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ABSTRACT

The Intergenerational Transmission of Teaching*

Parental influences, particularly parents' occupations, may influence individuals' entry into the teaching profession. Importantly, this mechanism may explain the relatively static demographic composition of the teaching force over time. We assess the role of parental influences on occupational choice by testing whether the children of teachers are disproportionately likely to become teachers themselves and whether the intergenerational transmission of teaching varies by race or sex. Overall, children whose mothers are teachers are 9 percentage points (or more than two times) more likely to enter teaching than the children of non-teacher mothers. This rate of occupational transmission is significantly larger than for several comparable professions. The transmission of teaching from mother to child is about the same for white children of both sexes and for black daughters; however, transmission rates for Hispanic daughters are even larger while those for black sons are about zero. Limited data on father's occupation suggests that sons whose fathers are teachers are more likely to enter the profession than the sons of non-teachers, though there is no such effect for daughters.

JEL Classification: I20, J62, J45

Keywords: intergenerational mobility, occupational choice, teacher labor supply

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1 Introduction

The changing racial and ethnic composition of the United States has led to a more diverse student body: as recently as 1986, about 70% of students enrolled in U.S. public schools were White, while today that number stands at about 50%. Despite such change, the teaching force remains about 80% White and overwhelmingly female (U.S. Department of Education, 2016). This is troubling, given the large, long-run benefits that non-White students receive from having a same-race teacher (Gershenson et al., 2018). Achieving a racially representative teacher workforce requires recruiting and retaining a diverse set of educators who are equipped with the racial/ethnic, cultural, and linguistic capital to teach a diverse student body (Dilworth and Coleman, 2014). However, despite aggressive attempts to recruit teachers of color, the demographic composition of the teaching force has yet to realize real change.

Given the importance of teachers in the schooling process, a large literature has investigated the supply of teachers (Dolton, 2006; Guarino et al., 2006). However, this literature has largely overlooked a potentially important determinant of entry into the teaching profession: parents' occupation. We address this gap in the literature by investigating the extent to which the children of teachers are more likely to become teachers than are the children of other college-educated women, and whether teaching is transmitted across generations at different rates than other professions are transmitted. In doing so, we contribute to the intergenerational mobility literature as well.

We do so using nationally representative survey data from the National Longitudinal Survey of Youth 1979 (NLSY) and the attached Child and Young Adults Supplement (CYA). We compare the transmission of teaching to that of similar professions, such as counseling, social work, and nursing. We find a strong relationship between maternal and child occupation in the case of teaching, but not for related occupations. This correlation is strongest for the white daughters of teachers, which likely explains some of the persistence of the demographic composition of the teaching force. Specifically, we find that the children of teachers are 9 percentage points (110%) more likely to become teachers themselves. This transmission rate is about the same for white children and for black daughters; however, there is no transmission of teaching from black moth-

ers to sons. Limited data on father's occupation suggests an intergenerational link as well, but only between fathers and sons.

2 Background

2.1 Teacher labor supply

Though some aspects of the teacher workforce are dynamic, such as the academic ability of females entering the teaching profession (Bacolod, 2007b), others are rather static. The field remains largely female-dominated and if anything is becoming more so (Ingersoll et al., 2014). The teaching force also remains majority-White, as minority teacher recruitment has not caught pace with increasing minority student enrollments (Guarino et al., 2006; U.S. Department of Education, 2016). Attrition from the profession, especially among minority teachers, tends to occur at higher rates than in many other professions.

Documented determinants of entry into the profession include altruism and wages (Bacolod, 2007a; Guarino et al., 2006), while school characteristics tend to affect where teachers teach, conditional on entering the field (Bacolod, 2007a; Hanushek et al., 2004). The flexibility of the job, specifically the ability to exit and return, is likely appealing to women whose labor force attachment is interrupted by childbearing (Flyer and Rosen, 1997; Grissom and Reininger, 2012). However, while an extensive literature documents the characteristics of current and entering teachers, less is known about the socioeconomic determinants of entry into the profession. Specifically, to what extent does parents' occupation predict children's occupational choices? We address this question in the context of teaching and teacher labor supply by formally estimating the intergenerational transmission of teaching and of other related occupations.

2.2 Intergenerational mobility

The transmission of occupations from parents to children is one channel through which the intergenerational transmission of socioeconomic status may occur. A seminal study showed that the intergenerational income correlation between fathers and sons was much higher than previously thought (Solon, 1992) and sparked a wave of new research on intergenerational mobility in the U.S. and abroad (Solon, 2002). Subsequent work showed that the intergenerational income correlation for daughters was somewhat weaker than that of sons, but still significant (Chadwick and Solon, 2002). Factors related to gender (i.e., assortative mating, sexism, and time out of the labor market) may explain this discrepancy. Using much richer tax data, Chetty et al. (2014b) confirmed that today's children have the same chances of moving up in the income distribution relative to their parents as did children in the 1970s and Chetty et al. (2014a) document significant geographic variation in mobility rates.

Education is also transmitted from parents to children, primarily via family characteristics and innate ability (Black et al., 2005; Hout and Janus, 2011). There are a number of other possible channels for the transmission of educational attainment across generations (Black and Devereux, 2010). First, highly educated parents tend to have higher incomes, which may affect educational expenditures on the child. Second, parental education may affect flexibility with time, as well as the type of experiences and child-enhancing activities that children of highly educated parents receive (Guryan et al., 2008). Third, higher levels of education may provide greater bargaining power in households, such that the more education a mother has may make her more successful in investing in the child's human capital. Greater maternal education is also associated with greater infant health, pre-natal care utilization, marriage, and smoking reduction (Currie and Moretti, 2003).

Given the large, established literatures on the intergenerational transmision of income and education, it is somewhat surprising that the intergenerational transmission of occupations is relatively understudied, as this is arguably an important mechanism behind the transmission of socioeconomic status. Early studies in this area focus on cultural and family pressure to follow in a parent's footsteps. For example, one study investigates the transmission of farming, though the theoretical

reasons for occupational transmission in the case of a family business like farming are unlikely to apply to a professional occupation such as teaching (Anderson, 1941; Blau and Duncan, 1967). Laband and Lentz (1983) propose a model in which children voluntarily follow in a parent's footsteps. This may occur if children seek to emulate or honor their parents. Alternatively, children may learn about, and find appealing, the characteristics of their parent's profession. The authors estimate this model using a sample of 831 men across three generations, which includes some teachers, but find no evidence that teaching is transmitted from fathers to sons. However, given the dominance of females in the teaching profession and the small and unrepresentative sample, it is unclear what to make of this null result. Another channel through which a profession such as teaching might be transmitted across generations is via parents' professional networks and references. While our data do not permit the identification of the precise mechanisms behind the intergenerational transmission of teaching, there are ample theoretical reasons to believe that such transmission occurs.

Finally, while to our knowledge the intergenerational transmission of teaching has not been directly studied, scholars have investigated the parenting practices of teachers and how the children of teachers might fare relative to the children of observationally-similar non-teachers. For example, having a parent who is a school teacher reduces the likelihood of behavioral problems in male children (McFarlin Jr, 2007). Furthermore, more teachers engage in activities such as reading to and helping children with schoolwork at home than do non-teachers (Hansen and Quintero, 2016). However, it is unclear whether such differences lead to different educational and occupational outcomes for the children of teachers. We address this question by specifically testing the hypothesis that the children of teachers are disproportionately likely to go on to become teachers. In doing so, we contribute to both the teacher labor supply and intergenerational-mobility literatures.

3 Data and Methods

3.1 NLSY-79

We use data from the National Longitudinal Survey of Youth (NLSY) 1979 and Child and Young Adult supplement (CYA). The NLSY was a nationally representative sample of 12,686 young men and women ages 14-22 in 1979. The NLSY collected a host of educational, labor market, and demographic data for individuals annually beginning in 1979 and biennially from 1994 to 2014. There were 4,934 eventual mothers in the NLSY, who together gave birth to 11,521 children.

The subsequent CYA followed the 11,521 children of these mothers biennially from 1994 through 2014. Thus, our main analyses are limited to mothers and their children. We apply an age filter of 25 years or above in the main analytic sample to exclude children who were too young to have meaningful occupational data and show that the main results are robust to using different age cut-offs. Applying this age filter yields a sample of 7,060 children. The analytic sample is further restricted to the 4,572 unique children of 2,488 unique mothers for whom mom's occupation, child's occupation, and mom's AFQT score are observed.[1] Individual children, nested in mothers, are the unit of analysis; accordingly, all statistical inference is corrected for arbitrary within-mother serial correlation.

The key outcome is a binary variable equal to one if the child was a teacher at any point during data collection and zero otherwise. Data for child and parental occupation were coded using three- and four-digit Census Industry and Occupational Codes, which varied by year, and are described in Appendix A. Generally, we define teaching to include primary and secondary school educators, trade/industrial school instructors, post-secondary instructors, and school librarians and their assistants. A final caveat about coding occupations is that the NLSY 1979 collects occupational information for multiple jobs held in any given year, so we take the first occupation that an

[1]The majority of observations are lost due to missing child occupation. Because this is the dependent variable, multiple imputation is of little use. Appendix Table A1 shows the exact number of observations lost at each step of sample creation. In a sensitivity analysis, we show that the main results are robust to including mothers whose occupation is unobserved in the analytic sample, coding them as non-teachers, and including a "missing occupation" indicator.

individual listed as his or her primary occupation for that survey year.

The NLSY contains a wealth of additional information that we adjust for in the regression analysis, as these factors might jointly predict parent and child occupation, including mother's region of residence, AFQT score, educational attainment, the child's birth order, and the mother's marital status and age at the birth of the child.[2] Similarly, the CYA contains information on the child's educational attainment and employment. Sample weights, provided by the NLSY, are used in all analyses to correct for the oversampling of certain demographic and geographic groups in the NLSY and CYA.

The CYA also contains the child's self-report of their father's occupation. Few data are available on the fathers of the CYA children, however, as the fathers were not directly interviewed. We use the child-reported information on father's occupation to investigate the transmission of occupation from fathers to children. However, we interpret these results with caution, as these data are limited for three reasons. First, children retrospectively report on their father's occupation, so these data may be subject to measurement error and recall bias. Second, there is some ambiguity as to which "father figure" children are reporting on, especially in cases when they do not live with their biological father, which again can lead to measurement error and obfuscates the interpretation of these regressions. Finally, many children simply did not know, or otherwise failed to answer this question, leading to concerns about power and missing data. Given these limitations, we do not use the father data in the main analyses and interpret the results that do rely on these data with caution, as an exploratory analysis.

3.2 Summary Statistics

Descriptive statistics for the children in the analytic sample, who are the unit of analysis, are provided in Panel A of Table 1. Column 1 summarizes the full analytic sample and shows that 23% of children went on to complete a college degree and 10% went on to become a teacher.

[2]The AFQT (Armed Forces Qualification Test) was administered to NLSY respondents in high school and is a commonly used statistical control for pre-existing ability differences (Altonji et al., 2009).

The sexes are approximately evenly represented. The sample is 19% black, 72% white, and 8% Hispanic.

Given the over-representation of women and whites in the teaching force, columns 2-6 of Table 1 summarize the sample separately by sex and race/ethnicity. Columns 2 and 3 compare daughters and sons of the NLSY mothers. Consistent with the well documented reversal of gender gaps in educational attainment (Bailey and Dynarski, 2011), daughters were six percentage points (30%) more likely to complete a four-year college degree than sons. Daughters were also ten percentage points (200%) more likely to be teachers than sons, again consistent with the strong female presence in teaching. There are no differences in the racial makeup of the female and male subsamples, which is intuitive given that boys and girls grow up in the same households. Comparing across race in columns 4-6, we see that whites have significantly higher college completion rates, but are only one percentage point more likely to be a teacher, than blacks and Hispanics.

Columns 7 and 8 report means for children who went on to be teachers and non-teachers, respectively. The majority, but not all, of teachers obtained a college degree. 73% of the teachers were female, which is in line with other national estimates of the gender composition of the teaching force. Similarly, 75% of teachers were white, while only 17% and 8% of teachers were black and Hispanic, respectively. Finally, columns 9 and 10 report means for the children of teachers and non-teachers, respectively. The paper's main result, that teachers beget teachers, is apparent: 19% of the children of teachers go on to become teachers, compared to only 8% of the children of non-teachers. This difference is statistically significant at traditional confidence levels and consistent with the regression results presented in section 4.

Panel B of Table 1 similarly summarizes the unique the mothers in the analytic sample. Column 1 shows that 14% of mothers completed a college degree and 17% ever worked as a teacher. The racial make-up of the mothers sample is similar to that for children; the slight differences are due to racial differences in birthrates of the mothers. Columns 4-6 report means separately for black, white, and Hispanic mothers, respectively. White mothers were more likely to have a college degree, to be a teacher, and to be married than their non-white counterparts. They also had

significantly higher AFQT scores. Finally, columns 9 and 10 report means separately for mothers who were and were not teachers, respectively. Teachers were significantly more likely to hold a college degree, had higher AFQT scores, and were more likely to be married.

3.3 Methods

We adapt a standard model of intergenerational mobility (Solon, 1999) as follows:

$$T_{ij} = \rho T_j + \beta X_{ij} + u_{ij}, \tag{1}$$

where i and j index children and mothers, respectively, T is a binary variable indicating whether the individual was ever a teacher, X is a vector of child and mother controls for gender, race, region of residence, mother's AFQT score, and mother's marital status at birth. ρ is the parameter of interest, which represents the intergenerational correlation coefficient of occupation. We test for heterogeneity in ρ by augmenting equation (1) to include interactions between T_j and elements of X_{ij}. We also probe the sensitivity of the results to the exact specification of X_{ij}. Robust standard errors are clustered by mother to account for within-family correlation in the idiosyncratic error u, as multiple children may be born to the same mother. We estimate the linear probability model described in equation (1) by OLS, though verify in Appendix Table A2 that the main findings are robust to specifying the right hand side of equation (1) as the linear index of a logit model that accounts for the binary nature of the dependent variable. Given the similarity between the OLS and logit estimates, we prefer the OLS estimates because they facilitate straightforward inclusion and interpretation of interaction terms (Ai and Norton, 2003).

4 Results

4.1 Transmission of teaching

Column 1 of Table 2 reports estimates of the baseline model (equation 1). Subsequent columns augment equation (1) with interaction terms that allow the intergenerational correlation coefficient to vary by child sex and race. All models control for the full set of socio-demographic controls described in section 3.1. Appendix Table A2 reports analogous estimates of logit models and confirms that that the results are not driven the choice of a linear model.

Column 1 shows that children of teachers are nine percentage points more likely than the children of non-teachers to enter teaching. This relationship is strongly statistically significant, similar to the raw difference observed in Table 1, and constitutes a 110% increase from the base rate among the children of non-teachers. Estimated coefficients on the demographic controls indicate that conditional on the mother being a teacher, white children are slightly less likely to become teachers than their non-white counterparts and daughters are significantly more likely to become teachers than sons.

The model estimated in column 2 allows the intergenerational transmission of teaching to vary by child sex. The estimate of ρ is 0.07, slightly smaller than the baseline estimate in column 1, though remains strongly statistically significant and suggests that the sons of female teachers are significantly more likely to become teachers than the sons of non-teachers. The interaction between mother-teacher and daughter is positive, and at 0.04 is large in size relative to the base effect of 0.07, suggesting that the transmission of teaching from mother to daughter is almost 60% stronger than that from mother to son. However, the interaction term is imprecisely estimated and indistinguishable from zero at traditional confidence levels, which might be due to the relatively small share of sons who become teachers. Nonetheless, it is intuitive and consistent with theory that the relationship between mother and daughter occupational choice is stronger than that between mothers and sons.

Column 3 similarly allows the effect to vary by race/ethnicity, interacting the mom-teacher

indicator with black and Hispanic indicators (white is the omitted reference group). This model assumes the transmission rate does not vary by child sex. Here, we see that the base (white) transmission rate is about 0.10 and remains strongly statistically significant. The black interaction term is negative, large in size relative to the base rate, and marginally statistically significant. This suggests a much smaller average transmission rate among black mother-child pairs of about 0.04. It is still positive, though less than half the size of the transition rate among whites. The Hispanic interaction term is large and positive, suggesting an even larger average transmission rate than observed for white mother-child pairs, though this interaction term is also imprecisely estimated and only on the margin of being statistically significant.

To this point, columns 1-3 of Table 2 provide strong evidence of positive, strong persistence of teaching across generations for both sons and daughters and for children of all racial and ethnic backgrounds. However, given the strong female presence in the teaching profession, it is possible that transmission rates vary at the interaction of sex and race. Accordingly, column 4 incorporates both dimensions of heterogeneity together in a single model and includes triple interaction terms that allow transmission rates to simultaneously vary by sex and race. These results identify some important nuances missed by the more restrictive models estimated in columns 2 and 3, particularly with regard to the lower average transmission rate for Blacks observed in column 3. First, the daughter interaction term is now zero, which means that the transmission rate for white sons is the same as for white daughters and that the positive daughter effect seen in column two was driven by race-specific daughter effects. Second, the black interaction term remains negative, statistically significant, and is even larger in magnitude than the interaction term observed in column 3. Comparing the interaction term of -0.11 to the base estimate of 0.09 implies that there is essentially zero (or even negative) transmission of teaching from black mothers to black sons, which is troubling given the importance and under-representation of black male educators. Third, the triple teacher-daughter-black interaction term is positive, and though imprecisely estimated, about the same size as the negative teacher-black interaction. This means that the transmission rate for black daughters ($0.09 - 0.11 + 0.10 = 0.08$) is about the same as that for white children (0.09). Finally,

the triple teacher-daughter-Hispanic interaction term is positive, twice as large as the base rate for whites, and statistically significant. This implies that the transmission of teaching from Hispanic mothers to daughters ($0.09 - 0.03 + 0.20 = 0.26$) is nearly three times that of whites (0.09).

4.2 Transmission of related professions

In Table 3, we estimate three separate versions of equation (1) for the transmission of counseling, social work, and nursing. Column 1 reproduces the main result for teaching (Column 1 of Table 2) to facilitate comparisons. We chose counseling and social work because the Occupational Information Network (O*NET) classifies counseling and social work as the most frequent professions that former teachers move to.[3] We chose nursing because it is typically regarded as a 'pink collar' job like teaching (Liben et al., 2001). The transmission rate for each of these three occupations is positive, though only in one case (nursing) is it even marginally significant and in no case is it as strong as that of teaching: the children of counselors and nurses are two percentage points more likely to enter those professions than the children of non-counselors and non-nurses. This suggests that there is something unique about teaching, as there is relatively strong inter-generational transmission of the profession, even when compared to "similar" professions.

4.3 Sensitivity analyses

To this point we have demonstrated that the children of teachers, specifically white children and black and Hispanic daughters, are significantly more likely to follow in their mother's footsteps and become teachers themselves than the children of mothers who work in other fields (or do not work at all). Moreover, there is not similar transmission of other, related occupations. Given this striking result, we now conduct a series of sensitivity analyses to verify the robustness of this result. Table 4 reports a number of such sensitivity analyses.

The first three columns of Table 4 consider different rules for selecting the analytic sample. First, recall that observations with missing data on mother's education were dropped from the an-

[3]We thank Marigee Bacolod for suggesting the use O*NET classifications to identify similar professions.

alytic sample. In column 1 we re-incorporate these children in the analytic sample and include a separate indicator for "missing mom's occupation." Note that only about 60 children are added, as the majority of cases that are missing mother's education are also missing the child's occupation. Nonetheless, it is reassuring to see that main result, a point estimate of 0.09 that is strongly significant, is robust to including these children in the analytic sample.

Second, in column 2 we re-estimate the baseline model (equation 1) on the full analytic sample, sans the age-25 age filter. The motivation here is that teachers begin teaching before age 25, and do so at different ages, so there is no one "correct" age filter. Removing the age filter altogether is incorrect as well, since there are certainly some children in the sample who are too young to be teaching. It is reassuring, then, that even when no age filter is applied the resulting estimate of ρ is only slightly attenuated, as expected, but remains positive, strongly statistically significant, and of similar magnitude (0.07). Intuitively, in results not reported here, the estimate of ρ monotonically decreases as the age filter is relaxed, so 0.07 can be viewed as a lower bound for ρ.

Third, column 3 shows that the basic result is robust to excluding the controls included in the baseline model. This is important for two reasons: it includes the roughly 200 observations for whom AFQT scores are missing and shows that the result is robust to excluding the socio-demographic controls. The latter suggests that estimates of ρ reflect real occupational transmission that are not confounded by other household characteristics that jointly predict both child's and mother's selection into teaching. This is not to say that ρ has a strict causal interpretation, as it is fundamentally a descriptive parameter, but rather that the correlation between child's and mother's entry into teaching is not entirely spurious.

The remaining columns of Table 4 consider various dimensions of heterogeneity in occupational transmission rates. Column 4 shows that the estimated transmission rate is the same among college-educated mothers as it is in the full sample, which suggests that the transmission of teaching is neither mediated nor moderated by mother's educational attainment. Column 5 augments the baseline model (equation 1) to include an indicator for whether the child is an only child and its interaction with the mom-teacher indicator. The estimate of ρ is unchanged and the interaction

term is small and insignificant, which suggests that the transmission of teaching is neither mediated nor moderated by the presence of household siblings.

Column 6 further augments the baseline model to also allow the transmission rate to vary by the mother's marital status. We define a single mothers as having not been married at the time of their first birth. The interaction term is negative and marginally significant, suggesting that married mothers are more likely to pass along the teaching profession to their children than are teachers who are single mothers. This is perhaps counter intuitive, as the absence of a partner (and absence of the influence of the partner's profession) might be expected to strengthen the occupational transmission of single mothers. However, any such effect is dominated by other factors, perhaps by the myriad difficulties than single parents face. For example, single parents might have less time to discuss their jobs with children and children of single parents might be less likely to attend college and achieve other credentials necessary to enter the teaching profession. This result is suggestive of potential mechanisms and merits further study.

Finally, column 7 further augments the model in column 6 to also allow occupational transmission rates to vary by region. This is motivated by recent work that finds intergenerational mobility varies by region (Chetty et al., 2014b). The NLSY defines current region of residence as South, North Central (Midwest), North East, and West. We created five mutually exclusive region dummies: one for each of the four NLSY-defined regions and a fifth (omitted reference group) for individuals who moved between regions. No systematic patterns are observed by region, though the transmission of teaching seems to be strongest in the Midwest and weakest in the Northeast. However, we are unable to examine differences across finer-grained areas, such as commuting zones, as in (Chetty et al., 2014a), which may be more informative and an interesting area for future research, given the prevalence of racial and socioeconomic segregation in school enrollments (Owens et al., 2016).

4.4 Transmission of teaching from fathers

Table 5 uses the limited data on father's occupation to investigate the transmission of teaching from father to child. Recall from section 3.1 that these data are limited in two ways: father's occupation is missing for more than half the sample and even when observed, is prone to measurement error. With those caveats in mind, we estimate several variants of the baseline model (equation 1) using these data.

Columns 1-3 exclude observations that are missing father's occupation. Column 1 replicates the baseline model and shows that in this restricted sample, the transmission from mother to child remains similar in magnitude (0.07) to that found in the full sample and is strongly statistically significant. Column 2 augments this baseline model to also include an indicator equal to one if the father was a teacher, and zero otherwise. The coefficient on the mom-teacher indicator is unaffected by the inclusion of the dad-teacher indicator. The coefficient on the dad-teacher indicator is positive and twice as large as that on the mom-teacher indicator, but is imprecisely estimated. The imprecision might owe to both measurement error in the child-reported data on father's occupation and the relatively small share of fathers who are teachers. Nonetheless, this suggests that teaching might be transmitted across generations by mothers *and* fathers. Finally, column 3 considers whether there is a multiplicative effect of *both* parents being teachers on the child's entry into teaching. It appears not, as the indicator for both parents is negative and imprecisely estimated. Taken at face value, the children of two teachers are 11 percentage points ($0.11 = 0.07 + 0.21 - 0.17$) more likely to become teachers than the children of non-teachers, which is not significantly different from the seven percentage point effect of the mother being teacher, as neither the father-teacher nor the two-teacher indicator is significantly different from zero.

The sample used in columns 1-3 is endogenously selected, of course, so it might not represent the full sample. Accordingly, the remainder of the table uses the full sample and adds an indicator for children whose father's occupation data are missing. Column 4 replicates the baseline model (equation 1), including the dad-missing and dad-teacher indicators, and replicates the main result of an estimate of $\rho = 0.09$. Like in column 2, the dad-teacher indicator is large and positive, but

imprecisely estimated. Again this suggests that the main result for the transmission of mother's occupation being robust to controlling for the father's presence and occupation, and that having a teacher father might increase the likelihood that a child enters teaching. Column 5 allows again for a multiplicative effect of *both* parents being teachers. Once again, the indicator for both parents is negative and imprecisely estimated. Taken at face value, the children of two teachers are 10 percentage points ($0.10 = 0.09 + 0.21 - 0.20$) more likely to become teachers than the children of non-teachers, which is not significantly different from the nine percentage point effect of the mother being teacher, as neither the father-teacher nor the two-teacher indicator is significantly different from zero.

Finally, columns 6 and 7 restrict the sample to sons, to see whether the effect of the father being a teacher matters more for sons than for daughters. Column 6 shows that for sons, hold constant the mom's occupation, having a father who is a teacher increases the likelihood of the son becoming a teacher by 20 percentage points, which is three times as large as the effect of the mother being teacher, and is marginally statistically significant. This suggests that any effect of the father being a teacher on the child's entry into teaching is entirely driven by the occupational choices of male children. This runs counter to the effect of the mother being teacher, which seems to have equal effects on sons and daughters, at least among white children. Finally, Column 7 includes the interaction term that allows for a multiplicative effect of both parents being teachers. Like in the full sample, the interaction term is negative, but this time it is marginally significant and effectively undoes the large father effect. Specifically, children of two teachers are 12 percentage points ($0.11 = 0.08 + 0.38 - 0.34$) more likely to become teachers than the children of non-teachers, which is larger than the effect of having only a mother teacher, but smaller than the father-only effect of 0.38. The reason for this counter-intuitive result is unclear and merits further investigation. One possibility is that when the father is the only teacher in the household, or the only parent, this occupation is stickier for sons and the perceived "feminization" of teaching is lessened. Alternatively, this could be driven by outliers in a small cell size, as only twenty children had parents who were both teachers.

5 Discussion

We provide novel evidence on the intergenerational transmission of teaching. Nationally representative data from the NLSY-79 cohort shows that the children of teachers were 9 percentage points (110%) more likely to go on to become teachers than the children of non-teachers. This result is robust to a number of modeling and coding choices, and is unlikely to be entirely driven by unobserved factors that jointly determine mothers' and children's entry into teaching. The transmission of teaching from mother to child is 60% larger for daughters, but this simply difference masks important racial variation in the transmission of teaching: the transmission rate is about the same for white sons, white daughters, and black daughters. However, there is essentially zero transmission of teaching from black mothers to their sons, while the transmission from Hispanic mothers to their daughters is even stronger than that seen for white children and black daughters.

These findings corroborate qualitative work by Schutz et al. (2001) who found that around 10% of pre-service teachers cited encouragement from parents or family members in their decision to become a teacher. These results are mostly consistent with the sex-role hypothesis, as we found suggestive evidence of father-son transmission as well as mother-daughter transmission. The bottom line is that while parents' occupation does not fully explain entry into teaching, it does shed light on one channel through which people enter teaching. But why? Does the transmission of teaching occur because of parental pressure, network membership, information and choice set, or a combination of factors? It would be fruitful for future mixed-methods research to investigate the channels through which this sort of intergenerational transmission occurs, as it has important implications for the recruitment of a diverse teaching force and teacher recruitment more generally.

The current study, and the NLSY-79 data, have some additional limitations that merit mention. The data cover one birth cohort, which limits our ability generalize these results to more recent cohorts. For this reason, it would be useful to future research to use more recent data, such as the NLSY-97 or the Panel Study of Income Dynamics (PSID). Also, the data on father's occupation is of limited quality, which again highlights the usefulness of replicating this type of research in another data set, such as the PSID.

In closing, we note that this study adds to the literatures on intergenerational mobility and teacher labor supply by providing novel evidence that entry into the teaching profession is transmitted from mother to child. That transmission rates are approximately equal for white sons and daughters and black daughters explains part of the persistence of the racial and gender composition of the teaching force, in which males and blacks are underrepresented. Aside from issues of demographic representation, it is not obvious whether this type of transmission is good or bad for the overall quality of the teaching force, as answering this question depends on understanding the reasons that such transmission occurs (e.g., is it due to network effects or the transmission of a passion for teaching). Future work would do well to explore the underlying mechanisms, and to directly test whether the children of teachers are more effective in the classroom than the children of non-teachers, or even whether *effective* teaching is transmitted across generations. The latter question could be tested using value-added measures in a large district or state in which administrative data covers multiple generations.

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Table 1: Summary statistics

	(1) Everyone	(2) Daughters	(3) Sons	(4) Black	(5) White	(6) Hispanic	(7) Teachers	(8) Non-teachers	(9) Mom was a teacher	(10) Mom was not a teacher
Panel A: Child means										
College degree	0.23	0.26	0.20	0.14	0.27	0.13	0.59	0.19	0.35	0.21
Teacher	0.10	0.15	0.05	0.09	0.10	0.09	1	0	0.19	0.08
Daughters	0.48	1	0	0.50	0.48	0.46	0.73	0.46	0.49	0.48
Sons	0.52	0	1	0.50	0.52	0.54	0.27	0.54	0.51	0.52
Black	0.19	0.20	0.19	1	0	0	0.17	0.20	0.17	0.20
White	0.72	0.72	0.73	0	1	0	0.75	0.72	0.76	0.72
Hispanic	0.08	0.08	0.09	0	0	1	0.08	0.08	0.07	0.09
Observations	4,572	2,234	2,338	1,694	1,843	1,035	433	4,139	720	3,852
Panel B: Mother means										
College degree	0.14			0.12	0.15	0.09			0.44	0.08
Teacher	0.17			0.15	0.17	0.13			1	0
AFQT	37.1			18.1	44.7	21.6			44.6	35.6
Married	0.34			0.18	0.40	0.26			0.38	0.33
Black	0.21			1	0	0			0.19	0.22
White	0.70			0	1	0			0.74	0.69
Hispanic	0.09			0	0	1			0.07	0.09
Observations	2,488			903	1,050	535			412	2,076

Notes: Sample means in panels A and B are weighted by child and mother weights, respectively.

Table 2: OLS estimates of the transmission of teaching

	(1)	(2)	(3)	(4)
Mom is teacher (T)	0.09	0.07	0.10	0.09
	(0.02)***	(0.02)***	(0.02)***	(0.03)***
Black	0.03	0.03	0.03	0.04
	(0.01)**	(0.01)**	(0.01)***	(0.01)***
Hispanic	0.02	0.02	0.01	0.02
	(0.01)*	(0.01)*	(0.01)	(0.01)
Daughter	0.10	0.10	0.10	0.10
	(0.01)***	(0.01)***	(0.01)***	(0.01)***
Mom T*Daughter		0.04		0.00
		(0.04)		(0.05)
Mom T*Black			-0.06	-0.11
			(0.03)*	(0.03)***
Mom T*Hispanic			0.07	-0.03
			(0.04)	(0.05)
Black*Daughter				-0.00
				(0.02)
Hispanic*Daughter				-0.00
				(0.02)
Mom T*Black*Daughter				0.10
				(0.07)
Mom T*Hispanic*Daughter				0.20
				(0.09)**
Observations	4,572	4,572	4,572	4,572
R-squared	0.06	0.06	0.06	0.07

Notes: The outcome of each regression is an indicator equal to one if the child entered teaching, and zero otherwise. Standard errors clustered by mother. Regressions control for region, mother's AFQT score, mother's birth cohort, and mother's age at birth. Regressions are weighted by child weights. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3: OLS estimates of occupational transmission

Occupation j:	Teaching	Counseling	Social Work	Nursing
	(1)	(2)	(3)	(4)
Mom is j	0.09	0.02	0.01	0.02
	(0.02)***	(0.02)	(0.02)	(0.01)*
Black	0.03	0.01	0.00	-0.01
	(0.01)**	(0.00)***	(0.00)	(0.01)
Hispanic	0.02	0.01	0.00	-0.02
	(0.01)*	(0.01)	(0.00)	(0.01)**
Daughter	0.10	0.00	0.01	0.04
	(0.01)***	(0.00)	(0.00)***	(0.01)***
Observations	4,572	4,572	4,572	4,572
R-squared	0.06	0.01	0.01	0.02

Notes: Each column presents OLS estimates of a regression in which the outcome is an indicator equal to one if the child entered occupation j, and zero otherwise. Standard errors clustered by mother. Regressions control for region, mother's AFQT score, mother's birth cohort, and mother's age at birth. Regressions are weighted by child weights. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Sensitivity of OLS estimates of the transmission of teaching

Sample:	All Moms |Controls	No age filter	All moms	College moms	Base	Base	Base
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mom is teacher (T)	0.09	0.07	0.10	0.09	0.09	0.10	0.09
	(0.02)***	(0.01)***	(0.02)***	(0.04)**	(0.02)***	(0.02)***	(0.04)**
Mom job missing	0.02						
	(0.04)						
Black	0.03	0.02		-0.03	0.03	0.03	0.03
	(0.01)**	(0.01)*		(0.04)	(0.01)**	(0.02)**	(0.02)**
Hispanic	0.02	0.03		0.10	0.02	0.02	0.02
	(0.01)*	(0.01)***		(0.06)*	(0.01)	(0.01)*	(0.01)*
Daughter	0.10	0.09		0.12	0.10	0.10	0.10
	(0.01)***	(0.01)***		(0.04)***	(0.01)***	(0.01)***	(0.01)***
South	-0.02	-0.01		-0.01	-0.02	-0.03	-0.03
	(0.02)	(0.01)		(0.05)	(0.02)	(0.02)	(0.02)
Northeast	-0.02	-0.01		-0.04	-0.02	-0.02	-0.01
	(0.02)	(0.02)		(0.06)	(0.02)	(0.02)	(0.02)
Midwest	-0.02	-0.01		0.04	-0.02	-0.02	-0.03
	(0.02)	(0.01)		(0.05)	(0.02)	(0.02)	(0.02)
West	-0.02	-0.01		0.00	-0.02	-0.02	-0.02
	(0.02)	(0.02)		(0.08)	(0.02)	(0.02)	(0.02)
Only child					-0.03	-0.03	-0.03
					(0.02)**	(0.02)*	(0.02)*
Mom T*Only child					-0.01	-0.00	0.00
					(0.05)	(0.06)	(0.06)
Single mom						-0.01	-0.01
						(0.01)	(0.01)
Mom T*Single mom						-0.07	-0.07
						(0.03)*	(0.04)**
Mom T*South							0.01
							(0.05)
Mom T*Northeast							-0.09
							(0.07)
Mom T*Midwest							0.09
							(0.06)
Mom T*West							0.01
							(0.07)
Observations	4,632	7,274	4,769	576	4,572	4,045	4,045
R-squared	0.06	0.05	0.01	0.10	0.06	0.06	0.07

Notes: The outcome of each regression is an indicator equal to one if the child entered teaching, and zero otherwise. Standard errors clustered by mother. Regressions control for region, mother's AFQT score, mother's birth cohort, and mother's age at birth. Regressions are weighted by child weights. *** p<0.01, ** p<0.05, * p<0.1

Table 5: OLS estimates of the transmission of father's teaching status

Sample:	Dad Occupation Observed			Baseline		All Sons	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mom T	0.07	0.07	0.07	0.09	0.09	0.07	0.08
	(0.03)***	(0.03)**	(0.03)***	(0.02)***	(0.02)***	(0.02)***	(0.02)***
Dad T		0.14	0.21	0.12	0.21	0.20	0.38
		(0.10)	(0.15)	(0.11)	(0.16)	(0.12)*	(0.15)***
Mom T*Dad T			-0.17		-0.20		-0.34
			(0.19)		(0.20)		(0.20)*
Dad job missing				-0.01	-0.01	-0.02	-0.01
				(0.01)	(0.01)	(0.01)	(0.01)
Black	0.07	0.07	0.07	0.03	0.03	0.01	0.01
	(0.02)***	(0.02)***	(0.02)***	(0.01)**	(0.01)**	(0.01)	(0.01)
Hispanic	0.02	0.02	0.01	0.02	0.02	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.01)*	(0.01)	(0.01)	(0.01)
Daughter	0.07	0.07	0.07	0.10	0.10		
	(0.02)***	(0.02)***	(0.02)***	(0.01)***	(0.01)***		
Observations	1,918	1,918	1,918	4,572	4,572	2,338	2,338
R-squared	0.05	0.05	0.05	0.06	0.06	0.05	0.06

Notes: The outcome of each regression is an indicator equal to one if the child entered teaching, and zero otherwise. Standard errors clustered by mother. Regressions control for region, mother's AFQT score, mother's birth cohort, and mother's age at birth. Regressions are weighted by child weights. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix

Appendix A

Occupation coding list

Data for child and parental occupational choice were coded using 3- and 4-digit Census Industry and Occupational Codes, which varied by year. Occupational data for mothers for years 1979-2000 were coded according to the 3-digit 1970 Census Industry and Occupational Codes list. Data for 2002 was coded using the 2000 Census Industry and Occupational Codes list. Data from 2004-2014 were coded using the revised 4-digit 2002 Census Industry and Occupational Codes list. Children's occupational data for 1994 was coded using the 3-digit 1970 Census Industry and Occupational Codes list. Data for 1996-2000 were coded using the 3-digit 1990 Census Industry and Occupational Codes list. Data for 2002 were coded according to the 3-digit 2000 Census Industry and Occupational Codes list and data for 2004-2014 were coded using the 4-digit Census Industry and Occupational Codes list.

We define teachers in the 1970 Census Industry and Occupational Codes list as librarians (032), agriculture teachers (102), atmospheric, earth, marine and space teachers (103), biology teachers (104), chemistry teachers (105), physics teachers (110), engineering teachers (111), mathematics teachers (112), health specialties teachers (113), psychology teachers (114), business and commerce teachers (115), economics teachers (116), history teachers (120), sociology teachers (121), social science teachers, n.e.c. (122), art, drama, and music teachers (123), coaches and physical education teachers (124), education teachers (125), English teachers (126), foreign language teachers (130), home economics teachers (131), law teachers (132), theology teachers (133), trade, industrial, and technical teachers (134), miscellaneous teachers, college and university (135), teachers, college and university, subject not specified (140), adult education teachers (141), elementary school teachers (142), prekindergarten and kindergarten teachers (143), secondary school teachers (144), and teachers, except college and university, n.e.c. (145).

We defined teachers in the 1990 Census Industry and Occupational Codes list as earth, environmental, and marine science teachers (113), biological science teachers (114), chemistry teachers (115), physics teachers (116), natural science teachers, n.e.c. (117), psychology teachers (118), economics teachers (119), history teachers (123), political science teachers (124), sociology teachers (125), social science teachers, n.e.c. (126), engineering teachers (127), mathematical science teachers (128), computer science teachers (129), medical science teachers (133), health specialties teachers (134), business, commerce, and marketing teachers (135), agriculture and forestry teachers (136), art, drama, and music teachers (137), physical education teachers (138), education teachers (139), English teachers (143), foreign language teachers (144), law teachers (145), social work teachers (146), theology teachers (147), trade and industrial teachers (148), home economics teachers (149), teachers, postsecondary, n.e.c. (153), postsecondary teachers, subject not specified (154), teachers, prekindergarten and kindergarten (155), teachers, elementary school (156), teachers, secondary school (157), teachers, special education (158), teachers, n.e.c. (159), and librarians (164).

We defined teachers in the 2000 Census Industry and Occupational Codes list as post-secondary

teachers (220), preschool and kindergarten teachers (230), elementary and middle school teachers (231), secondary school teachers (232), special education teachers (233), other teachers and Instructors (234), librarians (243), librarian technicians (244), teacher assistants (254), and other education, training, and library workers (255).

We defined teachers in the 2002 Census Industry and Occupational Codes list as post-secondary teachers (2200), preschool and kindergarten teachers (2300), elementary and middle school teachers (2310), secondary school teachers (2320), special education teachers (2330), other teachers and instructors (2340), librarians (2430), librarian technicians (2440), teacher assistants (2540), and other education, training, and library workers (2550).

Appendix B

Additional Tables

Table A1: Constructing the analytic sample

	Children	Moms
All	$11,521$	$4,934$
25 or older age filter	$7,060$	$3,746$
Mom occupation observed	$6,742$	$3,581$
Demographics	$4,769$	$2,597$
AFQT	**4,572**	**2,488**

Notes: Occupational data is missing for $3,863$ (33%) our of $11,521$ children in the Child and Young Adult Survey. The 25 and older age filter reduces the sample by nearly half. Without the stringent age filter, the analytic sample returns to $7,247$ children and $3,303$ moms.

Table A2: Logit Model Average Partial Effects for the transmission of teaching

Sample	All	Daughters	Sons	Black	White	Hispanic
	(1)	(2)	(3)	(4)	(5)	(6)
Mom T	0.07***	0.09***	0.05***	0.04**	0.07***	0.10***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Daughter	0.11***			0.12***	0.10***	0.13***
	(0.01)			(0.02)	(0.02)	(0.02)
Black	0.03**	0.04*	0.01			
	(0.01)	(0.02)	(0.01)			
Hispanic	0.02	0.04*	0.00			
	(0.01)	(0.02)	(0.02)			
Observations	4,572	2,234	2,338	1,694	1,813	1,035

Notes: These estimates are comparable to the linear probability model estimates presented in Table 2. The outcome of each regression is an indicator equal to one if the child entered teaching, and zero otherwise. Standard errors clustered by mother. Regressions control for region, mother's AFQT score, mother's birth cohort, and mother's age at birth. Regressions are weighted by child weights. *** $p<0.01$, ** $p<0.05$, * $p<0.1$