means to obtain a job teaching in low-income schools while Whites and Asians may view it as a short-term, volunteer activity. It could also indicate that Blacks and Latinos experience more success in the classroom than their Asian or White counterparts and thus, tend to remain in their initial schools and the profession. Finally, this finding could suggest that Blacks and Latinos continue to have less access to alternative careers than do Asians and Whites.

Does Black And Latino Teachers' Risk Of Turnover Differ As A Function Of Gender Or The Presence Of A Teacher In Their Family?

Females, Blacks, and Latinos were generally at lower risk than males, Asians, and Whites of leaving their placement schools and resigning from the profession. But, additional variation in the outcomes exists within these groups. Unlike White, Asian, or Black women, Latino women were *at greater risk* than Latino men of resigning from the profession and *at lower risk* than their male counterparts of transferring, given that they had not previously experienced these outcomes.

To illustrate these findings, Figure 4 presents the fitted hazard functions depicting a teacher's risk of resigning from teaching, conditional on not having done so previously (left panel), and transferring for the first time, provided that she had not transferred or resigned before (right panel). In the left panel, notice that Latino females' risk of resignation is well above that of Latino males in most time periods. For example, in year 2, approximately 36.6% of Latino females still in teaching were estimated to resign. By comparison, 28.8% of Latino males were estimated to resign in that year. Over time, these differences accumulated such that 50% of Latino females were estimated to resign from the profession after a median lifetime of 2.73 years. By contrast, half of all Latino males were predicted to resign within 3.62 years.

The right panel of Figure 4 reveals that, among those who stayed in their placement schools, Latino males were more likely to transfer than Latino females and all other racial groups. In year 3, for example, 21.9% of Latino males were estimated to transfer. By contrast, 17.2% of Latino females, 16.4% of Black teachers, and 18.7% of White or Asian teachers were predicted to transfer. Overall, 50% of Latinos still in their

placement school transferred within 4.00 years, while it took a median lifetime of 5.91 years for half of Latino females still in their placement schools to move. 50% of Asians and Whites transferred within 5.16 years but by the end of 6 years, fewer than 50% of Black teachers still in their placement schools had transferred to a new school. Contrary to the trends for women and men as a whole, Latino males' risk of resignation from teaching was *lower* that that of Latino females but their conditional probability of transfer was *higher*. As a group containing both men and women, Latinos' reduced risk of resignation relative to Asians and Whites is due to the low risk that Latino males will leave the teaching profession.

I also found variation within Black teachers as a group. Black teachers who were themselves related to a teacher had a substantially lower risk of resigning from the teaching profession than Blacks without such a relative. In contrast, the conditional probability that a White, Asian, or Latino teacher would resign from teaching did not depend on whether or not there was a teacher in her family. In Figure 5, I present a fitted hazard function with voluntary resignation from teaching as the outcome. Notice that the dashed line representing the conditional probability that a Black teacher with a relative in teaching will resign is well below the other dashed line, representing the fitted conditional probability that a Black teacher without a teacher relative will leave the profession. It is also well below the two solid fitted lines (representing Latino, Asians, and Whites' risk of resignation) in years 2 and 3, when the majority of TFA teachers resign. In year 2, for example, 21.2% of Black teachers with a teacher relative were estimated to resign from the profession, compared to 29.1% of those without a relative, 32.0% of all Latinos, and 37.5% of all Whites and Asians. These differences compounded over time such that 50% of Black respondents related to a teacher left in a

median lifetime of 4.06 years, while half of their Black counterparts without a teacher relative left in 2.94 years. 50% of Latinos were estimated to resign within 3.08 years and 50% Whites and Asians were estimated to resign from the profession in 2.60 years. Thus, Black teachers with a teacher relative experienced careers that were, on average, approximately one year longer than those of Latinos and Blacks without a teacher relative, and one-and-a-half years longer than those of Asians and Whites.

DISCUSSION

In summary, I found that teachers' risk of leaving their initial placement school and the profession differed by gender, race, and whether or not they were related to a teacher. Overall, the risk that females, Blacks, and Latinos would leave their initial placement schools or resign from the profession was lower than the risk that males, Asians, and Whites would do so. However, the effects of race on turnover differed by gender and the presence of a teacher in one's family. Unlike other racial groups, Latino males' conditional probability of resigning from the profession was lower than that of Latino females. Black individuals related to a teacher at lower risk of resigning from teaching than Blacks not related to a teacher, Latinos, Whites, or Asians.

To some extent, my findings are consistent with prior research. I found that, compared to Whites and Asians, Black and Latino teachers were at lower risk of leaving their schools, which has been well documented in the literature (see., e.g. Hanushek, Kain, & Rivkin, 2004). The fact that the high-achieving Blacks and Latinos in my sample were at lower risk for turnover than Asians and Whites has not been demonstrated in prior research. In fact, there is some evidence that high-ability African American males resign from the profession at extremely high rates (Podgursky et al., 2004). Given

that most districts experience a shortage of Black and Latino teachers, particularly those strong academic backgrounds, these results are notable.

The finding that Black individuals related to a teacher had an especially low probability of leaving teaching has not been demonstrated in prior empirical work, but is consistent with research on a legacy of teaching in Black families (Dixson & Dingus, 2008). Prior work demonstrates that many Black teachers are drawn to the classroom by moral, spiritual, and political motivations rooted in their family's tradition of teaching. It makes sense that, given their family background in teaching, these individuals may be more prepared for and/or more committed to teaching low-income children and children of color than their counterparts of other races or Black teachers without such a family tradition.

In some ways, my findings depart from research to date. Prior studies have found that young women—the majority of this sample—have a greater probability of resigning from teaching than young men (Murnane et al., 1991; Podgursky et al., 2004). Here we see that the risk that women, with the exception of Latinas, will leave their school and resign from teaching is lower than that of men. One explanation is that my data collection period, 6 years, is too short to register the resignation of females due to childbearing, which is often the reason women leave teaching in the early years of their career (see e.g., Stinebrickner, 2001). The Murnane and Podgursky studies each tracked teachers for over 10 years, by contrast. Moreover, highly educated women--like those in TFA-- increasingly postpone motherhood. By comparison, these prior studies were based on samples of teachers entering the profession in the 1970s (Murnane et al.) and the early 1990s (Podgursky et al.) and thus may not reflect this relatively new trend in delayed childbirth.

Alternatively, this deviation from prior research may be due more to differences between male TFA teachers and males in the general population than females in each population. Males may be more likely to view teaching through the TFA program as a short-term, volunteer activity. The easy-in, easy-out structure of TFA supports this notion of teaching as temporary, service work. In contrast, males in the general population who choose to enter teaching may commit to it as a career. Given teaching's reputation as women's work, men in the general population who choose to teach must overcome this gender stereotype and the low professional status that accompanies it. These men have likely come to terms with these associations, and may be more committed to the teaching career than their female counterparts, for whom there is little lost in entering a traditionally female occupation.

The fact that, unlike other women in the sample, female Latinos' risk of leaving the profession is higher than that of their male counterparts is interesting and warrants further research. Given the scarcity of college-educated Latinos, this group may have been heavily recruited (and encouraged) to leave teaching and enter fields such as business or law that have been traditionally dominated by White males. Latino females appeal to private and public sector recruiters on both racial and gender grounds, which may explain why their attrition rates are higher than those of their male counterparts. Support and encouragement from teacher relatives may help retain Black females, who might also be heavily recruited by such employers.

IMPLICATIONS

In this paper, I examined the retention of *Teach For America* teachers in their initial placement schools and the teaching profession overall. Because this is a study of TFA teachers in particular, its findings cannot be generalized to the population of new

teachers. However, TFA teachers, with their high standardized test scores and diplomas from the nation's most selective colleges, possess some of the few characteristics known to make an ultimate difference to student achievement (Ehrenberg & Brewer, 1994; 1995). Thus, this is a population whose career decisions we should want to examine more carefully.

Generalizations based on this study are further limited by differences between my sample and census. As with all survey research, it is possible that the characteristics of respondents in the sample differ from those of non-respondents, giving rise to biased parameter estimates. If we accept the TFA records as accurate, Black teachers, in particular, are slightly but significantly underrepresented in my sample. However, the paucity of research on academically strong teachers of color and the challenges districts face in recruiting such instructors make this paper's focus on Black teachers especially timely and important.

With these cautions in mind, my findings suggest several actions TFA and its partner districts might consider. First, if TFA cares about the retention of its teachers in low-income schools, it might redouble its efforts to recruit Black and Latino teachers. Not only do many districts have a shortage of such teachers, especially those with strong academic backgrounds, but my findings suggest they are more apt than Asians and Whites to remain in low-income schools and the teaching profession. In particular, such efforts might target Black candidates who are related to a teacher. TFA and partner districts could work together to offer Black and Latino candidates focused incentives, including bonuses that are released gradually to such teachers so that they remain in low-income classrooms beyond years 1-3, when they are most likely to resign from the profession or switch schools.

TFA and partner districts might also launch initiatives that raise awareness about the need for good teachers and the opportunity to make a difference in low-income schools. Such initiatives might include a "cohort-within-a-cohort" program whereby TFA and districts place small groups of Black and Latino teachers in schools and cultivate systems of mutual support among these teachers. Skilled, experienced Black and Latino teachers with a strong commitment to the teaching profession could serve as mentors to the new teachers. In this way, Black and Latino teacher retention may be even further strengthened.

White and Asian teachers also have a role to play in the low-income schools where TFA places them. TFA and districts should inquire into why these groups tend to leave earlier than Black and Latinos. Are these teachers being pulled out of the classroom by enticing careers outside of teaching or education? Did they always plan to teach for the short term and then pursue a graduate degree or a different occupational path? Or did teaching in low-income schools prove so challenging that those who considered building a full-fledged career in teaching decided not to teach long-term after all? If such teachers always planned to teach briefly, there may be little TFA and partner districts can do to encourage such teachers to stay. If such teachers left teaching before they had planned to because of challenging working conditions, TFA and partner districts might work together to address these by securing additional resources for schools or jointly sponsoring school-based professional development.

Admittedly, these recommendations push *Teach For America* to expand the scope of its work beyond its established purpose of providing bright, hard-working teachers to districts serving large numbers of low-income students. However, many of these districts would benefit from broader access to the capacity, capital, and connections TFA can

offer. A reconceived and expanded partnership between TFA and the districts with whom it works may be exactly what is needed for low-income students to make real academic progress.

Beyond these implications for practice and policy, more research is needed to determine whether these results hold for other TFA teachers or teachers whose academic credentials mirror those selected by TFA. Additional quantitative research should inquire into whether these results hold for samples of new teachers whose academic profiles match those of TFA teachers but who graduate from traditional teacher preparation programs. Qualitative research should explore how TFA teachers decide whether to remain in their initial school and in the profession more generally. Interview-based studies are an important way to develop an in-depth understanding of how individuals make career decisions.

As the first rigorous, nationwide analysis of *Teach For America* teacher retention, this study provides important information about who among these high-achieving teachers stays in low-income classrooms and the teaching profession more generally. Although the easy-in, easy-out structure of TFA allows a considerable number of corps members to teach for a short while before pursuing alternative careers, some people appear to launch a career in teaching from their initial TFA placement. Through additional examination and careful research, educators, policymakers, and researchers may learn more about what helps academically talented teachers remain in the profession and in the low-incomes schools where they are needed the most.

Table 1: Parameter estimates (standard errors), and goodness-of-fit statistics from selected discrete-time hazard models in which the risk that a teacher will voluntarily leave her initial placement school, voluntarily transfer, or voluntarily resign from teaching is predicted by cohort, time, gender, race, the presence of a teacher in one's family, age of entry into teaching, college major, school level, and urbanicity (n=2029).

| | Outcome | | | | | |
| | VEXITSCHL | | VTRANSFER | | VEXIT | |
Predictor	Baseline Model	Final Model	Baseline Model	Final Model	Baseline Model	Final Model
Cohort covariates						
C2	0.139	0.126	0.037	0.052	0.128	0.107
	(0.089)	(0.091)	(0.120)	(0.122)	(0.086)	(0.089)
C3	0.118	0.156~	-0.015	-0.012	0.129	0.171*
	(0.080)	(0.083)	(0.109)	(0.111)	(0.079)	(0.082)
Time predictors						
T1	-2.298**	-2.214**			-3.120**	-3.351**
	(0.094)	(0.152)			(0.154)	(0.191)
T4	-0.473**	-0.456**				
	(0.130)	(0.133)				
postT1	0.219	0.245				
	(0.140)	(0.180)				
T2to6	-0.125**	-0.085~				
	(0.045)	(0.046)				
TIMEC			1.840**	1.752**		
			(0.203)	(0.216)		
TIMEC2			-0.724**	-0.757**		
			(0.122)	(0.125)		
TIMEC3			0.076**	0.087**		
			(0.019)	(0.020)		
T5					0.334*	-0.122
					(0.156)	(0.238)
lnTIME					-1.145**	-0.777**
					(0.118)	(0.178)
Substantive Predictors						
FEMALE		-0.282*		0.328**		-0.369**
		(0.118)		(0.112)		(0.076)
BLACK		-0.493**		-0.158		-0.218
		(0.119)		(0.140)		(0.449)
BLACKxT1		0.796**				1.323**
		(0.253)				(0.484)
BLACKxlnTIME						0.771*
						(0.326)
LATINO		-0.226~		0.428		-0.012
		(0.130)		(0.314)		(0.331)
LATINOxFEMALE				-0.625~		0.725*
				(0.374)		(0.313)
Substantive Covariates						
FAMILY		-0.185		0.252*		0.162
		(0.131)		(0.110)		(0.159)
FAMILYxBLACK						-0.424*
						(0.213)

FAMILYxFEMALE		0.251~ (0.153)				
FAMILYxTIMEC3				-0.014* (0.006)		
FAMILYxlnTIME						-0.262~ (0.155)
agestartC		-0.055* (0.024)		-0.068 (0.042)		-0.109** (0.019)
agestartCxT1		0.082* (0.036)				0.115* (0.049)
agestartCxBLACK		0.068* (0.034)				
agestartCxFAMILY		-0.063* (0.030)				
SCITECHmaj		0.411** (0.107)				0.279* (0.134)
SCITECHxBLACK		-0.666* (0.338)				-0.710~ (0.406)
SCITECHxT1						0.793** (0.262)
HUMANmaj				-0.551** (0.166)		0.458** (0.114)
HUMANxTIMEC				0.232* (0.105)		
HUMANxagestartC				0.154** (0.046)		
HUMANxBLACK						-0.765** (0.291)
HUMANxLATINO						-0.979** (0.302)
midhs_yr		0.125~ (0.071)		0.089 (0.093)		0.428* (0.167)
midhsxT5						0.587~ (0.312)
midhsxlnTIME						-0.433* (0.176)
RURAL		0.186* (0.094)		0.147 (0.168)		0.049 (0.131)
RURALxT1		-0.750** (0.241)				-0.659* (0.299)
RURALxT5						0.627~ (0.332)
RURALxFAMILY				-0.584* (0.231)		0.298~ (0.166)
RURALxagestartC				-0.101~ (0.052)		
Constant			-2.874** (.124)	-2.898** (.216)	.130 (.133)	-.313 (.229)
Goodness-of-fit Statistics						
-2LL	5608.151	5352.9094	3578.964	3447.8698	6076.0999	5734.8487
Δ -2LL*(df)*[1]		255.242*(15)*		131.094*(14)*		341.251*(24)*
p-value		<.0001		<.0001		<.0001

~ p<.10; * p<.05; ** p<.01

[1] Compared to the fit of the baseline model, in each case

Appendix 1: Mean values of key variables

Variable	Mean
C1	.2434697
C2	.2636767
C3	.4894036
FEMALE	.7142142
BLACK	.1153846
LATINO	.0673077
FAMILY	.5730503
agestartC	0
midhs_yr1[1]	.498275
SCITECHmaj	.1513061
HUMANmaj	.7654017
RURAL	.2035485

[1]I include year one values for select time-varying variables as a point of reference.

Appendix 2: Variables Included in Statistical Models

Variable	Description
Outcomes	
VEXITSCHL	Time-varying dichotomous outcome variable indicating whether the teacher voluntarily left her school for the first time; measured repeatedly during each of the <u>up to</u> six academic years beginning in the first year in which respondent i taught, (coded 1 if the teacher experienced the event of interest during year j, 0 otherwise).
VTRANSFER	Time-varying dichotomous outcome variable indicating whether the teacher voluntarily transferred for the first time; measured repeatedly during each of the <u>up to</u> six academic years beginning in the first year in which respondent i taught, (coded 1 if the teacher experienced the event of interest during year j, 0 otherwise).
VEXIT	Time-varying dichotomous outcome variable indicating whether the teacher voluntarily left the teaching profession for the first time; measured repeatedly during each of the <u>up to</u> six academic years beginning in the first year in which respondent i taught, (coded 1 if the teacher experienced the event of interest during year j, 0 otherwise).
Predictors	
Question Predictors	
FEMALE	Time-invariant dichotomous predictor indicating respondent's self-reported gender, (coded 1 if female, 0 if male).
BLACK	Time-invariant dichotomous predictor indicating respondent's self-reported race, (coded 1 if respondent identified as "African American or Black", 0 if respondent did not).
LATINO	Time-invariant dichotomous predictor indicating respondent's self-reported race, (coded 1 if respondent identified as "Latino or Hispanic", 0 if respondent did not).
FAMILY	Time-invariant dichotomous predictor indicating whether the respondent said her parent, sibling, aunt, uncle, or grandparent was a teacher self-reported race, (coded 1 if "yes", 0 "no").
Time specifications	
T1-T6	System of six dichomotomous variables that distinguish each of the up to six years during which respondents could have taught.
post T1	Dichomotomous variable that is coded 1 if T1 is coded 0.
T2to6	Continuous variable coded 2-6; coded 2 if T2=1, 3 if T3=1, etc.
TIMEC	Continuous variable centered on 0. Coded 0 if T1=1, 1 if T2=1, etc.
TIMEC2	TIMEC squared.
TIMEC3	TIMEC cubed.
lnTIME	The natural log of continuous representation of time j, where

	j=1 if T1=1, j=2 if T2=1, etc.
Covariates	
C1-C3	System of three dichomotomous variables corresponding to the year in which a respondent entered teaching. C1=1 if respondent was in the 2000 cohort; C2=1 for 2001 cohort, etc.
agestartC	Time-invariant continuous predictor indicating how old respondent was when she entered teaching. Centered at the mean.
SCITECHmaj	Time-invariant dichotomous predictor indicating whether respondent majored in a science or technology (coded 1 if respondent was coded "1" for SCImaj or TECHmaj, or 0 otherwise).
HUMANmaj	Time-invariant dichotomous predictor indicating whether respondent majored in English, social studies/social science, or the arts, (coded 1 was coded "1" for ENGmaj, SSmaj, or ARTSmaj , 0 otherwise).
midhs_yr	Time varying dichomotomous variable that captures whether the teacher taught at the elementary level (grades 7-12 check) in year 1 (coded 1 if the teacher taught these grades during year 1, 0 otherwise)
RURAL	Time-invariant dichotomous predictor indicating respondent's self-reported teaching location, (coded 1 if respondent indicated a region classified by researcher as "rural", 0 if respondent indicated a region classified as "urban").

Appendix 3

Figure 1: Fitted hazard and survival functions describing the risk of voluntary exit from initial placement school (top panel), voluntary transfer (middle panel), and voluntary resignation from teaching (bottom panel), conditional on not having experienced event previously; based on baseline fitted models from Table 1 with covariates held at their sample means (n=2029).
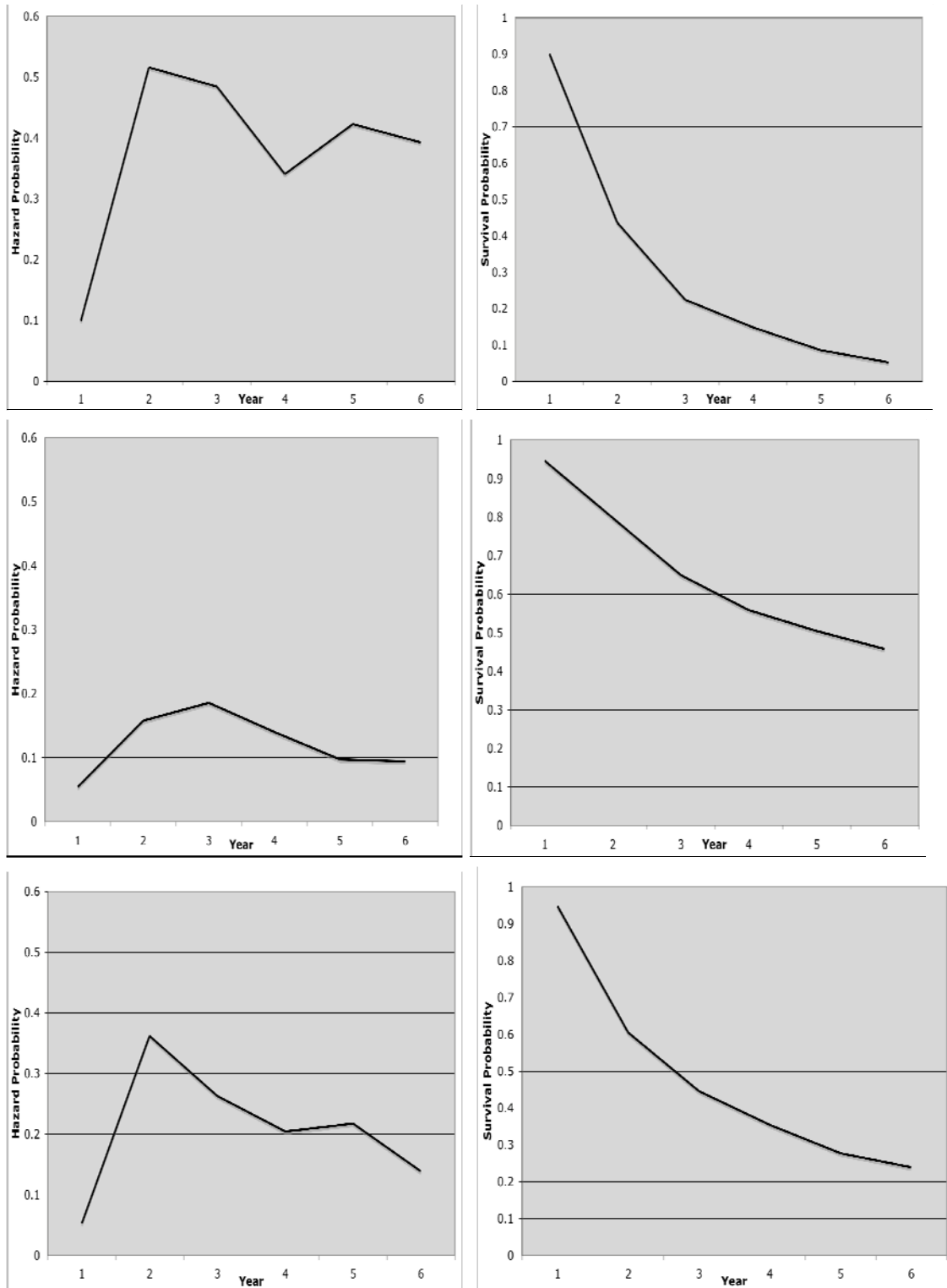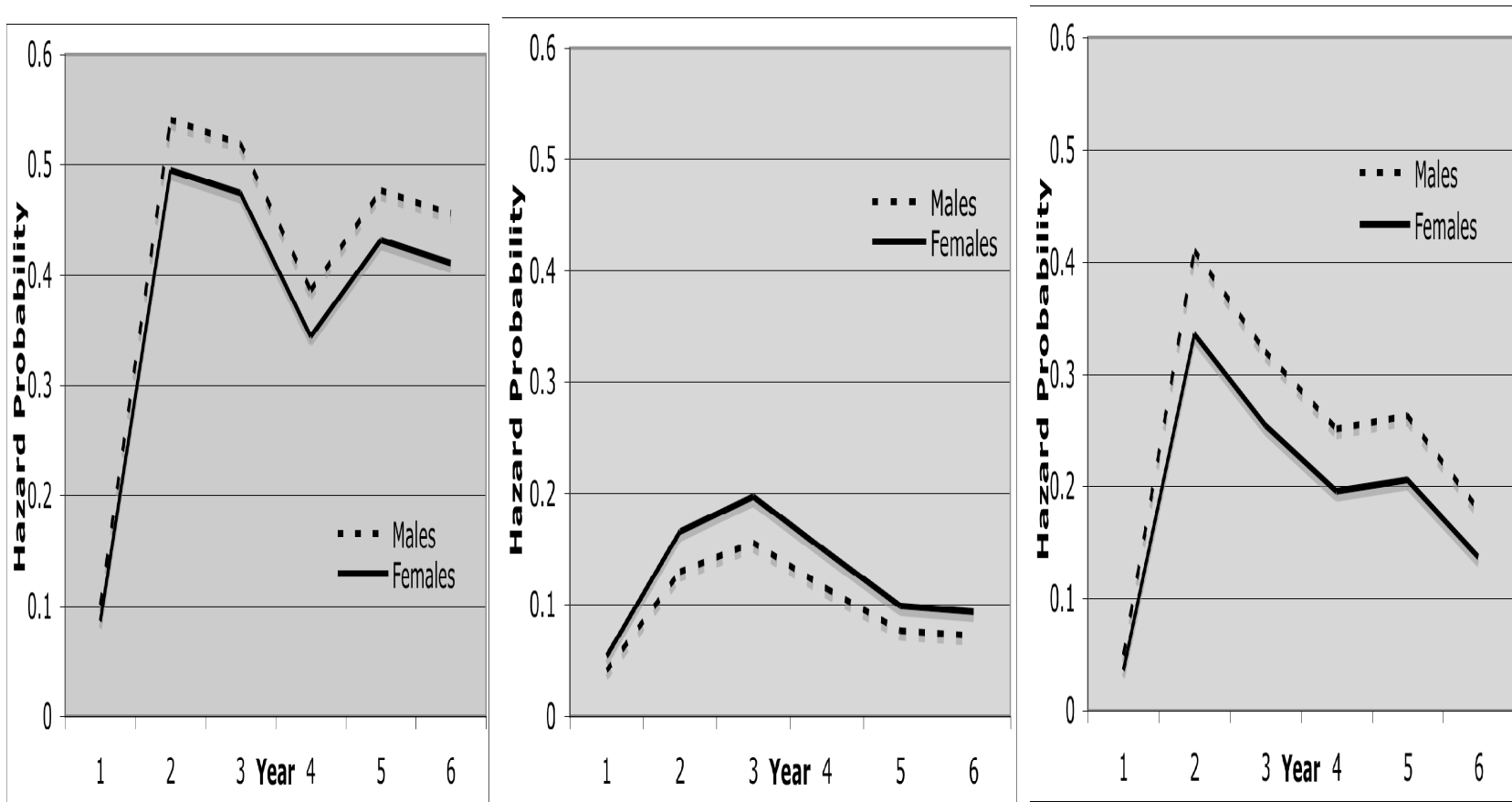
Figure 2: Fitted hazard functions describing the risk of voluntary exit from initial placement school (left panel), voluntary transfer (middle), and voluntary resignation from the profession (right panel), conditional on not having experienced event previously, for males and females. Based on final fitted models from Table 1 with covariates held at their sample means (n=2029).

Figure 3: Fitted hazard functions describing the risk of voluntary exit from initial placement school (left panel), voluntary transfer (middle), and voluntary resignation from the profession (right panel), conditional on not having experienced event previously, for Blacks and Latinos compared to Asians and Whites. Based on final fitted models from Table 1 with covariates held at their sample means (n=2029).
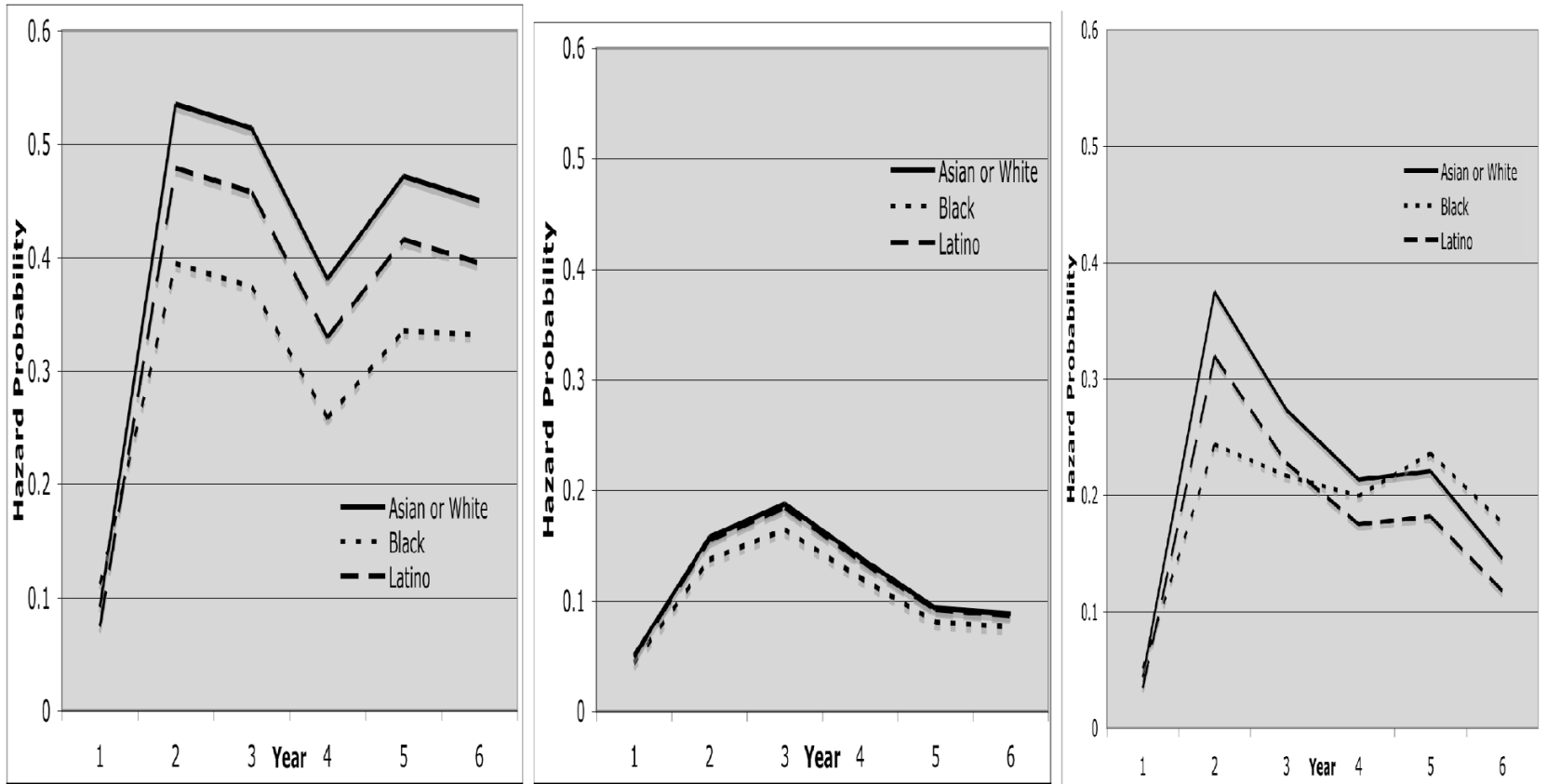
Figure 4: Fitted hazard functions describing the risk of voluntary resignation from the profession (left panel) and voluntary transfer (right panel), conditional on not having experienced event previously, for Latino males compared to Latino females, Blacks, and Asians and Whites. Based on final fitted models from Table 1 with covariates held at their sample means (n=2029).
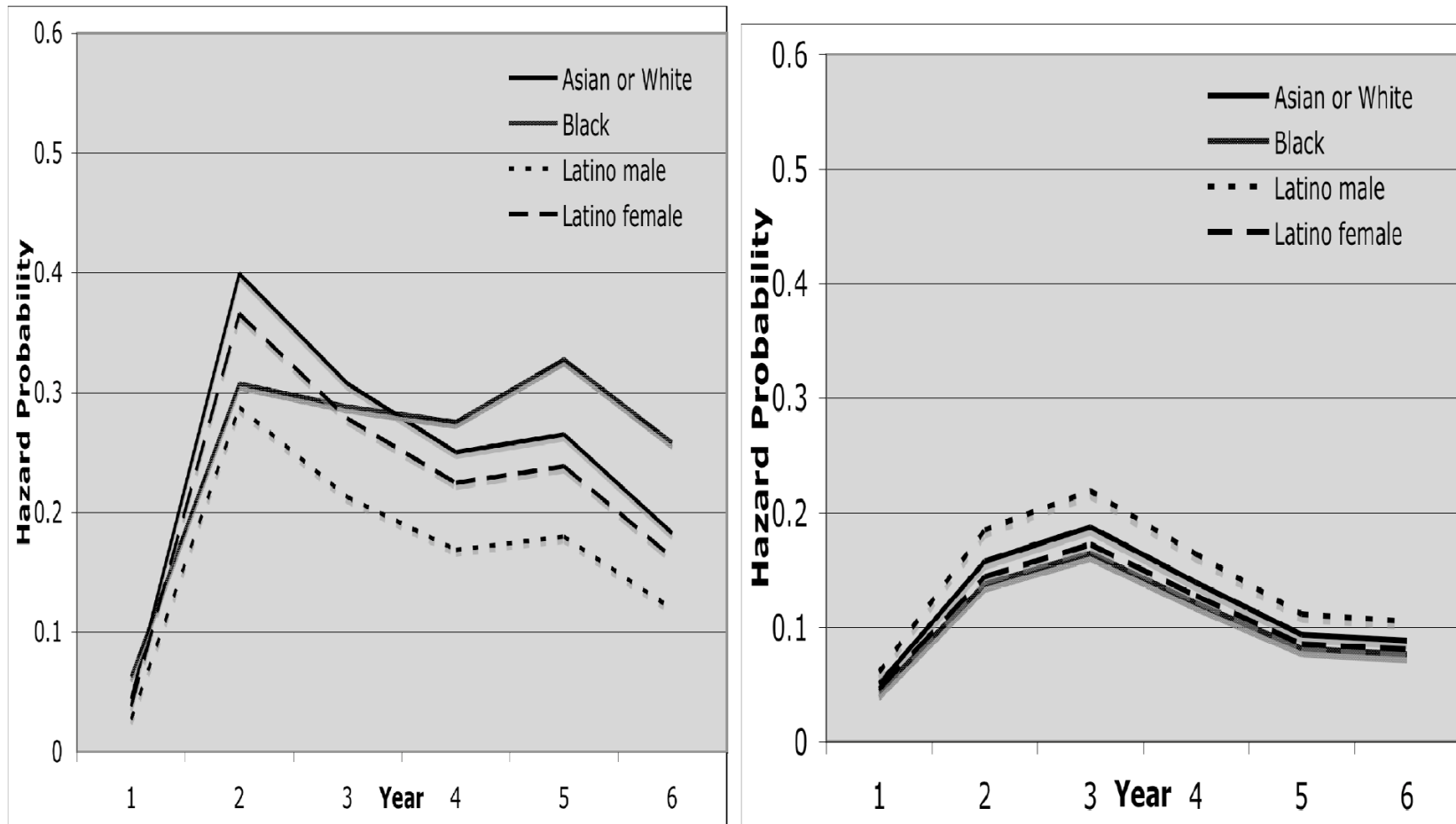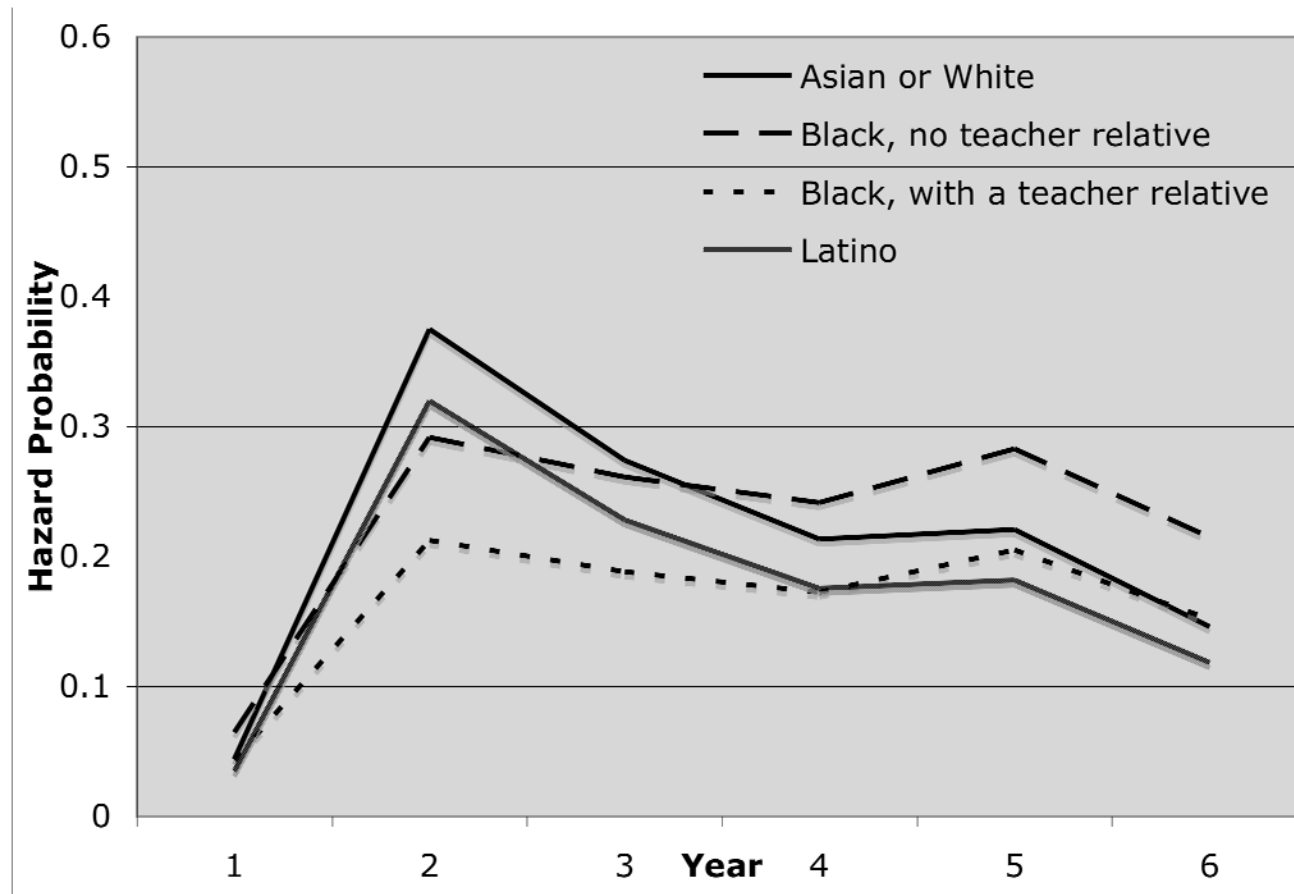
Figure 5: Fitted hazard functions describing the risk of voluntary resignation from the profession for Black teachers with a family member in teaching, compared to Black teachers without such a relative, Latinos, and Asians and Whites. Based on final fitted models from Table 1 with covariates held at their sample means (n=2029).

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[i] Based on my calculations using the total number of first-year teachers as published by the *National Education Association*, *Status of the American Public School Teacher*, 2000-01.

[ii] I included three cohorts in my data-analyses in order to improve my statistical power. *A priori* power analysis suggested that the resulting sample size should provide sufficient statistical power to detect small effects (Cohen, 1977).

[iii] American Indian respondents are also included in this group. However, because there were so few such respondents (.81% of the sample identified as American Indian and .1% identified as *only* American Indian), I refer to the comparison group as "Asian and White."

[iv] I consider an exit, transfer, or resignation to have occurred "in" a particular year if it happened during *or* at the end of that year.