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Increased Educational Attainment among U.S. Mothers and their Children's Academic Expectations

Jennifer Augustine, PhD^a

^aDepartment of Sociology, University of South Carolina, Columbia, SC 29208; phone: 803-777-3123; augustjm@mailbox.sc.edu.

Abstract

Existing research provides strong evidence that children with more educated parents have higher academic expectations for themselves, but has yet to consider how an increase in the education of lower educated mothers might alter the expectations of their children. In light of the historic increase in U.S. mothers' pursuit of additional education, this study investigates this timely question using data from a nationally representative, intergenerational sample of U.S. children and mothers participating in the National Longitudinal Surveys of Youth ($n_{mothers} = 3,265$; $n_{children} = 8,027$). Combining random and fixed effects procedures, the findings revealed that that an increase in mothers' educational attainment is linked to an increase in their children's expectations to earn a Bachelor's degree. Increased maternal education did not, however, buffer against the risk that children will downgrade these expectations upon approaching the end of high school. These results have theoretical importance to traditional models of status attainment, which typically view parental education as a stable feature of family background; extend a small but burgeoning literature that explores whether and why increased maternal education improves the mobility prospects of their children; and speak to current two-generation policy approaches that aim to leverage trends in mothers education to reduce inequality for future generations.

Keywords

maternal education; academic expectations; intergenerational mobility; life course; child development

1. Introduction

In the U.S. today, it has become increasingly common for women to complete their education after becoming parents. For example, among a recent cohort of college students, 26 percent were parents, of which 76% were women (Gault et al., 2014). Demographic research also highlights how among a contemporary cohort of U.S. children, 17% had mothers who returned to the educational system to complete an additional degree, including both higher education degrees and, with even greater frequency, high school level degrees

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(Augustine, 2016). This trend in which women with children today are pursuing additional levels of education presents a new challenge for research on intergenerational mobility, which remains grounded in a theoretical tradition (e.g., Blau & Duncan, 1967; Sewell, Haller, & Portes 1969) that originated during a historical era when women's life course was still largely defined by a specific sequence of events in which the completion of school normatively preceded the transition into motherhood (Marini 1984a; Marini 1984b). As a result, research on intergenerational mobility has continued to presume that parental education is a stable feature of family background (for example, see reviews by Black & Devereux, 2010 and Haveman & Wolf, 1995 on parents' education and children's attainments), and there has been limited investigation into whether an *increase* in mother's education can improve children's opportunities for socioeconomic mobility.

This study aims to address this important limitation in our understanding of modern day intergenerational mobility by examining the specific question of whether an increase in the educational attainment of mothers with lower levels of education (i.e., less than a Bachelor's degree) affects their children's expectations of earning a higher education degree. This study's focus on children's expectations is motivated by two sets of factors. First, research in the status attainment tradition suggests that children's academic expectations are the principal mechanism in link between parents' education and children's mobility (Haller & Portes, 1973; Sewell et al., 1969), yet it remains unclear whether a change in mothers' education subsequent to children's births can impact this focal link. Second, a handful of studies in developmental psychology have found that increases in the education of less educated mothers are associated with improvements in children's grades and cognitive test scores (Genettian, Magnuson, & Morris, 2008; Harding, 2015; Magnuson, 2007), but scholars have yet to consider whether such increases also affect children's academic expectations. Doing so is important, not only because expectations are both key predictors of children's academic performance and subsequent attainment (Jacob & Wilder, 2010), but because they can also buffer against risky behaviors that often derail socioeconomic mobility, such as alcohol and drug use, non-use of contraceptives, and early sexual debut (Frisco, 2008; Sutherland & Shepard, 2001). As such, academic expectations are a developmentally important academic outcome to consider as well.

In order to examine how increases in lower educated mothers' educational attainment affects their children's academic expectations, this study examines whether increased maternal education is associated with an increased likelihood their children expect to earn a Bachelor's degree, which is the threshold for entry into the middle class today (Torche, 2011), as well as whether such increases protect children from downgrading their expectations, which children from less advantaged backgrounds are at greater risk of doing (Crosnoe, 2001; Kao & Tienda, 1998). Data for the study come from a nationally representative, intergenerational U.S. panel survey, the National Longitudinal Survey of Youth (NLSY79), which includes repeated reports of youth expectations for youth between ages 10–18; extensive details on their mothers' education histories; and allows for the use of random and fixed effects techniques that help address problems of selection that challenge intergenerational research. The results will both broaden our understanding of stratification in the modern era, when a growing share of mothers complete their education after having children, and speak to the potential for “two-generation” approaches to policy, which aim to

reduce socioeconomic disparities in children's opportunities for mobility by targeting the human capital characteristics of their mothers (Kaushal, 2014).

2. Background and conceptual framework

2.1. Theoretical perspectives on the formation of children's educational expectations

Contemporary research on stratification finds that youth from higher socioeconomic families are continually more likely to expect to complete a Bachelor's degree than are youth from less advantaged families, in spite of the fact that, over the past few decades, the percentage of less advantaged youth who expect to earn higher education degrees has begun to catch up with the percentage of more advantaged youth who expect to do so (Domina, Conley, & Farkas, 2011; Goyette, 2008; Haveman & Wolfe, 1995; Johnson & Reynolds, 2013). This persistent linkage exists because of socialization processes that vary by parental education and occur within the home and school, such as parent's expectations of their children's educational attainment, parents' academically oriented behaviors (e.g., helping with homework, going on intellectual outings to museums), and children's positive interactions with their teachers and peers (Bozick et al., 2010; Davis-Kean, 2005; Hamre & Pianta, 2001; Lareau, 2003). These experiences, in turn, culminate in what scholars describe as a "college habitus," in which children develop a set of preferences, behaviors, and beliefs that shape their expectation that they will achieve a 4-year college degree—the threshold for entering the middle class today and "equalizer" of social class background (Grodsky & Riegle-Crumb, 2010; Torche, 2011).

Yet despite our fairly robust understanding of this intergenerational process, one issue that remains unclear is whether a change in mothers' education—which in modern society has become a powerful indicator of family's socioeconomic position and key predictor of children's mobility (McLanahan, 2004; Beller 2009)—*after* children are born can impact their expectations to earn a Bachelor's degree. The issue of increases in women's education after having children remains largely unexplored because, as stated above, research on intergenerational mobility has been anchored in the status attainment model (Blau & Duncan, 1967). Thus, researchers have by-and-large proceeded with the implicit assumption that the pursuit of education stops once one becomes a parent. Support for this assumption has been further bolstered by other studies which have found that motherhood generally deters additional educational and dampens one's academic aspirations for the future (Gerson, 1985; Raley et al., 2012; Strange, 2011).

Beyond the limited amount of research on the intergenerational impact of mothers' postnatal education, there is also an additional reason for why the impact of *additional* maternal education on children's expectations remains unclear: the extant research and theory suggest competing hypotheses. On one hand, the life course paradigm articulates how the benefits that individuals derive from their social roles depend of their ordering vis-à-vis the transition into other social roles (Elder, 1994). As such, motherhood may blunt the intergenerational returns to an increase in her educational attainment because "the demands and conditions encountered in out-of-sequence or off-time transitions interfere with the achievement and enactment of other roles and statuses" (Pearlin et al., 2005:212). The Wisconsin model of stratification—which connects parents' education to children's status attainments as adults

via children's expectations (Haller, 1982; Haller & Portes, 1973; Sewell et al., 1969)—also points to a similar outcome. According to this model, children's expectations form, and solidify, when they are young. Thus, from this perspective, an increase in mother's education will have little impact on children's expectations, at least for children who were older when their mothers completed their degrees.

On the other hand, there is also reason to think that an increase in mothers' education may be linked to an increase in their children's expectations. For example, while the results of one national study of U.S. students found that in 40 percent of students, academic expectations remained stable from fourth through eleventh grade, the researchers also stated that "individuals also continue to respond to changing contexts and circumstances as they age (Bozick et al., 2010: 2030)." The potential impact of "changing contexts" on children's expectations is also reflected in the life course paradigm, which in addition to emphasizing role sequencing, also emphasizes the impact of "turning points," such as an increase in mother's education, and how it may affect children's development (Elder, 1998). Additionally, scholarship anchored in Bayesian learning theories highlights how youth continually incorporate new information (which may come about through an increase in grades, higher tract placement, or new details on the benefits of college) about their future potentials and often upgrade their expectations in response (Andrew & Hauser, 2011, Karlson, 2015; Morgan, 2005). Finally, there is evidence that increased maternal education is positively associated with changes in children's grades test scores and cognitive skills during both the early stages of development and middle childhood period (Genettian et al., 2008; Harding, 2015; Magnuson, 2007). Taken together, this body of research and theory highlights the malleability of children's academic expectations and their potential to respond, at various stages of youth development, to a change in mothers' education.

2.2. Linking increased maternal education to youth expectations

Beyond this literature, there is also a robust body of research that highlights the pathways connecting parent's educational attainment to their children's educational progress that provides additional insights into how increased maternal education might bring about higher expectations in their children or, among children with already high expectations, protect them from fading. This literature also provides a framework for understanding how increased maternal education when children are young and have yet to form clear judgments about their futures may influence them to set higher levels of academic expectations when they eventually do.

At a structural level, education is associated with greater human capital, which provides parents increased access to labor opportunities, jobs with higher levels of occupational prestige, and jobs with higher wages (Becker, 1993; Devereux, 2004). An increase in human and financial capital resources, in turn, may impact youth's perception of the viability of pursuing a higher education degree and expose them to greater—or at least, more personal—knowledge of the benefits they stand to gain from completing a college degree (Domina et al., 2011; Morgan, 2005; Teachman & Paasch, 1998). An increase in such human and financial parental resources can also provide parents with the means (i.e., money, access to networks with detailed information about schools) to relocate to neighborhoods that are

more organized and to transfer their children to schools in which college going is more normative and teacher-student interactions more positive (Ainsworth, 2002; Grodsky & Riegle-Crumb, 2010).

At the family level, parental education is associated with higher quality home learning environments (which includes parenting behaviors such as assisting with homework, but also extends to children's learning opportunities outside the home, such as children's enrollment in extracurricular activities or intellectual outings) and greater levels of parental involvement in children's schooling (Bornstein & Bradley, 2003; Augustine, 2014). In fact, there is direct evidence that such parenting resources increase as a result of increases in mother's educational attainment (Domina and Roska 2012; Magnuson 2007). The modeling of academically oriented behaviors is argued to heighten mothers' roles as expectancy socializers (Eccles, 1983) for their children, resulting in higher levels of expectations for themselves. Through similar socialization processes, children whose mother's increase their education may also observe their mothers' own academic efforts and perseverance and adopt higher academic expectations for themselves (Frome & Eccles, 1998). Lastly, following their success in school, mothers may increase their expectations for their children's futures and imprint them on their children (Davis-Kean, 2005).

Finally, on an intrapersonal level, changes in structural and interpersonal resources as a result of increased maternal education may improve children's success in school, which has been observed in several recent studies which find a link between increased education among less educated mothers and an increase in children's grades and test scores (Genettian et al., 2008; Harding, 2015; Magnuson, 2007). Success in school (e.g., higher grades, higher track placement) may subsequently lead youth to "adapt" their expectations in ways that reflect their cognitions of their potential (Andrew & Hauser, 2011; Morgan, 2005), positive feedback from teachers and peers (Hamre & Pianta, 2001), or experience being in a higher track class (Kristian, 2015).

2.3. Overview of current study

The aim of this study is to examine the impact of an increase in maternal educational attainment on children's expectations. In doing so, it focuses on the population of mothers who had less than a Bachelor's degree at the time of their child's birth because they are the subset of the population for whom the trends in increased education among mothers are most pronounced; the issue of their children's upward mobility is of greatest significance; and the group likely to be the targets of social policy (Kaushal, 2015). They are also the population that has been studied by previous research on additional maternal education, for these reasons (Harding, 2015; Magnuson, 2007). Expectations are conceptualized on the basis of whether youth expect to complete a Bachelor's degree: considered the threshold for educational and economic success in the U.S. today and focus of recent political rhetoric (Morgan, 2005; Office of the Press Secretary, 2009).

To assess the "impact" of increased maternal education, this study observes whether it is associated with an increased likelihood that children expect to earn a Bachelor's degree, as well as a whether it is associated with a decreased likelihood that they downgrade their expectations. This latter approach is important because it recognizes how in today's 'college

for all' culture, a majority of youth report at some time that they expect to earn a college degree (Goyette, 2008; Rosenbaum 2001; Reynolds et al. 2013), but youth from less advantaged backgrounds (whose mothers are largely lower educated) are more likely to downgrade their expectations as they get older and approach the end of high school than are youth from more advantaged families (Kao & Tienda, 1998). Of course, while it may be true that many disadvantaged youth downgrade their expectations to eventually match the reality of their economic situations, the expectation to earn a 4-year degree is also essential to most youths' goals of economic mobility (Schneider & Stevenson, 2000).

In this pursuit, this study pays special attention to the issue of whether increases in maternal education and children's expectations are linked in a causal way, or rather, it is the case that unobserved characteristics of the mother or changes in other characteristics of the family (e.g., marital status) draw or propel women back to school and confound the association with youth expectations. The potential for such "selection" is pointed to in other research, which finds that in general, mothers who return to school are likely to be "positively selected." For example, they have better academic records, higher test scores, and more financial and social support, and they report more positive experiences in their secondary schools than mothers with similar levels of education who do not return to school (Augustine, 2016; Brooks-Gunn, Guo, & Furstenberg, 1993; Felmlee, 1988; Way & Leadbeater, 1999). Furthermore, given how having children deters women typically from returning to school (Taniguchi and Kaufman 2007), mothers that return to school are likely to anticipate more positive returns from doing so than mothers who choose not return to school. This study addresses this challenge through the use of different methodological strategies, including the inclusion of an unusually rich set of covariates and random and fixed techniques, explained in more detail below.

As final considerations, this study explores the possibility that the associations between additional maternal education and children's academic expectations vary for different subgroups defined by the child's gender or race or ethnic background, the child's developmental stage when the mother completed her degree, and the mother's education when the child was born; as well as how the expectations of children whose mothers increased their education ultimately compared to the children whose mothers completed the same level of schooling before they were born.

3. Method

3.1. Data

Data for this study come from the National Longitudinal Surveys of Youth (NLSY79) and linked child and young adult files. The NLSY79 is a nationally representative survey of a cohort of over 12,000 young Americans designed to capture their experiences across the life course. Participants were between the ages of 14 to 21 years old when they were first recruited in 1978. Data collection began the next year and continued annually up through 1994, when it switched to a biennial format. In 1986, a separate biennial survey of the NLSY79 mothers and their children was added, which contains information on over 90% of all children (over 11,000 children) born to the NLSY79 women. Data collection for both surveys is ongoing, with the most recent wave of data released in 2012. These surveys are

particularly well-suited for this study for several reasons. Most obviously, they are a nationally representative, intergenerational source of data. The NLSY79 survey also prospectively tracks mothers across a wide swath of their life course, thereby capturing their nearly complete education histories and an array of information that preceded mothers' reentry into school rarely included in other surveys, such as mothers' own academic expectations reported when she was an adolescent, or her academic ability. Additionally, the child and young adult surveys include repeated measures of youth expectations assessed at each survey wave among children ages 10–14 and at least once when they were between ages 15–18. Finally, the surveys measure numerous time-varying and fixed measures of conventional socio-demographic factors at the child (e.g., birth weight), mother (e.g., marital status) and family (e.g., income) levels.

3.2. Analytic sample

The final outcome of interest is youth academic expectations, making youth the unit of analysis. Thus, to form the analytical sample, I began with the 11,503 children that were ever interviewed. I then excluded children that were part of NLSY oversamples that were dropped in later rounds of the study ($n = 1,744$) and children who did not live continuously with their mothers from birth through age 18 ($n = 1,769$). These exclusions left me with a final analytic sample that consisted of 8,027 children born to 3,265 NLSY79 women.

3.3. Measures

Beginning in 1988 and biennially thereafter, youth aged 10 and 14 repeatedly reported “how far they thought they would go in school” and youth ages 15–18 responded to the question: “What is the highest grade or year you think you will actually complete.” Based on these reports, I created a time-varying binary variable of whether a youth *expects to earn at least a Bachelor's degree* (i.e., selected categories of “graduate from college” or “4th year college [Bachelor's]”). Time was based on the child's age, not the survey year. Youth expectations were coded in this dichotomous fashion because, as stated above, a Bachelor's degree is the marker of success today and therefore, a relevant threshold for considering the intergenerational impact of increased maternal education. The idea of a Bachelor's as a commonly held threshold was also reflected in the distribution of responses, which clustered around the Bachelor's degree category (41% of reports), with only 10% selecting a 2-year degree or other post-secondary credential.

Information on mother's educational histories was pulled from a number of different reports, including reports of the highest grade/year of schooling she completed; whether she received a high school diploma or GED and the date it was attained; the highest degree she ever received and date it was attained; if she attained a college degree and what type; whether she received a degree since the last interview; and whether she was enrolled in school during the interview. Piecing this information together allows for both nearly complete educational histories and the correction of some measurement errors. For example, in cases where education was reported inconsistently (e.g., mother reported 12 years, then 10 years, then 12 years), I recoded the outlying year (10) with the modal report (12).

Combining this information along with information on the month and year of the birth, I created a time-varying indicator (i.e., 0/1 measure) for whether the *child's mother increased her educational attainment*. As with youth expectations, time was represented by the child's age (in formal terms, "child years"), not survey year, as it was originally recorded, ranging from child age 0 (the child's birth year) to age 18. An increase in education was credited when the child's mother earned a high school diploma or GED, an Associate's degree or other 2-year credential, or a Bachelor's degree after the child's birth and following a period of exit from the school system. Once an additional degree was earned, all subsequent time-varying indicators of additional education were coded as "1." Doing so allowed for an average of all child reports of expectations among years in which the measure of additional education was a 1 versus a 0, rather than just the year it was earned. Using the same set of reports, I also created a time-invariant measure of the child's mother's education at the time of the child's birth, dummy coded: less than a high school diploma, high school diploma/GED, Associate's, or Bachelor's or higher.

To account for mother and child related background factors that may positively (such as mother's ability) or negatively (such as traditional gender attitudes) select some children's mothers into school, I account for a host of time-invariant factors. Child factors included gender (*male* = 1, *female* = 0), mother reported race/ethnicity (dummy coded *White*, *Hispanic*, *Black*), whether the child had a health limitation (1 = *yes*, 0 = *no*), birth order (continuous), birth year (continuous), and whether the child was born low-birth weight (1 = *yes*, 0 = *no*). Maternal factors included indicators for whether the mother lived in a single parent household any time from birth to age 18 (1 = *yes*, 0 = *no*), if her household of origin ever received welfare (1 = *yes*, 0 = *no*), whether a foreign language was spoken in her household or origin (1 = *yes*, 0 = *no*), whether she reported any illicit drug use before her first child's birth (1 = *yes*, 0 = *no*) or had sex before age 16 (1 = *yes*, 0 = *no*), whether she reported drinking alcohol as an adolescent (1 = *yes*, 0 = *no*), her mother's and father's years of schooling (continuous), the highest grade or year of school she expected to complete (reported at the baseline wave), her score on the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) (higher scores reflect more positive self-esteem), her views on women's roles outside the home (higher scores reflect more traditional gender roles), and an assessment of her cognitive skills based on the Armed Forces Qualification Test (AFQT). Drawing on information reported at each wave, I also included a set of time-invariant measures taken from the year of the child's birth, including the mother's marital status (dummy coded *married*, *never married*, *divorced/widowed*), age (continuous), family income (continuous), employment (1 = *employed 75% of the year or more*), wealth (i.e., value of all assets minus debt), urban residence (1 = *urban*, 0 = *other location*), region (dummy coded *West*, *South*, *Northeast*, *Midwest*), and a marker for high occupational prestige (1 = *administrative or professional job*, 0 = *other status positions or no employment*).

Additionally, I accounted for several factors that may vary over time and confound the linkage between increased maternal education and youth expectations. These covariates included a measure of maternal job stability (a rate based on the number of different jobs the mother held per year since age 18), marital status (*married* = 1, *unmarried* = 0), the number of children living in the home (continuous), and using the same coding schemes described above, employment status, region, urban location, family income, wealth, and whether the

mother worked in a high prestige job, as well as a time-varying measure of the child's age at the observation. I do not include a control for the child's academic performance because as explained above, it is likely to be endogenous to an increase in mothers' education, and thus, a potential mechanism in the link with children's expectations. To the extent that children's performance is stable, however, which it is more typically throughout early and later adolescence (Gusky 2011), its potential to confound the association between increased maternal education and children's expectations will be addressed by the fixed effects models.

3.4 Analysis plan

The multivariate analyses drew on two longitudinal modeling strategies, random effects and fixed effects. Both are longitudinal techniques that pool data across all observations of the dependent variable (i.e., time-varying measures of children's expectations between ages 10 and 18) and nest them within individuals (i.e., children). As such, both approaches adjust for non-independence in the repeated measures of the dependent variable by correlating errors within subgroups (Allison, 2009b) and take advantage of the longitudinal structure of the data.

In addition, fixed effects models have the notable advantage of adjusting for unobserved time-invariant factors that may confound the estimates (Allison, 2009b). At the same time, because they rely on within-child variability, they are only able to estimate the effect of increased maternal education among children whose mothers increased their education when they were between ages 10 and 18, which is only 20 percent of the children whose mothers increased their education. Thus, the fixed effects models have reduced power to detect an "effect," and their estimates can only be generalized to children whose mothers increased their education when they were beyond age 10 and who may be different in unknown ways. For example, they may be more motivated to fulfill a lifelong goal, rather than improve their and their children's circumstances, and thus, the effect of additional maternal education for them may be weaker. Further limiting their generalizability is the fact that I cannot generalize the results of the fixed effects models beyond the actual sample of children age 10 and older who participated in the CNLY.

For these reasons, I consider the random effects models as the primary models because they allow for an examination of the association between increased maternal educational and youth expectations for the *entire* sample of children whose mothers' increased their education, including parents of younger children who are more likely to be the target of policy. In doing so, they offer both more statistical power, generalizability, and relevance to policy. Yet they also have a key limitation; namely, they assume that any sources of unobserved heterogeneity are uncorrelated with the predictor variables. Thus, although I include of a uniquely rich set of theoretically identified covariates in the models—such as measures of the mother's background, cognitive abilities, social psychological skills, attitudes, and expectations, all taken at the baseline wave of data collection—should any key confounds be omitted, the results may still be biased (Ware & Laird, 1982). Given this shortcoming, I pursue the use of fixed effects models to test the robustness of several of the

random effects models to this assumption, in spite of their limited power and generalizability.

As a first step in the modeling progressions, I estimated the association between mother's education at the time of children's births and youth expectation of earning a Bachelor's degree using random effects within logistic regression, controlling for the full set of covariates and specifying robust clustered errors to adjust for nesting at three levels (i.e., time within children, and children within time) and thus, any additional unobserved heterogeneity that varied between children's families. The coefficient for each measure of education corresponds to the mean differences in odds, averaged across ages 10–18, that a child will report that he/she expects to earn a Bachelor's degree, adjusted for child age, compared to the reference group. Average marginal effects, which provide a more intuitive and substantively meaningful interpretation of these effects, are also calculated and provided in the text. The age coefficient captured the trend in youth expectations. As the next step, I added the time-varying measure of additional maternal education to test whether, net of mothers' education at the child's birth, children whose mothers increased their education had a greater odds of expecting to earn a Bachelor's degree compared to children whose mothers did not (again providing the average marginal effect in the text). I then added an interaction between the time-varying measure of increased education and age to test whether increased maternal education buffers against a drop-off in youth expectations.

Next, I assessed whether the association between additional education and youth expectations varied among different subsets of the population by estimating a series of models that interacted the time-varying measure of additional maternal education with measures of maternal education at the child's birth, child gender, and child race/ethnic background. To assess whether the association between additional maternal education and youth expectations varied depending on the child's stage of development when the increase occurred, I replaced the time-varying bivariate measure of additional maternal education with a time-invariant version with four categories where: 1 = no additional education, 2 = increase between child age 0–4, 3 = increase between child age 5–9, and 4 = increase between child age 10–18. Positioning group 4 as the reference group allowed me to observe whether the coefficient of additional education on youth expectations differed when the increase occurred during adolescence versus earlier stages of development. Next, I compared the expectations of children whose mothers increased their education to children whose mothers completed the same degree before they were born by adding an interaction between the time-varying measure of highest degree and time-varying measure of additional education. As a final step, I repeated the second (estimating the coefficient for additional education) and third (interacting additional education with time) steps, specifying fixed effects. I also pursue the tests of heterogeneous effects within fixed effects, but only as an exploratory step, given the limited within child variability beyond age 10, when expectations are assessed, to determine whether they are differences from the results using random effects. To corroborate the results of all tests of interactions, which were based on a non-linear model, I reanalyzed them using linear probability models as well (see Ai & Norton, 2003; Mood, 2010).

All models were estimated using the statistical software package Stata. To account for missing data in the multivariate models, I employed multiple imputation techniques, using the user-written program *ice* (see Royston, 2009) to produce 20 fully imputed data sets. As part of this imputation process, I created customized equations that predicted each variable based on the subset of variables in the imputation model that were most highly correlated with the variable being imputed. This approach of creating customized equations was necessary given the large number of variables (>250) in the model. I then used Stata's *mi estimate* suite of commands in Stata to analyze the multiply imputed data, which included measures of mothers' education and the youth expectations, which was in following with recommended best practices for when the imputation model includes auxiliary variables, such as other time-varying versions of the same variables (see Allison, 2009a). Several sensitivity tests provided general support for the validity of this approach.¹ Imputed estimates for children who had not reached the child age being observed, however, (e.g., the 10% of the sample who had not reached child age 18), were censored for that child-year, resulting in a total of 7,839 groups (i.e., children) with 64,457 observations (e.g., child years) in the multivariate analyses.

4. Results

4.1 Descriptive statistics

To begin, I provide some details on the educational trajectories of children's mothers. Among the sample, 21% of children were born to mothers with less than a high school education, 58% were born to mothers with a high school diploma/GED, 7% were born to mothers with an Associate's degree, and 15% of children were born to mothers with a Bachelor's degree. Of those children born to mothers without a Bachelor's degree (i.e., 85% of the sample), 13% had mothers that earned an additional academic credential after they were born and before their 19th birthday. Most of these children (94%) were born to mothers with a high school diploma or less. Among children born to mothers without a high school diploma, 53% ($n=550$) had mothers who earned a high school diploma or GED, 2% earned an Associate's ($n=30$), and 1% earned a Bachelor's degree ($n=15$). Among children born to mothers with a high school diploma, 7% earned an Associate's degree ($n=303$) and 4% earned a Bachelor's degree ($n=172$). Among children born to mothers with an Associate's degree, 12% ($n=66$) returned to school to earn a Bachelor's degree. A small handful of children's mothers also earned multiple degrees, including 9% of children born to mothers

¹Reestimating the random effects models associating an increase in mothers' education with children's expectations (i.e., Model 2 or Table 3) using the non-imputed version of children's expectations yielded a similar result, in terms of both coefficient size and significance, as the models using the imputed version, although the coefficient was in fact somewhat larger. Thus, it appears that for the random effects models, using the imputed version of the dependent variable produced a more conservative effect. The parallel fixed effects model (Model 2 of Table 4), however, did not reveal evidence of statistical significance. Although it is possible that this difference in results was due to the imputation, it is also probable that it was due to the further reduction in power and increase in standard errors that resulted from using listwise deletion to drop cases with missing values on the dependent variable. Indeed, such estimates were based on, at a maximum, the 12% of children with mothers who increased their education, which is the percent of children whose mothers increased their education when they were between age 10 and 18 and had at least two reports of expectations. This is nearly half the sample available for the fixed effects models using the imputed version of the dependent variable. Reestimating the fixed effects models using the imputed version of expectations but restricting the sample to children who had at least two reports of expectations, however, revealed results consistent with the models based on the fully imputed results. Furthermore, estimating the fixed effects models using the fully imputed data and linear regression, which is less vulnerable to bias due to imputation, also revealed similar results as those using logistic regression.

without a high school degree and 23% of children born to mothers with a high school level of education.

Table 1 provides estimates of youth expectations (pooled across time) and the complete set of fixed covariates, stratified by mothers' education at the time of the child's birth. Within each strata of education, I used t-tests to determine whether there were statistically significant differences (at the minimum probability level of $p < .05$) in the expectations and background characteristics of children whose mothers increased their education compared to those whose mothers did not. The patterns in youth expectations revealed that the percentage of children who expected to earn a Bachelor's degree increased as mothers' starting education increased—a pattern consistent with prior research—yet within each education strata, children whose mothers earned additional education were also more likely to report expecting to earn a Bachelor's degree or more than their peers whose mothers did not increase their education. For example, 47% of children born to mothers without a high school diploma/GED who increased their education reported they expected to earn a Bachelor's degree versus 38% of their peers whose mothers did not increase their education. The difference was largest among children whose mothers had an Associate's Degree when they were born (90% versus 74%).

Of course, such patterns could be driven by the factors associated with selection into additional maternal education. For example, looking at children whose mothers had less than a high school diploma at the time of birth, those whose mothers increased their education were more likely to be White, married at the child's birth, have higher educated parents who received the newspaper, and have higher cognitive scores, self-esteem, and educational expectations at the baseline wave (1979) compared to mothers of children who did not increase their education. They were also less likely to have had early sex, used drugs, have traditional gender attitudes, or received welfare growing up, although they had more job changes and were younger. Among the children whose mothers had a high school diploma/GED at the time of their birth, those whose mothers earned additional education had higher educational expectations, cognitive scores and self-esteem, higher educated mothers, and more egalitarian gender attitudes, and were less likely to drink during adolescence and have had early age, although their incomes were lower, and they were less likely to be married, younger, had more job changes, and were more likely to have had a single parent compared to children of mothers who did not increase their education.

Lastly, children whose mothers had an Associate's level education at the time of their birth and earned additional education had higher cognitive scores, higher educated mothers, were more likely to have grown up in homes that received the newspaper compared to mothers who did not increase their education. They also had less traditional views on gender, were less likely to have grown up in a family that received welfare, and were less likely to have children born at a low birth weight or have a health limitation. Taken as a whole, these results highlight a complex set of factors that positively (e.g., higher cognitive skills) and negatively (e.g., younger age at birth, perhaps because some mothers had interrupted trajectories through school) select some women back into school. More generally, they underscore the importance of accounting for such factors in the multivariate analyses.

4.2 Multivariate analyses

The first set of multivariate results appear in Table 2. These results are from the random effects models predicting the association between youth expectations and maternal education at the child's birth (Model 1), an increase in maternal education (Model 2), and whether additional maternal education blunts the negative trend in youth expectations as youth approach the end of high school (Model 3). In addition to controlling for mother's education at the child's birth, each of these models includes the full set of rich covariates described above and employ robust cluster standard errors to adjust for the clustering of children within families.

The results of Model 1 are consistent with existing empirical evidence indicating that the expectation of earning a Bachelor's degree is greater among children born to mothers with higher levels of education. The odds that children whose mothers had a high school diploma or GED ($B=.39$, $SE=.06$) expected to earn a Bachelor's degree was significantly greater compared to children born to mothers without a degree, and it was even greater for children whose mothers had an Associate's degree ($B=.85$, $SE=.10$) or Bachelor's degree ($B=1.23$, $SE=.14$) at their time of birth. Translating these coefficients to a more substantially meaningful metric, average marginal effects, revealed that compared to children born to mothers without a high school level of education, children born to mothers with a high school level of education had a 8% increased probability of expecting to go to college; children born to mothers with an Associate's degree had an increased probability of 17%; and children born to mothers with a Bachelor's degree had a 23% increased probability.

At the same time, controlling for these associations, additional maternal educational attainment relative to no additional education was associated with a 7% increase in the probability ($B=.37$, $SE=.06$) that youth expected to attain at least a Bachelor's degree (Model 2). It did not, however, appear to blunt the negative age-related trend in youth expectations—which persisted for both children whose mothers increased their education and those who did not—as indicated by the significant main effect of age in Model 2 ($B=-.12$, $SE=.01$) and non-significant interaction between age and additional maternal education in Model 3. Replicating Models 2 and 3 with (a) a sample of children born to mothers without a Bachelor's degree and a (b) categorical specification of age produced similar results.

Next, I tested whether the association between additional maternal education and youth expectations varied by the mother's starting education, child gender, and child race/ethnicity. These models, which included interactions between measures of maternal education at birth (Model 4), gender (Model 5), race/ethnic background (Model 6) and time-varying measures of additional maternal education, appear in Table 3. None of the five interaction terms were statistically significant. In Model 7, I substituted the time-varying measure of additional maternal education with a time-invariant categorical measure that grouped children into one of four categories: (1) no additional maternal education, (2) additional degree between child ages 0–4, (3) additional degree ages 5–9, and (4) additional degree ages 10–18. Although in some cases, this approach incorrectly associates additional education with the children's educational expectations for youth in Group 4 prior to their mother actually completing their degree, it provides a general test of whether the associations are stronger for children whose

mothers earned their degree at earlier versus later stages of child development. These results, in which the effect of no additional maternal education compared to additional education between child ages 10–18 was significant ($B = -.35$, $SE = .08$), but comparisons with, and among, other age groups was not, does not provide evidence of such a developmental timing effect. Note, for mothers that pursued more than one additional degree, this analysis was based on the age of the child when the first degree was obtained. Analyses that used a measure of age that reflected the timing of the final degree, however, yielded similar results.

As a final step using random effects, I added interactions between the time-varying measure of additional education and time-varying measure of highest level of education to assess whether there were significant differences in the expectations of children whose mothers increased their education compared to those whose mothers completed the same level of education prior to their birth (Model 8). These results did not reveal any significant interactions, although estimates of average marginal effects revealed a pattern in which children whose mothers increased their education had lower probabilities of expecting to complete a Bachelor's degree, ranging from 10–14% differences, compared to children whose mothers completed the same degree before they were born. Thus, while my results provide preliminary evidence that an increase in mothers' education helps narrow socioeconomic disparities in children's expectation, given the possibility of Type II error and the magnitude of these probabilities, I am cautious in drawing such conclusions. Models 3–8 were each replicated using a linear probability model and the pattern of results were the same.

The findings from Model 7 also provide additional support for the generalizability of the fixed effects models, which only examined the effect of additional maternal education for this oldest age group. Before making such conclusions, however, the final step was to reestimate models 2–3 using fixed effects. These models, which appear in Table 4 and difference out stable sources of unmeasured heterogeneity and capture actual changes in youth's reports, yielded results that are consistent with the results of Model 2 from the random effects models (see Model 1; $B = .30$, $SE = .14$, $p < .05$), although the magnitude of this effect—reflected by the average marginal effect and corresponding to a 6.5% increase in the probability of expecting to go to college associated with an increase in mothers' education—was slightly reduced. The results from the fixed effects models are also consistent with those from Model 3 using random effects in that the negative age related trend in youth expectations (see the significant negative coefficient for age; $B = -.15$, $SE = .07$, $p < .05$ in Model 1) observed among the subsample of children whose mothers increased their education sometime between age 10 and 18 remained significant, even after mothers increased their education, as indicated by the non-significant interaction term. Again, using a categorical measure of age produced a similar result. Results were also the same when using linear regression, which also allowed for the use of robust clustered standard errors when specifying fixed effects. Finally, exploratory analyses of Models 4–6 and Model 8, which are not shown, do not reveal any significant interactions.

5. Discussion and conclusions

A seminal body of literature considers children's academic expectations to be the key mechanism linking parents' and children's education and socioeconomic position (e.g., Bozick et al., 2010; Dubow et al., 2009; Haller & Portes, 1973). Within this long-standing literature, what remains unclear is whether an increase in a powerful indicator of families' socioeconomic status and predictor of children's mobility, maternal education, can alter this key link. Pursuing this question is historically relevant, given the ongoing rise in women's post-childbearing educational attainment (NCES, 2011), and theoretically important, given the lack of recognition of this trend reflected in intergenerational research, and the contradictory set of expectations suggested by the literature. It also forms a bridge to the small but burgeoning literature developing outside of this tradition which examines how increases in maternal education can improve the development of children born to women with lower levels of education (e.g., Harding, 2015; Magnuson, 2007). Finally, it speaks to the current interest in two-generation policies for improving the well-being of such families. Although prior analyses of two-generation policies have generally shown small effects (e.g., Dickson, Gregg, & Robinson, 2016; Holmlund, Lindahl, & Plug, 2011), scholars and policy makers are looking for ways to enhance the efficacy of newer "Two-Generation 2.0" programs (see Chase-Lansdale & Brooks-Gunn, 2014). As part of this effort, the results of this study offer several new insights.

First, the result of both the random effects models and the fixed effects models provided evidence that an increase in maternal education can have a positive impact on children's academic expectations by boosting their likelihood of expecting to complete a Bachelor's degree. Moreover, these results appear to be generalizable to the larger U.S. population beyond the NLSY and CNLY samples and in ways that reflect the experiences of children whose mothers increased their education at both younger (which is most common) and older ages. They were also robust to models that adjusted for unobserved time-invariant factors, which the random effects models did not, as well as models that explored variation in these associations across subsets of the population. At the same time, the results of the fixed and random effects models suggest that while additional maternal education may positively impact children's academic expectations, the impact is likely to be modest. This conclusion is consistent with other methodologically rigorous studies on the link between parental education and children's achievement and attainments (Black & Devereaux, 2011) and evaluations of the impact of two-generation policies (Dickson, Gregg, & Robinson, 2016; Holmlund, Lindahl, & Plug, 2011). The modest impact of such policies are further underscored by the lack of evidence that an increase in maternal education helped prevent some children from downgrading their expectations.

These limitations notwithstanding, the findings also offered some important conceptual insights. First, they provide evidence that children's cognitions about their educational goals and the importance that education will have in their future can be affected when their socio-demographic contexts change. These findings, which parallel recent research which finds that youth positively "adjust" their expectations in a self-reflexive way, suggest they may respond to changing socialization processes as well (Andrew and Hauser 2011). This insight, thus, offers an important refinement to traditional models of intergenerational mobility,

which largely overlook the question of whether, and in what ways, a change in family context may alter the mobility trajectories of children. Second, they revealed that among older children experiencing changing contexts, educational goals are still subject to reappraisal. This finding challenges traditional interpretations of the status attainment model in which youth expectations are set in early childhood (Haller, 1982). Finally, although I did not examine the mechanisms by which youth expectations are increased (which would be difficult to do for young children who are just starting to see their expectations come into focus), the results highlight an additional way that policies that help mothers return to school can alter the trajectories of their children.

At the same time, the study also has some limitations. First, I did not relate academic expectations to youth's actual status attainment. Expectations do not perfectly predict attainment, and their power in predicting actual attainment may vary across demographic groups (Schneider & Stevenson, 2000). Moreover, increased maternal education may lead to increased expectations in some children, but changes in their expectations may be "too little too late" for their mobility trajectories. Thus, the extent to which increased education improves children's mobility remains unknown. Nevertheless, the focus on youth expectations is important in its own right, and has implications for an array of youth outcomes that not only matter for educational attainment, but other behavioral predictors of status attainment outcomes (e.g., labor force participation, productivity). Thus, the focus on expectations has broad significance to the study of mobility. Moreover, there is emerging evidence that expectations may have particular significance for the youth who do not pursue higher education immediately following high school graduation. For example, a recent study found that the expectations mothers' held during adolescence was one of the primary factors distinguishing mothers who returned to school to increase their education from those who did not (Augustine 2016). Thus, in an era when education is now pursued in a discontinuous fashion, the power of youth expectations may extend into adulthood (Bozick and DeLuca 2005), thereby taking on new importance in today's society as well.

Next, the models assume the direction of the association flows from mother to child, but it is possible that the reverse associations may be true. For example, a recent study found that children's participation in Head Start has a significant impact on the educational attainment of some of parents (Sabol & Chase-Lansdale, 2015). Thus, it remains plausible that the characteristics (e.g., academic aspirations) of children initiate parents to make changes in their education. Only random assignment could fully tease out these issues of directionality. Next, I did not investigate the mechanisms through which increases in mothers' education are associated with children's increased expectations. While I provided a conceptual argument for how the effects of increases in maternal education flow through multiple factors (e.g., mother involvement in child's education, the child's self-concept, maternal expectations for her child), these links, and the strength of each, should be empirically examined in future research. It also remains possible that these links vary at different stages of develop, or among different subgroups, which should be considered too. Next, I could not account for many traits of the child's father because such information is unavailable in the NLSY. Assuming such traits are stable, however, they are accounted for in the fixed effects models. Finally, the size of the sample of children whose mothers increased their education during the period in which youth expectations were assessed was small, limiting the utility

and generalizability of the fixed effects. Although it would have been preferable to have data in which the assessments of children's expectations were synchronous with the time when the majority of children's mothers were increasing their expectation, when they were younger, such data does not currently exist.

Extending existing literatures, this study finds that increases in maternal educational attainment can have positive impacts on children's own educational expectations. This finding lends nuance to classic status attainment models by incorporating insights from a multi-disciplinary set of literatures and theories, which reveal how mothers' education can change after she becomes a parent and highlights the processes through which youth academic expectations to earn a Bachelor's degree might increase. In addition to these theoretical and substantive insights, the results of this study have implications for understanding the processes of social mobility today, when an increasing number of U.S. women return to school after having children. Finally, these findings lend support to current social and education policies in the U.S. (as well as other countries) that encourage less advantaged mothers to improve their human capital. They do so by revealing how increases in the educational attainment of mothers without four-year degrees can convey a powerful cognitive resource to children that can help promote children's own pursuits of higher education and improve the mobility and well-being of the next generation.

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Highlights

- Additional maternal education is associated with children's increased academic expectations.
- It does not, however, buffer children from downgrading their expectations as they get older.
- These associations are observed using random and fixed effects methods.
- They appear generalizable to various demographic subgroups.
- And to exist for both younger and older children whose mothers increased their education.

Table 1

Means and Percentages of All Study Variables, Stratified by Mother's Education at Child's Birth and Additional Education ($n=8,027$)

	< High School		High school diploma		Associate's Degree		Bachelor's	
	No Additional Education	Additional Education	No Additional Education	Additional Education	No Additional Education	Additional Education	No Additional Education	Additional Education
Youth Academic Expectations								
Bachelor's or more	38% ^a	47%	61% ^a	69%	74% ^a	90%	90%	90%
Child Characteristics								
Female	49%	46%	50%	49%	49% ^a	39%	48%	48%
Race/Ethnicity								
White	23% ^a	35%	47% ^a	42%	53%	56%	76%	76%
Black	38% ^a	37%	32% ^a	39%	28%	28%	14%	14%
Hispanic	40% ^a	28%	21%	20%	19%	16%	10%	10%
Health limitation	21% ^a	20%	23% ^a	32%	32% ^a	22%	28%	28%
Low birth weight	9%	11%	8%	6%	7% ^a	0%	7%	7%
First born	47% ^a	43%	38%	43%	40% ^a	41%	43%	43%
Mother Background Characteristics								
Single parent family	39%	44%	30% ^a	37%	22%	28%	17%	17%
Received welfare	38% ^a	32%	18%	16%	11% ^a	7%	2%	2%
Foreign language	29% ^a	17%	14%	15%	11%	19%	11%	11%
Mother education	8.50 ^a	9.46	11.04 ^a	11.64	11.83 ^a	12.81	13.44	13.44
Mother employed	44% ^a	50%	54%	56%	55% ^a	75%	52%	52%
Father education	8.11 ^a	9.37	10.86 ^a	11.62	12.54	12.40	14.39	14.39
Family size	5.20 ^a	4.43	3.72	3.71	3.42	3.05	2.81	2.81
Newspaper	56%	68% ^a	80%	83%	89% ^a	97%	94%	94%
Mother Psychosocial Characteristics Attitudes/Expectations								
Grade completion	11.24 ^a	12.07	13.43 ^a	14.36	14.75	14.80	16.10	16.10
Women's role	2.39 ^a	2.23	2.10 ^a	1.97	1.95 ^a	1.85	1.86	1.86

	< High School		High school diploma		Associate's Degree		Bachelor's	
	No Additional Education	Additional Education	No Additional Education	Additional Education	No Additional Education	Additional Education	No Additional Education	Additional Education
<i>Unweighted n (%)</i>	1,102(14%)	562 (7%)	4,217 (53%)	439 (5%)	467(6%)	67 (1%)	1,374 (15%)	
Cognitive/psychological								
Self-esteem	2.98 ^a	3.04	3.19 ^a	3.27	3.27	3.34	3.38	
AFQT score	13.40 ^a	21.35	34.37 ^a	44.25	51.28 ^a	58.34	73.00	
Behavior								
Illicit drug use	46% ^a	57%	65%	66%	66%	62%	62%	
Adolescent drinking	76%	79%	81% ^a	87%	85% ^a	94%	87%	
Young sex	40% ^a	30%	11% ^a	17%	4% ^a	1%	4%	
Factors at Time of Child's Birth								
Marital Status:								
Married	47% ^a	51%	67% ^a	65%	84%	80%	95%	
Not married	12%	9%	8%	9%	5%	6%	1%	
Never married	41%	40%	25% ^a	26%	11%	14%	4%	
Employed	10%	12%	34%	37%	51%	53%	57%	
Job rate	0.37 ^a	0.57	0.52 ^a	0.63	0.51	0.57	0.60	
Age (years)	22.10 ^a	20.23	26.39 ^a	24.51	29.44	28.86	31.21	
High prestige job	0%	0%	5%	8%	16%	23%	33%	
Income	13,103.07	14,992.8	35,415.90 ^a	26,330.22	46,834.77	94,862.36	92,670.97	
Wealth	9,373.53 ^a	8,487.37	60,064.83	41,594.03	71,490.00	76,017.53	171,257.20	
<i>Unweighted n (%)</i>	1,102(14%)	562 (7%)	4,217 (53%)	439 (5%)	467(6%)	67 (1%)	1,374 (15%)	

Notes:

^aDesignates that the group mean value for the no additional education group is significantly different than the additional education group at the minimum probability level of .05. Weighted sample descriptive statistics using child-level weight provided in the survey.

Table 2

Random Effects Models Predicting Log Odds Youth Expects to Earn a Bachelor's degree

	B(SE)		
	Model 1	Model 2	Model 3
Child age (continuous)	-.12 (.01) ***	-.12 (.01) ***	-.12 (.01) ***
Maternal education			
High school diploma (no degree)	.39 (.06) ***	.49 (.05) ***	.49 (.05) ***
Associate's degree	.85 (.10) ***	.96 (.10) ***	.96 (.10) ***
Bachelor's degree	1.23 (.14) ***	1.40 (.14) ***	1.40 (.14) ***
Additional degree	---	.37 (.06) ***	.72 (.29) *
Other factors measured at child's birth			
Divorced (married)	-.04 (.06)	-.05 (.06)	-.05 (.06)
Never married	-.05 (.04)	-.05 (.04)	-.05 (.04)
Mother age	.01 (.00) **	.02 (.00) **	.02 (.00) **
Mother employed	.00 (.08)	.00 (.08)	.00 (.08)
Family income	6.80 (2.49)	1.10(2.49)	1.10(2.49)
Time-invariant child characteristics			
Female	.11 (.03) ***	.12 (.02) ***	.12 (.02) ***
Race/ Ethnicity (White)			
Black	.05 (.04)	.04 (.04)	.04 (.04)
Hispanic	.00 (.07)	.00 (.07)	.00 (.07)
Health limitation	-.02 (.03)	-.03 (.03)	-.03 (.03)
Low birth weight	.00 (.05)	.01 (.05)	.01 (.05)
Birth order	-.04 (.02) *	-.04 (.02) *	-.04 (.02) *
Time-invariant mother factors			
Mother's mother years of schooling	.01 (.01)	.01 (.01)	.01 (.01)
Mother's father years of schooling	.00 (.01)	.00 (.01)	.00 (.01)
Educational expectations	.06 (.01) ***	.06 (.01) ***	.06 (.01) ***
AFQT score	.01 (.00) ***	.01 (.00) ***	.01 (.00) ***
Self-esteem	.07 (.04)	.07 (.04) +	.07 (.04) +
Family received newspaper	.02 (.03)	.02 (.03)	.02 (.03)
Grew up with both parents	-.04 (.03)	-.04 (.03)	-.04 (.03)
Family received welfare	-.03 (.04)	-.03 (.04)	-.03 (.04)
Drug use during adolescence	-.04 (.04)	-.04 (.04)	-.04 (.04)
Egalitarian gender attitudes	-.03 (.04)	-.03 (.04)	-.03 (.04)
Drinking during adolescent	-.01 (.01)	-.01 (.01)	-.01 (.01)
Early sexual debut	-.08 (.04) *	-.07 (.04) +	-.07 (.04) +
Foreign language	.10 (.06)	.10 (.07)	.09 (.07)
Selected time-varying factors			
Mother married	.08 (.04) *	.08 (.04) *	.08 (.04) *

	B(SE)		
	Model 1	Model 2	Model 3
Mother employed	.04 (.04)	.04 (.04)	.04 (.04)
Family income ^a	8.50 (2.70) *	8.09 (2.69) *	8.07 (2.68) *
Family wealth ^b	8.62 (6.07)	8.77 (6.09)	8.47 (6.03)
Job stability	.11 (.09)	.07 (.09)	.07 (.09)
High prestige job	.12 (.04) *	.09 (.04) *	.10 (.05) *
Interaction			
Additional maternal education x age	---	---	-.02 (.02)

Notes: Models include full set of time-invariant and time-varying covariates. Only selected covariates some are shown.

^aExponentiated to the seventh degree.

^bExponentiated to the eighth degree.

p<.001,

**
p<01,

*
p<05.

Table 3

Random Effects Models Testing Variations in Association between Additional Maternal Education and Youth Expectations

	B(SE)							
	Model 4	Model 5	Model 6	Model 7	Model 8			
Additional maternal education	.32 (.07) ***	.36 (.06) ***	.38 (.07) ***	---				.10 (.16)
Main effects and interactions								
Model 4.								
High school at birth (less than hs)	.48 (.05) ***	---	---	---				---
Associate's at birth	.95 (.10) ***	---	---	---				---
Bachelor's at birth	1.39 (.14) ***	---	---	---				---
High school x additional education	.10 (.09)	---	---	---				---
Associate's x additional education	.07 (.25)	---	---	---				---
Bachelor's x additional education	---	---	---	---				---
Model 5.								
Female	---	.12 (.03) ***	---	---				---
Female x additional education	---	.00 (.08)	---	---				---
Model 6.								
Black (White)	---	---	.06 (.04)	---				---
Hispanic/Other	---	---	-.01 (.07)	---				---
Black x additional education	---	---	-.09 (.10)	---				---
Hispanic x additional education	---	---	.05 (.11)	---				---
Model 7.								
No additional education (age 10–18)	---	---	---	-.35 (.08) ***				---
Additional education age 0–4	---	---	---	-.04 (.11)				---
Additional education age 5–9	---	---	---	.02 (.11)				---
Model 8.								
Highest degree high school/GED	---	---	---	---				.13 (.01) ***
Highest degree Associate's	---	---	---	---				.21 (.02) ***
Highest degree Bachelor's	---	---	---	---				.24 (.02) ***
Additional education x high school	---	---	---	---				-.14 (.16)

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B(SE)					
	Model 4	Model 5	Model 6	Model 7	Model 8
Additional education x Associate's	---	---	---	---	-.10 (.16)
Additional education x Bachelor's	---	---	---	---	-.10 (.16)

Notes: Models include full set of time-invariant and time-varying covariates, not shown.

*** $p < .001$,
** $p < .01$,
* $p < .05$.

Table 4

Fixed Effects Models Predicting Log Odds Youth Expects to Earn a Bachelor's degree

	B(SE)	
	Model 1	Model 2
Additional maternal education	.30 (.14) *	.78 (.23) *
Child age (continuous)	-.15 (.07) *	-.12 (.01) ***
Time-varying covariates		
Mother employed	.01 (.04)	.00 (.04)
Mother high prestige job	.02 (.05)	.03 (.05)
Family income ^a	4.30 (3.00)	4.42 (3.05)
Labor force attachment	-.02 (.30)	-.01 (.30)
Mother married	.04 (.06)	.04 (.05)
Number of children in home	.00 (.03)	-.00 (.03)
Wealth ^b	7.15(6.36)	7.55 (5.43)
Urban	.01 (.05)	.01 (.05)
Region		
South (Northeast)	-.04 (.14)	-.05 (.14)
West	-.05 (.16)	-.05 (.16)
Midwest	-.13 (.20)	-.12 (.20)
Interaction terms		
Additional education x age	---	-.03 (.02)

Notes:

^aExponentiated to the seventh degree.^bExponentiated to the eighth degree.***
 $p < .001$,**
 $p < .01$,*
 $p < .05$