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Early Childhood Behavior Problems and the Gender Gap in Educational Attainment in the United States

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Abstract

Why do men in the United States today complete less schooling than women? One reason may be gender differences in early self-regulation and pro-social behaviors. Scholars have found that boys' early behavioral disadvantage predicts their lower average academic achievement during elementary school. In this study, I examine longer-term effects: do these early behavioral differences predict boys' lower rates of high school graduation, college enrollment and graduation, and fewer years of schooling completed in adulthood? If so, through what pathways are they linked? I leverage a nationally representative sample of children born in the 1980s to women in their early-to-mid-20s and followed into adulthood. I use decomposition and path analytic tools to show that boys' higher average levels of behavior problems at age 4 to 5 years help explain the current gender gap in schooling by age 26 to 29, controlling for other observed early childhood factors. In addition, I find that early behavior problems predict outcomes more for boys than for girls. Early behavior problems matter for adult educational attainment because they tend to predict later behavior problems and lower achievement.

Keywords

Gender; Behavioral Skills/Behavior Problems; Educational Attainment; Life Course; Inequality

In the United States today, men face a gender gap in education: they are less likely than women to finish high school, enroll in college, and complete a four-year college degree (Aud et al. 2010). Men comprised 50 percent of students enrolled in 9th grade in 2014, but they received 48 percent of high school diplomas, comprised 43 percent of college enrollees, and were awarded 40 percent of bachelor's degrees (U.S. Census Bureau 2015). Today's gender gap in college completion emerges from a growing gender imbalance across educational transitions. The gender gap is relatively small at high school graduation; it grows larger among young adults who enroll in college conditional on completing high school, and it is largest among people who complete college conditional on enrolling. The relatively small gender gap in high school completion is due to a stagnation, or by some measures a decline, in men's rates of high school completion accompanied by a gain in women's rates of completion over the past half century (Heckman and LaFontaine 2010; Stark, Noel, and

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McFarland 2015). The larger gap in college completion is due to men's lower rates of college enrollment conditional on high school or GED completion and lower rates of college persistence (U.S. Census Bureau 2015).

One explanation for the current gender gap is that boys come to school with higher levels of behavioral problems than do girls, due to a combination of physiological, biological, and social differences (Belsky and Beaver 2011). Boys starting school, on average, experience greater difficulties self-regulating, paying attention, and demonstrating social competence. I refer to these difficulties as "learning-related behavior problems" or "externalizing problems" ("behavior problems" for short) (Blair and Diamond 2008). We know that gender differences in these early behaviors help account for the gender gap in 5th-grade math and reading achievement (DiPrete and Jennings 2012). Research has shed light on specific factors linking gender differences in behavioral problems to gender differences in education during elementary school, middle school, and high school (DiPrete and Buchmann 2013; Jacob 2002), but scholars have not yet extended this work to college completion. Life course scholars, in contrast, have developed models for how early behaviors are connected to later educational outcomes, including high school completion and college enrollment (Alexander, Entwisle, and Horsey 1997; Cunha, Heckman, and Schennach 2010; Duncan et al. 2007), but they have not examined how social processes may operate differently for men and women. In this study, I estimate to what degree, and through what pathways, higher levels of early childhood behavior problems may affect men's lower rates of high school and college completion in the United States. I address the following questions:

1. To what degree do gender-related differences in children's early behavior problems explain today's gender gap in overall years of schooling completed, high school completion, college enrollment, and college completion?
2. Through what pathways are men's early behavior problems linked to their lower educational attainment compared to women?
3. Are early behavior problems more or less consequential at high school completion, college enrollment, or college completion?

Applying a Life Course Perspective to the Gender Gap in College Completion in the United States

Scholars such as Duncan and colleagues (2007), Cunha and colleagues (2010), and Entwisle, Alexander, and Olson (2005) in the United States and Flouri (2006) in the United Kingdom have developed life course perspectives for understanding how early behaviors are connected to adult educational attainment. Much prior research focuses unidirectionally on the factors that shape children's development, but life course researchers show that children's individual characteristics are both shaped by, and themselves shape, the environments around them (Alexander et al. 1997). For example, important child development studies find that the inputs children receive from their environments shape their behaviors, learning, and skills (Carlson and Corcoran 2001). These environmental inputs, like parenting, shape learning directly, but they also indirectly influence children's early behaviors (Cooper et al.

2011). Children internalize the behavioral expectations they perceive from others, which, in turn, influences their behaviors and, subsequently, the rate at which they learn new skills.

Children's behaviors also reciprocally shape their environments (Sameroff 2009). Scholars have paid less attention to this feedback even though school and home contexts may mediate the relationship between children's early behaviors and their educational attainment. Parents may structure the home context to respond to children's early behavior, such as by providing developmentally appropriate books and toys, or setting strategic rules and disciplinary strategies (Cunha and Heckman 2007). Parents who respond to their children's behavior by adjusting opportunities for emotional and cognitive development in the home may be able to promote positive, or disrupt negative, behavior trajectories. At school, institutional responses to children's behavior problems may influence children's ability to succeed, shaping how predictive these early behaviors are of educational progress and, ultimately, attainment (Duncan and Magnuson 2011; Entwisle, Alexander, and Olson 2007). Schools that exercise punitive and exclusionary disciplinary practices, or where teachers are not well versed in their subjects or engaged in their students' lives, may not be well positioned to help children, especially boys, overcome educational challenges resulting from early behavior problems.

Early behavior problems may be more strongly linked to educational attainment for boys than for girls. Through families, schools, and peers, boys and girls learn distinct social norms for behavior (Thorne 1993). When these gendered behavioral norms are internalized as expectations, children and the adults around them police these behaviors and reinforce a process in which girls are expected to find school environments "more compatible" with their behaviors (Entwisle et al. 2007). Certainly, a larger share of boys than girls enter school with high levels of self-regulation and social problems and are less able to concentrate or seek out academic opportunities, leading to less learning and lower achievement. However, children's behaviors also influence subsequent learning through another channel: behavior serves as a signal to teachers and parents that either open or, in the case of many boys, close doorways to additional learning opportunities (DiPrete and Jennings 2012; Duncan et al. 2007). Many schools systematically enforce gendered behavioral norms: boys on average receive harsher exclusionary discipline than girls for the same behaviors (Skiba et al. 2014). Starting in preschool, more boys are retained, suspended, expelled, and retained (Entwisle et al. 2007; Farkas et al. 1990; Gilliam and Shahar 2006).

To help shed light on if and how boys' and girls' behaviors are differentially linked to their levels of adult educational attainment, I extend well-developed life course models to research on gender stratification in education (DiPrete and Eirich 2006). I begin by highlighting a number of the individual and contextual factors through which early childhood gender differences in externalizing problems may be linked to the gender gap in educational attainment.

Indirect Pathways Linking Gender Differences in Early Behaviors to Today's Gender Gap in Education

Figure 1 displays some of the indirect pathways through which boys' and girls' early behavior problems may be differentially linked to adult educational attainment. Individual-

level factors, including achievement, persistent behavior problems, academic effort, and grade retention, may both shape and be shaped by contextual factors such as home, school, and peer environments.

Test Scores

Test scores measure learning and achievement. Girls, on average, score roughly .15 standard deviations above boys on reading test scores from kindergarten through high school (DiPrete and Jennings 2012; Sameroff 2009). National Assessment of Educational Progress (NAEP) math scores suggest parity until age 17, but most work shows rough gender parity in math test scores only until 3rd grade (Rampey, Dion, and Donahue 2009). After 3rd grade, boys score, on average, .20 standard deviations above girls at least through 5th grade (DiPrete and Jennings 2012). High test scores are associated with home environments and parenting practices that support cognitive stimulation and emotional development, and negatively associated with behavior problems (Carlson and Corcoran 2001). Test scores are also key predictors of educational attainment (DiPrete and Buchmann 2013).

Home and Early-Care Environments

Researchers often use the emotional and cognitive development subscales of the Home Observation and Measurement of the Environment (HOME) scale to measure home and early-care environment. Boys and girls are generally raised in similar environments, but some scholars find that boys' behavioral and cognitive development is more negatively affected than girls' when they are exposed to HOME factors like limited or harsh discipline, lack of cognitive stimulation, father's absence, and family instability (Bertrand and Pan 2013; Cooper et al. 2011; DiPrete and Buchmann 2013). Because home/early-care environments and parenting practices are related to child behaviors and achievement, they may help explain why boys' early behavior problems are linked to lower achievement and, ultimately, attainment (Carlson and Corcoran 2001; Roscigno and Ainsworth-Darnell 1999; Sameroff 2009).

Schools and Peers

Similar to home environments, school environments differ in their instructional, curricular, and disciplinary responses to children's behaviors (Farkas et al. 1990; Skiba et al. 2014). Because learning in most schools is based on the ability to sit still for extended periods and learn passively, boys start school with more behavior problems and have more difficulty learning. Boys are also less likely to perceive schools as welcoming places, where classes are intellectually and socially rewarding (DiPrete and Buchmann 2013). Disciplinary practices thwart rather than enhance many boys' school commitment (Skiba et al. 2014). Boys are therefore more likely than girls to become involved with peer groups that emphasize "stereotypical adolescent masculine cultures" in which "nerdiness" is negatively sanctioned (Legewie and DiPrete 2012). Boys' behaviors and peer cultures are associated with low performance and exposure to harsh discipline and grade retention, which exacerbates poor behavior, low achievement, and low attainment (Dee, Jacob, and Schwartz 2013; Skiba et al. 2014).

Persistent Behavior Problems

The gender gap in self-regulation and social problems typically stays at a similar magnitude in childhood but grows during adolescence (Caspi et al. 1995; McLeod and Kaiser 2004). Examining self-regulation and social problems in early adolescence enables me to capture "persistent" behavior problems among a segment of children (Duncan and Magnuson 2011).

Academic Effort

I distinguish between behaviors that promote learning and achievement directly (e.g., hours studying) versus indirectly (e.g., self-regulation and social skills). On average, boys invest less academic effort than do girls (DiPrete and Buchmann 2013). If boys' early behavior problems lead to lower achievement and rejection of formal schooling, boys may also invest less academic effort. This may be especially true in home or peer environments that deemphasize academic values and attachment to high achievement, leading to lower attainment.

Grade Repetition/Retention

Persistent behavior problems, low effort, and low achievement all predict grade retention and dropping out of high school (Duncan and Murnane 2011). Boys are more likely than girls to have persistent behavior problems throughout childhood and adolescence (Duncan and Murnane 2011). Grade retention may therefore mediate the relationship between behavior problems and educational attainment.

Educational Expectations

Across cohorts of adolescents since the 1980s, girls have gradually come to set higher educational expectations than boys (Fortin, Oreopoulos, and Phipps 2013; Jacob and Linkow 2011). Although not likely causally related, educational expectations may mediate the link between behavior problems and educational attainment, because educational expectations are individuals' best predictions of their future outcomes (Morgan 2005).

At their best, schools and families would respond effectively to boys' early behaviors by making school and home contexts more conducive to boys' learning, therefore weakening the connection between behaviors that impede learning, engagement in school, and ultimately, educational attainment (see Duncan and Magnuson 2011). I find, however, that the *persistence dimension* of early behavior problems better predicts boys' lower educational attainment than do their school-entry skills alone. Boys' behaviors upon school entrance initiate cumulative cascades that shape educational attainment and ultimately help account for the gender gap in college completion in the United States.

Data and Measures

Data and Sample Restrictions

This study uses data from the Children of the National Longitudinal Survey of Youth (NLSY-C) and matched maternal records from the 1979 National Longitudinal Survey of Youth (NLSY79) (Baker 1993). The women in the NLSY79 were age 14 to 22 in 1979; they gave birth to roughly 11,000 NLSY-C children between 1979 and 2012. Between 1986 and

2012, the NLSY-C collected detailed developmental information biennially for children age 4 to 14 years. After excluding the poor white and military oversamples, the working sample includes the 2,663 children bom 1983 to 1986 (a supplementary analysis pools children born 1983 to 1993). Complete educational attainment at age 26 to 29 and behavior measures at age 4 to 5 are available for 1,857 children (69.7 percent of the original 2,663 children, reflecting 30.3 percent attrition between birth and 2012). Mothers were age 18 to 29 at child birth. They are younger and of lower socioeconomic status (SES) (e.g., having higher fertility and lower educational attainment at the birth of the focal child) than the national cross-section of mothers who gave birth in 1986. All analyses use inverse-probability weights to adjust for the initial oversampling of black and Hispanic children and sample attrition by the 2012 follow-up wave (weights are described at https://www.nlsinfo.org/weights/nlsy79). Once inverse-probability survey weights are applied, the working sample with complete attainment and behavior information drops from 1,857 to 1,661 children. Standard errors are clustered for siblings.

Measures

Educational attainment includes a continuous measure for years of schooling completed, and binary indicators for completing a GED, high school, and conditional college enrollment and four-year college completion as of age 26 (for children born in 1986) to 29 (for children born in 1983). Because 82 percent of college graduates complete their degree within six years of enrollment, and 92 percent do so within eight years, age 26 to 29 attainment captures the vast majority of eventual college graduates (National Center for Education Statistics [NCES] 2010).

The externalizing behavior problems scales sum two self-regulation problems and four social problems items (see Table 1) (Peterson and Zill 1986). The scale ranges from 0 to 12 (Cronbach's alpha = .70).[1] Due to biennial sampling, I use behavior assessments from age 4 or 5 and age 12 or 13. Items cover the self-centered/explosive, inattentive/overactive, and antisocial/aggressive subscales of "externalizing problems" in the Pre-Kindergarten Behavioral Skills-2nd Edition and Child Behavior Checklist (CBCL). Sensitivity analyses using standardized externalizing problems, all available CBCL items, and separate analyses of self-regulation problems and social problems subscales are discussed in the Online Appendix.

I include the following mediators. *Math and reading test scores* at age 6 to 7 and 12 to 13 come from the Peabody Individual Achievement Test Math and Reading Recognition percentile scores. *Negative school and peer context* at age 10 to 11 are summed student responses to four items (1 = not true at all, 2 = not too true, 3 = somewhat true, and 4 = very true): (1) child does not feel safe at school, (2) teachers do not know their subjects well, (3) child can get away with almost anything, and (4) most of child's classes are boring (Cronbach's alpha = .70). Peer context is the sum of student responses to six yes-or-no questions: "child feels pressure to," (1) try cigarettes, (2) try marijuana or drugs, (3) drink alcohol, (4) skip school, (5) commit crime, and (6) work hard in school (reverse-coded)

[1] I also conducted analyses using age-standardized early externalizing problems scores. They yielded similar patterns of results and are available upon request.

(Cronbach's alpha = .75). Results from factor analysis led to a single factor-loaded, standardized index.

Home context measures opportunities for emotional and cognitive development (two separate scales extracted directly from the NLSY-C public-use data, described in Caldwell and colleagues [1984]): spanking, child insecure attachment, parental conflict, and child interaction with the father (or father-figure). All factors except child insecure attachment (measured at age 0 to 1) are measured at age 3 to 5 and 10 to 11. Factor analysis led to a single factor-loaded, standardized index.

Academic effort at age 12 to 13 reflects a child's response to the question, "On average, how many hours per week do you spend on homework both in and out of school?" Grade retention at age 14 to 17 is an indicator for children's reports of whether they were held back a grade between age 14 and high school completion. I include sensitivity analyses individually and as a summed index of three binary items indicating if the child had ever (1) gotten (someone) pregnant, (2) been convicted of a crime, or (3) been retained a grade in school. Substantive findings did not change.

Educational expectations at age 14 to 15 are a factor-loaded standardized index of the mother's and child's educational expectations for the child. Mothers and children were separately asked, "How far do you expect [your child] to go in school?" Responses were: 1 (leave high school before graduation), 2 (graduate high school), 3 (get some college or training), 4 (graduate college), or 5 (surpass a bachelor's degree).

Early childhood factors include whether children attended daycare, nursery school, or pre-kindergarten at age 3 to 4; children's literacy/cognitive development at 3 to 4 years (i.e., Peabody Picture Vocabulary Test (PPVT) score); inflation-adjusted household income at age 4 to 5; and total number of children living with the focal child at age 4 to 5. PPVT is standardized within-age to adjust for the slight upward trend in scores by age relative to other same-aged children during test administration. Demographic controls include mother's education and age at birth, child's birth order, low birth-weight status, and race/ethnicity. Like the demographic controls, early childhood factors are potential confounders that influence both early behaviors and educational attainment. Unlike the demographic controls, they are measured alongside or immediately prior to early externalizing problems, because they influence the immediate context in which early behaviors occur.

Treatment of Missing Data

Many observations had missing data on multiple predictor variables between the mid-1980s and 2012. I used the Multiple Imputation procedure in Stata 14 to produce 20 imputed datasets (Royston 2004) (see Online Appendix). I included educational attainment (missing for the 30 percent of cases that attrited from the sample by 2012) in the imputation equation, but I dropped observations with imputed attainment prior to analysis.

Analytic Strategy

To address question one—how much of the gender gap in educational attainment is explained by gender differences in the levels or "effects"[2] of early externalizing problems relative to other observed factors—I use a two-stage Oaxaca-Blinder decomposition. For each observed factor, say, early externalizing problems, this decomposition parses the gender gap in average years of schooling completed into two components. The first component is associated with the gender difference in boys' versus girls' mean levels of externalizing problems, assuming that if boys and girls had the same level of externalizing problems, they would complete the same number of years of schooling, all other observed factors being equal. The second component of the decomposition identifies the gender gap in schooling associated with the gender difference in how the same mean level of externalizing problems predicts schooling. Whereas the first component assumes the gender gap in schooling results from boys' higher mean level of externalizing problems and the effect of early externalizing problems is the same across genders, the second component assumes the gender gap in schooling results from gender differences in the effects of each observed factor if boys and girls have the same levels of externalizing problems. In both, we assume we are comparing boys and girls with the same early childhood factors, controls, and (where indicated) mediating variables. This is shown in Equation 1:

$$Schooling_F - Schooling_M = \underbrace{(x'_F - x'_M)\beta_M}_{\text{Exposure/levels}} + \underbrace{\bar{x}'_M(\beta_M - \beta_M)}_{\text{Vulnerability/"effects"}} \quad (1)$$

where $(x'_F - x'_M)\beta_M$ is the contribution of gender differences in levels of exposure to the observed predictors, and $\bar{x}'_M(\beta_F - \beta_M)$ is the contribution of gender differences to their effects.[3]

Next, I examine question two: What mediators affect the path between early externalizing problems and years of schooling? Following Morgan and colleagues (2013) and Legewie and DiPrete (2014), I first carry out five decompositions that sequentially add the five sets of individual orientations and contextual factors shown in Figure 1 to the baseline decomposition. I assume a range of different underlying causal models for the ordering of mediators.

To identify the magnitudes of specific mediating factors by gender (rather than groups of factors, by stage), I estimate a multiple-group-path model that uses ordinary least squares (OLS) regressions to simultaneously estimate all paths shown in Figure 1. This path model is comprehensive and recursive. It assumes temporal ordering by constraining the arrows in Figure 1 to operate chronologically. However, because the prior analysis allowed me to identify the largest groups of mediators without assuming temporal ordering, I can now differentiate within these groups the specific first-, second-, and higher-order indirect

[2]The term "effects" should not be interpreted causally. In a decomposition framework, "effects" refer to differential susceptibility or vulnerability based on underlying associations estimated through (gender-)stratified OLS regressions.

[3]Three-stage decompositions indicated small, non-significant interaction terms for the contributions of both differences in exposures and effects.

pathways with the largest magnitudes. To investigate research question three—are the effects of early behavior problems more or less consequential at different educational transitions—I estimate separate conditional logit models by gender. In light of potential complications with comparing logit coefficients across groups (Karlson, Holm, and Breen 2012), I turn to predicted probabilities to compare gender differences across educational transitions.

Results

Descriptive Results

Table 2 displays weighted descriptive statistics. On average, men complete a statistically significant .70 fewer years of schooling than do women. Looking by educational transition, slightly more men complete GEDs. Men have statistically significantly lower rates of high school completion (6.5 percentage points) and college enrollment (11.1 percentage points). However, conditional on college enrollment, only 3.2 percentage points more women complete four-year college (a non-statistically significant difference). As expected, on average, boys score a statistically significant .63 points higher than girls on mother-rated externalizing problems at age 4 to 5 and .69 points higher at age 12 to 13.

Most gender differences in mediating factors relate to learning and school experience. Boys score significantly lower on elementary and middle school reading achievement (5.78 percentile points at age 6 to 7 and 4.91 percentile points at 12 to 13). But, boys score similarly on math at age 6 to 7 and significantly lead girls by 4.72 percentile points at age 12 to 13. In elementary school, compared to girls, boys on average report significantly greater exposure to negative school environments and peer pressure at age 10 to 11 but report similar hours per week studying at age 12 to 13. In high school, boys report significantly higher rates of grade retention/repetition (by 4.5 percentage points) and lower educational expectations. On average, boys and girls experience similar childhood home and early-care environments, and they develop similar early receptive vocabularies.

Decomposing the Gender Difference in Years of Schooling

Table 3 summarizes key results from a baseline decomposition of the mean gender difference in years of schooling completed by age 26 to 29 among children born in 1983 to 1986. This decomposition estimates how much of the total .75 years gender gap in schooling is associated with each of the observed early childhood factors and demographic controls shown in Table 2 (complete results are shown in Online Appendix Table A1.1). Columns 3 and 6 of Table 3 show that boys' higher mean level of early externalizing problems accounts for .107 years (14.2 percent) of the .754 years of the gap in years of schooling relative to the other observed early childhood factors and demographic controls. Column 7 shows that the stronger average association between early externalizing problems and schooling among boys compared to girls with the same early externalizing problems (shown in columns 4 and 5) accounts for .341 years (45.2 percent) of the .754 years gender gap in schooling. These gender differences in levels and coefficients of early externalizing problems together account for .448 years (59.4 percent) of the .75 years gender gap in schooling.

The contribution of gender differences in early externalizing problems to the gap in schooling may also be understood relative to the subset of observed early childhood factors and demographic controls that are *positively associated* with the gender gap in schooling (i.e., gap-widening). Factors are considered gap-widening either because of boys' higher average level of a given factor negatively associated with schooling (or lower level of a factor positively associated with schooling), or because a given level of the factor predicts a lower level of schooling among boys than among girls. Summing all early childhood and demographic controls positively associated with the gap in schooling (see column 8 of Online Appendix Table A1.1) yields a positive gender gap of 2.369 years. Note that this positive gap due to gap-widening factors is offset by a negative gender gap of 1.990 years, yielding the net gender gap of .754 years. The gender gap in early externalizing problems relative to observed gap-widening factors is .448 years, relative to 2.369 years, or 16.3 percent.

Note that this decomposition uses boys' means and coefficients as the reference. Because results are sensitive to choice of reference, analyses using girls are shown in Online Appendix Table A1.2. A comparison of results across reference groups indicates that the contribution of gender differences in levels and coefficients, or "effects," of early externalizing problems are smaller when using girls as the reference (42.6 percent of the net gap in schooling, or 10.6 percent of all positive, gap-widening early childhood and demographic factors). By contrast, the contribution of factors such as birth order increases when using girls' means and coefficients as the reference. This is because the mean level and the coefficient on early externalizing problems are smaller for girls than for boys, such that girls' proportion of the overall gap is smaller. The contribution of covariates where means and coefficients for girls are closer to those of boys (e.g., birth order) is less sensitive to choice of reference.

The decomposition using boys as the reference hypothetically assumes both boys and girls are exposed to boys' coefficients (and vice versa). Although each assumed counterfactual scenario offers different estimates of the precise contribution of early externalizing problems to the schooling gap, both tell a generally consistent story about the importance of early behavior problems. Neither counterfactual scenario should be assumed to precisely reflect reality.

Results are also sensitive to mother's age at birth. Because this sample disproportionately represents children born to younger mothers, many from low-SES backgrounds, I also conducted supplementary analyses of on-time high school completion and college enrollment by age 19 to 22. Results shown in Online Appendix Table A2.1 suggest early externalizing problems may not present such a formidable barrier to attainment among boys born to mothers from high-SES backgrounds. I return to this point in the discussion.

The Ordering of Mediators Linking the Gender Gap in Early Externalizing Problems to the Gender Gap in Attainment

The baseline decomposition described earlier contains only the early childhood variables and demographic controls measured temporally prior to or alongside externalizing problems

at age 4 to 5. However, life course scholars have proposed a range of plausible causal models for the ordering through which contextual factors, such as home and school/early-care environments, are associated with individuals' behavioral and cognitive development. Although the conceptual model of Figure 1 includes a number of reciprocal relationships at particular ages, the ordering of the sets of variables nonetheless implies a particular causal ordering by age. Orderings may also differ by gender. Table 4 thus summarizes results from 10 additional decompositions that present minimum and maximum estimates of the degree of mediation by each set of variables. These models provide estimates based on different assumed causal orderings of each set of variables.

The simplified baseline decomposition model in Table 4 contains only early externalizing and demographic controls. Additional results from this simplified baseline model (not shown) indicate the mean gender difference in level of early externalizing accounts for .126 years of the .750 years gender gap in schooling. The average difference in effects accounts for .203 years. I calculated the maximum mediation from each set of x's by adding the indicated group of x's to the simplified baseline model. This maximum mediation reflects the degree of attenuation of the .126 years' contribution due to mean differences or .203 years' contribution due to effects differences. For the minimum contributions, I subtracted the indicated x's from the full decomposition model that includes early externalizing problems and all mediators and controls shown in Table 2. So that differences in the contribution of levels or effects of early externalizing problems are comparable across columns, I rescaled the differences (from the full model, or the model with demographic controls) into percentages. I divided the absolute value of the difference by the relevant baseline contribution (.126 or .203).

Results suggest that, regardless of the assumed causal model, adolescent behavioral, achievement, and school factors are stronger mediators of the link between gender differences in early externalizing problems and the gap in attainment than are childhood achievement or school and home contexts. The maximum mediation by the latter group (roughly 25 percent due to the mean gender difference in reading achievement) is roughly on par with the minimum contribution of the adolescent factors. This finding aligns with prior work that suggests behavioral and achievement factors proximate to educational attainment exert a stronger influence than do similar factors from earlier developmental stages (see McLeod and Kaiser 2004). Nonetheless, early development is critical due to path dependencies resulting from the cumulative nature of development. The salience of adolescent behavioral development and achievement for predicting later attainment is also consistent with an underlying causal model in which the early childhood home/care context and cognitive factors predict early externalizing problems (rather than serving as key mediators). The maximum extent of mediation by these early childhood factors (10 to 28 percent due to their contribution to effects) is also on par with the minimum of the factors with which they are correlated at age 12 to 13 and 14 to 17 (26 to 43 percent).

Indirect Mechanisms of the Association between Early Childhood Externalizing Problems and Today's Gender Gap in Attainment

Without imposing assumptions of temporal order, the decompositions summarized above reveal that the broad sets of adolescent behavioral and schooling factors are the largest mediators of the association between the gender gap in early externalizing problems and the gap in schooling. Roughly one- to two-thirds of the contribution of early externalizing problems to the schooling gap operates through the larger negative association between these adolescent factors and boys' schooling. Because mediating pathways may involve correlated second- and higher-order indirect paths, I use path analysis to estimate their magnitudes. Figure 2 summarizes the contribution of specific, observed indirect pathways through which boys' early externalizing problems are associated with their lower schooling, compared to girls (complete model results are shown in Online Appendix Table A1.3).

The height of the bar in Figure 2 is taller for boys because the estimated association between early externalizing problems and schooling is larger for boys than for girls (the absolute value of the indirect path is −.129 years for boys versus −.101 years for girls). The indirect paths appear smaller in magnitude for boys and larger for girls than the net effects controlling for early childhood and demographic factors in Table 3. This is because the estimated association between early externalizing problems and schooling that remains after controlling for all mediators becomes positive for girls (roughly .063 years) but remains negative for boys (roughly −.040 years). Only pathways greater than .001 SD in magnitude are included. Smaller pathways are subsumed within *other indirect paths.*

For boys and girls, the *persistence* of early externalizing problems into adolescence accounts for the largest share of the association between early externalizing problems and completed schooling as adults. Behavioral persistence accounts for roughly 65 percent (or .065 years) of the relatively small overall association among girls and 40 percent (or .052 years) of the association among boys. When considering second-order indirect paths with grade repetition and educational expectations, the share attributed to behavioral persistence increases to nearly 80 percent (.079 years) among girls and 49 percent (.064 years) among boys. This finding is consistent with prior research (see Duncan and Magnuson 2011). For girls, the remaining 20 percent (.022 years) is associated with reading or math (6 percent each, .006 years) and peers and effort (4 percent each, .004 years). For boys, the remaining 51 percent is associated with math (21 percent, .027 years), reading (14 percent, .018 years), grade repetition (9 percent, .012 years), and schools/peers (3 percent, .004 years).

For which Transitions are Early Behavior Problems Most Influential?

To address question three—at which educational transitions do early behavior problems matter most—Table 5 presents coefficients from conditional logit regressions of the relationships between early externalizing problems and GED completion, high school completion, conditional college enrollment, and conditional four-year college completion by age 26 to 29. Models control for early childhood and demographic factors. Results indicate that early externalizing problems scores are not statistically significantly associated with GED completion for either men or women. But, early externalizing problems are statistically

significantly associated with men's (but not women's) lower odds of high school completion, college enrollment conditional on high school or GED completion, and four-year college completion conditional on enrollment. Among men, the magnitude of the association between early externalizing problems and college completion is larger than that between early externalizing problems and college enrollment. This early externalizing problems-college completion relationship among men is of similar magnitude as the association between early externalizing problems and high school completion, even though a much wider cross-section of men are in the high school than the college going pool.

In light of potential complications with comparing logit coefficients across gender and educational transitions (Karlson et al. 2012), I turn to predicted probabilities for each conditional educational transition shown in Figure 3 to help depict the magnitudes of these nonlinear associations (covariate values are set to group means). When comparing counterfactual men with average covariate values, an early externalizing problems score of 0 is associated with a 5 percent probability of dropping out of high school (without a GED) by age 26 to 29. A score of 12 (the highest score) is associated with a 33 percent probability of dropping out. By contrast, for average counterfactual women, probabilities of dropping out range from only 4 percent (at a score of 0) to 2 percent (a score of 12). Although predicted probabilities of at most GED completion are similar across genders (ranging from 5 to 20 percent at behavior scores of 0 to 12, respectively), for each transition from high school to college completion (conditional on the former), predicted probabilities are consequentially associated with early behavior problems for the average boy, but much less so for the average girl. Comparing counterfactual boys with average covariate values, the lowest versus highest early externalizing problems scores are associated with 86 versus 50 percent predicted probabilities of high school completion and 78 versus 43 percent predicted probabilities of conditional college enrollment. For average girls, the range is only 89 to 83 percent for high school completion and 83 to 87 percent for college enrollment. Even for college completion conditional on enrollment, predicted probabilities for the average counterfactual boy range from 32 to 5 percent, depending on low versus high early externalizing problems. The range is again much smaller for the average girl, from 27 to 17 percent. These results indicate that early behavior problems remain consequential for transitions from high school to college completion for the average boy. In spite of increased selection levels in the pool of college-goers, early externalizing problems remain strong predictors of college completion even among the highly-selected subset of boys who persist through college enrollment.

Discussion

I used a life course perspective to examine how gender differences in children's behavioral development help account for today's gender gap in college completion. Building on well-developed life course models of the pathways between early behavioral development and educational attainment, I leveraged data following children from birth to age 29 to investigate how gendered paths between early behaviors and college completion are shaped by developmental trajectories of behavior and learning. I also expanded on studies of gender stratification in education to examine how these trajectories interact with intervening school, peer, and family factors throughout childhood and adolescence.

Men's educational attainment predicts their long-term health and well-being (Montez et al. 2009), and their well-being, in turn, affects that of their children and families (Hout 2012). Because this sample disproportionately represents children born to younger mothers, many from low-SES backgrounds, findings generalize to the gender gap in attainment among children born to young mothers. Understanding the dynamics that produce the gender gap among this segment of the U.S. population is particularly important, because it is here that the gender gap in attainment is largest. These findings carry implications for family and child well-being among people from low-SES backgrounds, but also for intergenerational social inequality more broadly (Hout 2012). Among higher-SES segments, these findings serve as upper-bound estimates of the relationships between early behavior problems and educational attainment.

My findings offer broad policy-relevant insights. Early childhood education programs that target behavioral and cognitive development have gained deserved attention (Cunha and Heckman 2007; Schweinhart et al. 2005). On the one hand, this study's findings may be taken to support unqualified investments in early education programs, which seek to alter boys' (and a minority of girls') early behavior problems. Generalizing to a nationally representative sample of children born in the 1980s to mothers in their early-to- mid-20s, findings indicate that gender differences in early behavior problems account for 10 to 16 percent of the total contribution of all observed early childhood factors that predict the gap in schooling. Of observed early childhood factors, the contribution of the gender difference in early self-regulation problems and social problems to the gap in schooling is second only to the less protective effects of mothers' schooling on boys' attainment. The contribution of early behavior problems is on par with that of birth order—being a later-born son is associated with fewer years of schooling than being a later-born daughter. Early behavioral problems persist throughout elementary school and into middle school for 50 percent of boys in this sample, predicting their lower attainment.

On the other hand, boys' behaviors have a larger negative effect on achievement compared to the same behaviors in girls.[4] The same behaviors are more likely to lead to retention for boys than for girls. This is partly why boys' behaviors are more strongly linked to their completed schooling than are girls'. Of the 10 to 16 percent of the gender gap in years of schooling attributed to gender differences in early behaviors relative to other early factors positively associated with the gap, 76 percent is due to gender differences in how early behavior problems are treated in schools (e.g., through grade retention) or affect boys' ability to learn (based on test scores). These factors are then linked to lower attainment (i.e., the effects of early behavior problems are greater for boys' attainment than for girls' attainment). Only 24 percent of this 10 to 16 percent contribution is due to differences in initial levels of early externalizing problems. This finding is consistent with research suggesting that teachers are more likely to believe boys are harder to control than girls and more frequently exhibit dangerous behaviors (Ferguson 2001; Skiba et al. 2014). Implicit

[4]This may be in part due to greater variance in boys' behaviors than girls', such that the difference is driven by outlier boys with greater behavior problems. However, supplemental analyses indicate a relatively linear relationship between early behaviors and elementary school achievement, similar to that found by Duncan and colleagues (2007). This implies that nonlinear effects do not drive the result.

stereotypes may lead to increased grade retention and disproportionately harsh discipline, such as school suspension or expulsion, which in turn, are associated with lowered achievement and, ultimately, attainment (Bertrand and Pan 2013; Skiba et al. 2014).

Boys' learning also may be more sensitive to a given level of behavior problems. Even when the institutional response to behaviors is consistent across genders, boys' behaviors may be associated with a larger cognitive load that further impedes learning. Some research suggests that genetic plasticity may lead to increased susceptibility to environmental factors in boys' development of self-regulation (Belsky and Beaver 2011; Belsky, Hsieh, and Crnic 1998; Moffitt et al. 2002). Boys' learning may thus be more sensitive than girls' to particular treatments (Autor, Figlio, Karbownik et al. 2016; Bertrand and Pan 2013).

My findings are broadly consistent with the notion that many school environments are not conducive to boys' success. However, findings also suggest an opening to serve male students: the educational fates of boys with early behavior problems are not fully sealed by age 4 or 5. Early behaviors persist throughout elementary school and into middle school, predicting years of schooling for 78 percent of girls but only 49 percent of boys in this sample. That behavioral trajectories shifted for 51 percent of boys suggests that supportive contexts may help boys with early behavior problems. For the roughly 50 percent of boys in my sample for whom lower reading and math test scores and grade retention are associated with early behaviors, schools could create environments more conducive to their success (Moffitt et al. 2002; Sameroff 2009).

In line with this view, I show that high school completion, college enrollment, and (perhaps most so) barriers once enrolled consistently present formidable bottlenecks on boys' path to college completion. This points to the need for schools and families to help boys who want to complete college learn strategies to successfully navigate key educational transitions that currently thwart college completion. Doing so will likely require changes to social policies, classroom environments, and teacher training programs. Shifts in the structure of learning and pedagogy are probably also essential. Neither boys' perceptions of school or peer environments, nor parent reports of home context, significantly mediate the relationship between early behaviors and adult attainment, but these factors may still independently predict educational attainment. Future work should investigate this possibility.

This study has a number of limitations. Most broadly, the findings are subject to omitted-variables bias due to the possibility of unobserved factors correlated with both early behavior problems and later educational attainment outcomes. Although I control for baseline family and child characteristics and consider likely academic, behavioral, and contextual mediating pathways, possible omitted factors may remain, such as poor executive functioning, child-teacher relationships, school tracking and curriculum, and schools' treatment of child behavior problems.

Estimates from this study may also be subject to bias due to measurement error, especially related to externalizing problems. Mothers' gendered behavioral expectations for girls compared to boys might influence their rating of their children's early externalizing problems. If mothers rate girls worse for comparable behavioral infractions because of a

priori expectations that girls do not misbehave, this may explain why I observe a lack of (or weaker) association between girls' early externalizing problems and their schooling outcomes. Future work should investigate this possibility. Many mothers in this sample are from low-SES backgrounds, so future analyses should also examine gendered behavior-attainment relationships among a more representative cross-section of mothers.

Finally, because of the study's single cohort design, my findings become less representative and generalizable over time due to shifting social, institutional, and labor market arrangements. The children in my sample are among the first cohorts to be born amid gender parity in college completion and to come of age with a growing female attainment advantage (DiPrete and Buchmann 2006). The female-favoring gender gap in college completion has grown since the early 1980s (DiPrete and Buchmann 2006). Because this study analyzed a single cohort of children born in the 1980s, one might ask how a relatively stable gender gap in children's behavior problems across birth cohorts aligns with this growing gender gap in college completion. I speculate that even if the magnitude of girls' behavioral advantage has remained constant, the context surrounding those behaviors has changed, such that behaviors may increasingly predict educational attainment.

Since the 1980s, overt forms of gender discrimination have continued to decline. The skilled labor market has become more open to women (Jacob 2002), and the low-skill labor market for female-typed jobs has shrunk (Goldin, Katz, and Kuziemko 2006). This post-1970s period may have created labor market incentives for women's education (Goldin et al. 2006). Particularly within low-SES families, parents' gender egalitarian ideologies have risen (gender egalitarianism has consistently been higher in higher-SES families). These ideological shifts are linked to equal educational and economic investments in sons' and daughters' educations, and they may have provided the "push factors" through which girls' behavioral advantage now more strongly predicts higher educational attainment (DiPrete and Buchmann 2006).

At the same time these social shifts have benefited girls, other shifts have potentially stymied boys. Rising rates of father-absent households, concentrated in low-SES communities, may impede boys' attainment. Father-absence may thwart fathers' ability to interrupt the pathway between behavior problems and low educational attainment (Buchmann and DiPrete 2006). If boys' behaviors more strongly predict lower educational attainment for men today, and gender egalitarian ideologies increasingly lead girls toward higher attainment, even a stable gender gap in early behaviors may help account for a growing gender gap in educational attainment.

Nevertheless, women continue to encounter persistent labor market barriers. Women's early behaviors might not translate into similar gains in the labor market as in some areas in education (Ridgeway 2011). Future analyses should therefore consider two-year degree completion, field of study, and educational quality (Hout 2012; Penner and Paret 2008), as well as outcomes like wages/earnings, employment stability, and occupational advancement (Heckman, Stixrud, and Urzua 2006; Penner 2008). The behaviors analyzed here are only a subset of those implicated for educational attainment; future work may identify additional consequential behaviors. Finally, with many policies affecting children and youth

administered at the state level (Chetty et al. 2014; Figlio, Kolpin, and Reid 1999), future work should examine how state political climates and policy regimes differentially shape boys' and girls' behavioral patterns, the relationship between early behavior problems and adult educational attainment by gender, and intervening pathways.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Biography

Jayanti Owens is an Assistant Professor of Sociology and International and Public Affairs at Brown University. She investigates the social and psychological processes that lead to gender and racial/ethnic inequality in education and labor markets. Ongoing projects examine how, on the one hand, differential perceptions of and institutional responses to behaviors create educational disadvantages for minority boys and predict high levels of educational attainment for girls, but, on the other hand, do not garner the same rewards for women in many labor market contexts. She received her Ph.D. in Sociology and Demography from Princeton University and has worked at a number of research and policy evaluation organizations.

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Research Ethics Statement

This study has been approved by the Institutional Review Board of the author's university. This study conforms with the ethical standards of the 1964 Declaration of Helsinki and its subsequent amendments and Section 12 (Informed Consent) of the ASA's Code of Ethics. All human subjects gave their informed consent prior to their participation in the NLSY data collection and adequate steps were taken in this study to protect participants' confidentiality.

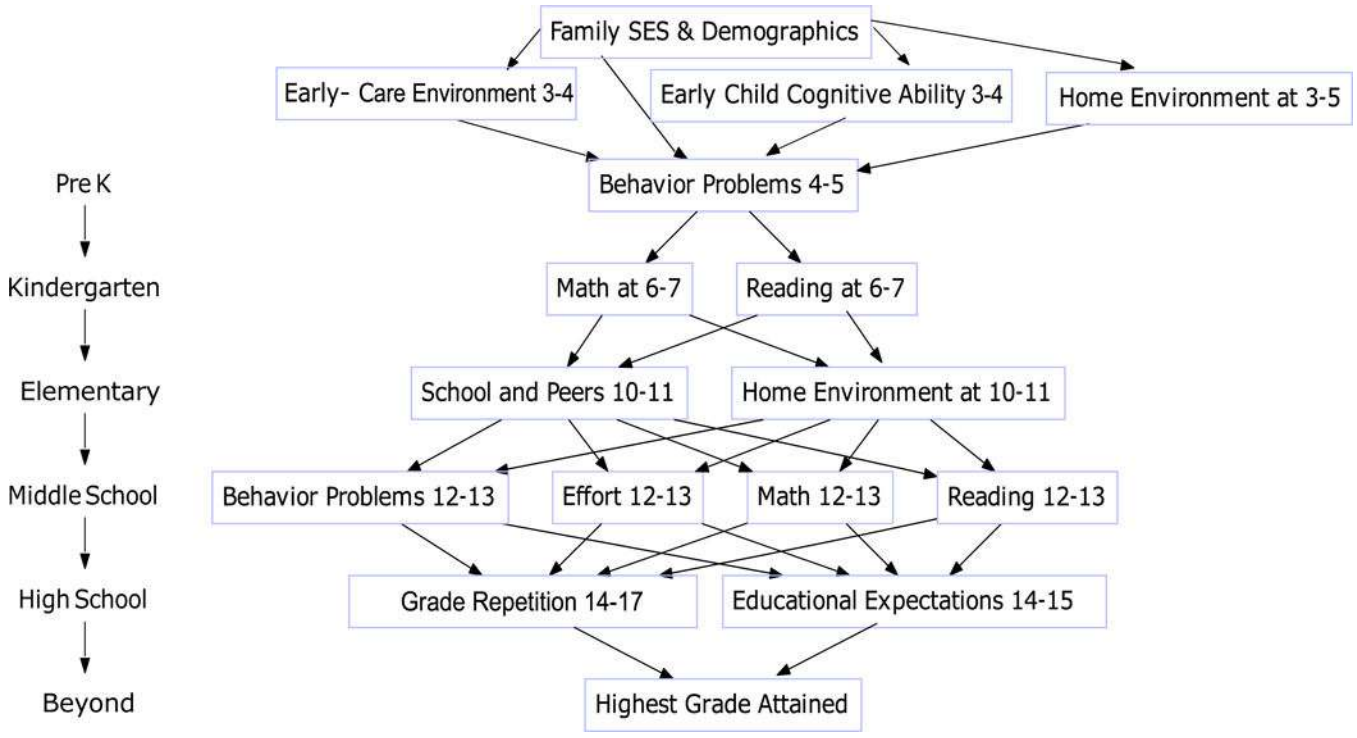

Figure 1.

Conceptual Model of the Pathways Between Childhood Externalizing Problems and Educational Attainment

Note: Paths are comprehensive and recursive. For simplicity, only consecutive paths (e.g., behavior problems at 4 to 5 to math and reading at 6 to 7) are shown. However, all direct and indirect recursive paths are estimated (e.g., the direct paths between early behavior problems and years of schooling, or between early and late behavior problems, as well as all forward-moving indirect paths between early behaviors and years of schooling).

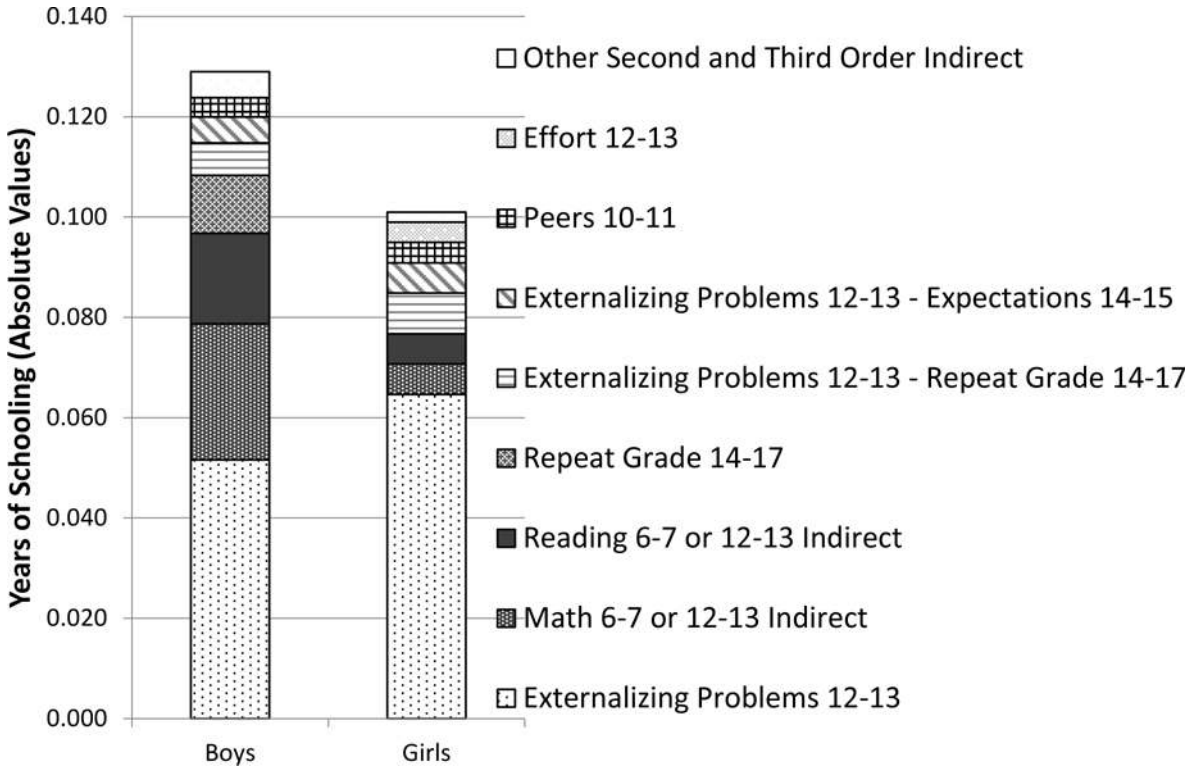

Figure 2.

Mediators of the Indirect Path between Early Externalizing Problems and Years of Schooling (i.e., Mediators of the Indirect Effect of Early Externalizing Problems on Schooling), by Gender ($N_{Females}$ = 881, N_{Males} = 780)

Note: Only pathways greater than .001 SD in magnitude are displayed; other pathways are subsumed within "other indirect paths." The term "indirect effect" in the title reflects statistical usage of the term: the components of each stacked bar chart encompass all mediating paths (those not captured through the single coefficient linking early externalizing problems and educational attainment).

Source: The 1983 to 1986 birth cohorts of the Children of the National Longitudinal Survey of Youth:1979 (NLSY-C) and matched National Longitudinal Survey of Youth:1979 (mother sample). The low-income white and military oversamples are excluded. The National Longitudinal Survey of Youth-Child Supplement (NLSY-C) consists of a nationally representative sample of children born to women age 14 to 21 in 1979; after excluding the poor white and military oversamples, the working sample in this study is restricted to the 1,857 children born 1983 to 1986, whose mothers were therefore 18 to 29 years at birth. Children born 1983 to 1986 were born early enough to be age 26 to 29 as of the 2012 followup survey, but late enough to have early behavior problems information measured at age 4 to 5 beginning in 1986, at which point these items were introduced for children age 4 to 16. I used multiple imputation of 20 datasets to handle item-missingness. Model estimates use inverse-probability weighting to deal with stratified sample design (minority oversampling) and sample attrition by the 2012 follow-up wave (weights are described at: https://www.nlsinfo.org/weights/nlsy79). Once inverse-probability survey weights are

applied, the working sample with complete attainment and behavior information drops from 1,857 to 1,661 children (881 girls, 780 boys).

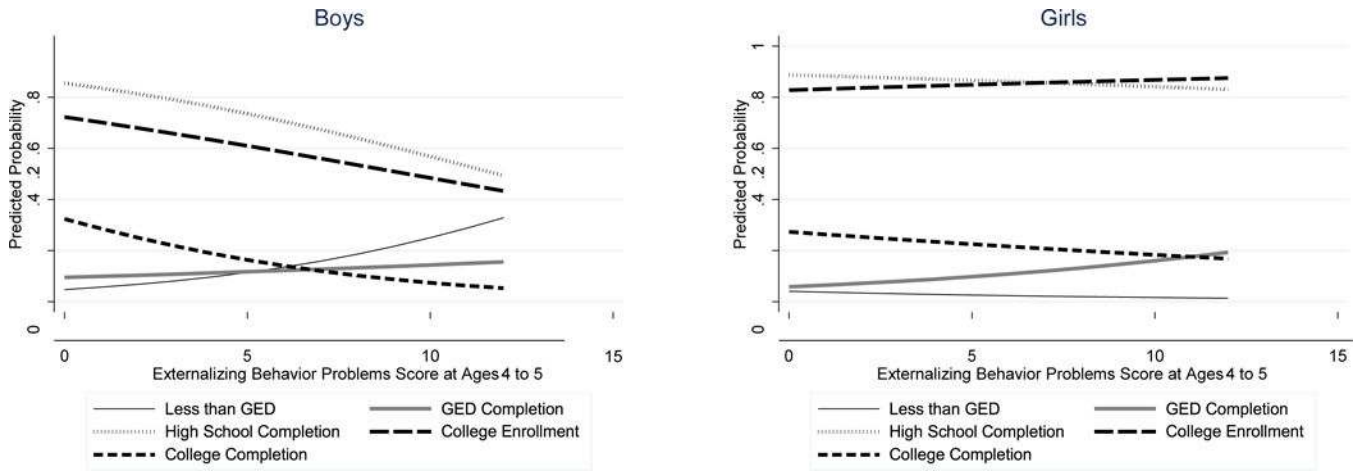

Figure 3.

Predicted Probabilities of GED Completion, High School Completion, Conditional College Enrollment, and Conditional Four-Year College Completion as a Function of Early Childhood Externalizing Problems, Net of Early Childhood and Demographic Controls, by Gender

Probabilities are depicted based on group average covariate values for all early childhood and demographic predictors. No mediators are included in these models. For less than GED, GED, and high school completion models, $N_{Females} = 881$ and $N_{Males} = 780$. For college enrollment conditional on high school or GED completion, $N_{Females} = 805$ and $N_{Males} = 692$. For college completion conditional on college enrollment, $N_{Females} = 654$ and $N_{Males} = 453$.

Source: The 1983 to 1986 birth cohorts of the Children of the National Longitudinal Survey of Youth:1979 (NLSY-C) and matched National Longitudinal Survey of Youth:1979 (mother sample). The low-income white and military oversamples are excluded.

Note: The National Longitudinal Survey of Youth-Child Supplement (NLSY-C) consists of a nationally representative sample of children born to women age 14 to 21 in 1979; after excluding the poor white and military oversamples, the working sample in this study is restricted to the 1,857 children born 1983 to 1986, whose mothers were therefore 18 to 29 years at birth. Children born 1983 to 1986 were born early enough to be age 26 to 29 as of the 2012 follow-up survey, but late enough to have early behavior problems information measured at age 4 to 5 beginning in 1986, at which point these items were introduced for children age 4 to 16. I used multiple imputation of 20 datasets to handle item-missingness. Model estimates use inverse-probability weighting to deal with stratified sample design (minority oversampling) and sample attrition by the 2012 follow-up wave (weights are described at: https://www.nlsinfo.org/weights/nlsy79). Once inverse-probability survey weights are applied, the working sample with complete attainment and behavior information drops from 1,857 to 1,661 children (881 girls, 780 boys).

Table 1

Items in the Externalizing Problems Scale (Composed of the Self-Regulation Problems and Social Problems Subscales)

SELF-REGULATION PROBLEMS:
I) Attention Problems
-He/She is impulsive, or acts without thinking. -He/She is restless or overly active, cannot sit still.
II) Concentration Problems*
-He/She has difficulty concentrating, cannot pay attention for long.*
SOCIAL PROBLEMS:
I) Antisocial/Aggressive
-He/She has trouble getting along with other children. -He/She breaks things on purpose or deliberately destroys his/her own or another's things. -He/She is not liked by other children.
II) Self-Centered/Explosive
-He/She has a very strong temper and loses it easily.
Cronbach's Alpha (full scale): .70

Note: Items were measured at age 4 to 5 and 12 to 13 and are based on mother's reports of "which phrase best describes your child's behavior over the last three months" on a scale of 1 ("often true"), 2 ("sometimes true"), or 3 ("not true"). I reverse-coded and linearly rescaled items to range from 0 to 2. The externalizing problems scale is a summed index of the subset of the six externalizing problems items that overlap across the Child Behavior Checklist's (CBCL) Behavior Problems Index (BPI) (Peterson and Zill 1986) and the PreKindergarten Behavioral Skills Scale, 2nd Edition (PKBS-2). These items produce a more valid index of externalizing problems than that used in the BPI alone (Guttmanova et al. 2007).

*Concentration is excluded from the externalizing problems scale to preserve comparability with other commonly used externalizing scales. Concentration is included in supplementary analyses of self-regulation problems alone, because it is central to most psychobiologists' notion of self-regulation (Blair and Diamond 2008).

Source: Items were collected through the Children of the National Longitudinal Survey of Youth:1979 (NLSY-C; https://www.nlsinfo.org/content/cohorts/nlsy79-children).

Table 2

Means and Standard Deviations (or Proportions) and Significant Differences, by Gender, for All Variables in the Analysis of the 1983 to 1986 Birth Cohorts of the Children of the NLSY:79

Variable	Girls	Boys	Difference	Sig.	*t*-Statistic
Educational Attainment (by Aaes 26 (1986 cohort) – 29 (1983 cohort))					
Highest Grade Completed	13.645 (2.619)	12.945 (2.604)	0.700	***	4.39
GED Certification Completion	0.092	0.111	–0.019		1.06
High School Completion	0.849	0.784	0.065	***	2.89
College Enrollment[a]	0.807	0.696	0.111	***	4.16
College Completion[b]	0.380	0.348	0.032	***	0.89
Pre-Kinderaarten (Ages 4–5)					
Externalizing Problems	1.971 (1.803)	2.603 (2.091)	–0.632		–5.55
Early Childhood					
Home Environment, Ages 3–5	–0.055 (0.438)	–0.031 (0.432)	–0.024		–1.01
Child Cared for Outside of Home (Daycare, Nursery, Pre-K), Ages 3–4	0.542	0.521	0.021		0.71
Number of Children in Family at Child Ages 4–5	2.218 (1.038)	2.255 (1.056)	–0.037		0.62
Adjusted Income (2011 dollars, in $10,000s), Ages 4–5	7.288 (16.905)	6.028 (9.510)	1.260		1.36
Child Standard Score on Peabody Picture and Vocabulary Test, Ages 3–4	0.247 (1.017)	0.185 (1.022)	0.062		1.02
Kinderaarten (Aaes 6–7)					
Reading Comprehension Percentile Score	58.628 (23.613)	52.925 (24.892)	5.703	***	4.01
Math Percentile Score	52.358 (23.613)	52.582 (24.892)	–0.224		–0.16
Elementary School (Ages 10–11)					
Negative Peer/School Context (Factor-loaded, standardized score combining Negative School Environment & Pressure from Peers)	–0.028 (0.147)	–0.018 (0.168)	–0.010	**	–0.98
Home Cognitive and Emotional Support (“Home Environment”) (Factor-loaded, standardized score)	0.096 (0.543)	0.058 (0.579)	0.038		1.20
Middle School (Ages 12–13)					

Variable	Girls	Boys	Difference	Sig.	*t*-Statistic
Externalizing Behaviors	1.717 (1.850)	2.407 (2.234)	−0.690	***	−5.78
Reading Comprehension Percentile Score	59.555 (27.458)	54.642 (30.134)	4.913	**	2.90
Math Percentile Score	51.459 (26.338)	56.183 (26.829)	−4.724	**	−3.01
Number of Hours/Week Studying In and Out of School	20.816 (44.944)	22.858 (48.136)	−2.042		0.73
Hiah School (Aaes 14–17 and 14–15)					
Repeat/Retained a Grade in School	0.072	0.117	−0.045	**	−2.69
Educational Expectations (Factor-loaded, standardized score)	0.186 (0.994)	0.043 (0.975)	0.143	*	2.44
Demoaraphic Controls					
Mom Years of Schooling, Ages 0–1	12.139 (1.985)	12.088 (1.987)	0.051		0.44
Father Absent at Child's Birth	0.193	0.179	0.014		0.65
Birth Order	1.784 (0.914)	1.791 (0.901)	−0.007		−0.14
African-American	0.179	0.154	0.025		1.62
Hispanic	0.075	0.081	−0.006		−0.69
Mother's Age at Child's Birth	23.820 (2.643)	23.865 (2.500)	−0.045		−0.29
Low Birthweight (LBW)	0.068	0.050	0.018		1.33
N	881	780			

Displaying means with standard deviations for continuous variables in parentheses.

*** p<0.001,

** p<0.01,

* p<0.05,

+ p<0.10 (two-tailed t-tests).

[a] College enrollment is conditional on high school or GED completion. N_{women} =805; N_{men} =692.

[b] College completion is conditional on both high school or GED completion and college enrollment. N_{women} =654; N_{men} =453.

Source: The 1983–1986 birth cohorts of the Children of the National Longitudinal Survey of Youth:1979 (NLSY-C; https://www.nlsinfo.org/content/cohorts/nlsy79-children), excluding the low-income white and military oversamples.

Note: The National Longitudinal Survey of Youth-Child Supplement (NLSY-C) consists of a nationally representative sample of children born to women age 14 to 21 in 1979; after excluding the poor white and military oversamples, the working sample in this study is restricted to the 1,857 children born 1983 to 1986, whose mothers were therefore 18 to 29 years at birth. Children born 1983 to 1986 were born early enough to be age 26 to 29 as of the 2012 follow-up survey, but late enough to have early behavior problems information measured at ages 4 to 5 beginning in 1986, at which point these items were introduced for children ages 4 to 16. I used multiple imputation of 20 datasets to handle item-missingness. Model estimates use inverse-probability weighting to deal with stratified sample design (minority oversampling) and sample attrition by the 2012 follow-up wave (weights are described at: https://www.nlsinfo.org/weights/nlsy79). Once inverse-probability survey weights are applied, the working sample with complete attainment and behavior information drops from 1,857 to 1,661 children (881 girls, 780 boys).

Table 3

Contribution of Gender Differences in Levels and Effects of Early Externalizing Problems to the Gender Gap in Years of Schooling Completed for NLSY-C Children Born 1983 to 1986, Based on a Two-Way Decomposition Model Including Early Externalizing Problems, Early Childhood Factors, and Demographic Controls (Reference Group: Boys)[a]

	Means		Diff. in Means	OLS Regression Coefficients				Contribution of Diff. in Levels	Contribution of Diff. in Coefficients	Total Contribution of Levels & Coefficients	Prop. of Positive Effects on Gap	Prop. of Negative Effects on Gap
	(1)	(2)	(3)	(4)		(5)		(6)	(7)	(8)	(9)	(10)
	F	M	F-M	F	Sig	M	Sig					
Externalizing Problems, Ages 4–5	1.971	2.603	−0.632	−0.038		−0.169	***	0.107	0.341	0.448	0.163	0.000
Observations (N)	881	780		881		780						
Overall Contribution of Early Externalizing Problems, Early Childhood Factors, and Controls to the Gender Gap in Years of Schooling Units:								0.152	0.601	0.754	1.000	1.000
Overall Contribution to the Gender Gap as a Proportion of Gap Driven by Levels vs. Effects:								0.202	0.798	1.000		

*** p<0.001,

** p<0.01,

* p<0.05,

+ p<0.10 (two-tailed *t*-tests for a statistically significant difference from 0). In addition to early externalizing problems, both decompositions include all the early childhood and demographic control variables shown in Table 2. Complete decomposition results are shown in the Appendix.

[a] These models use boys' coefficients as the reference when calculating each variable's contribution to the gap in schooling due to gender differences in mean levels and boys' means as the reference when calculating each variable's contribution due to gender differences in coefficients (i.e., effects).

Source: The 1983 to 1986 birth cohorts of the Children of the National Longitudinal Survey of Youth:1979 (NLSY-C; https://www.nlsinfo.org/content/cohorts/nlsy79-children) and matched National Longitudinal Survey of Youth:1979 (mother sample). The low-income white and military oversamples are excluded.

Note: The National Longitudinal Survey of Youth-Child Supplement (NLSY-C) consists of a nationally representative sample of children born to women ages 14 to 21 in 1979; after excluding the poor white and military oversamples, the working sample in this study is restricted to the 1,857 children born 1983 to 1986, whose mothers were therefore 18 to 29 years at birth. Children born 1983 to 1986 were born early enough to be age 26 to 29 as of the 2012 follow-up survey, but late enough to have early behavior problems information measured at ages 4 to 5 beginning in 1986, at which point these items were introduced for children ages 4 to 16. I used multiple imputation of 20 datasets to handle item-missingness. Model estimates use inverse-probability weighting to deal with stratified sample design (minority oversampling) and sample attrition by the 2012 follow-up wave (weights are described at: https://www.nlsinfo.org/weights/nlsy79). Once inverse-probability survey weights areapplied, the working sample with complete attainment and behavior information drops from 1,857 to 1,661 children (881 girls, 780 boys).

Table 4

Relative Predictive Power of Mediating Factors in Reducing Contribution of Gender Gap in Early Externalizing Problems to the Gender Gap in Years of Schooling for NLSY-C Children Born 1983 to 1986 to Mothers Age 18 to 29 Years at Birth (Reference Group: Boys) (N = 1,661)

	Percentage change in contribution of early externalizing problems to gender gap in years of schooling due to:			
	Gender Differences in *Levels* of Early Externalizing Problems		**Gender Differences in *"Effects"* of Early Externalizing Problems**	
x's:	**Minimum (x's in col. 1 subtracted from "full model" with all mediators) (%)**	**Maximum (x's in col. 1 added to "simplified baseline model" with demographic controls) (%)**	**Minimum (x's in col. 1 subtracted from "full model" with all mediators) (%)**	**Maximum (x's in col. 1 added to "simplified baseline model" with demographic controls) (%)**
Early Home and Care Context, Early Cognitive Development, Ages 3–4	2.4	15.1	9.9	27.6
Math and Reading Development, Ages 6–7	1.6	25.4	3.4	6.9
School/Peer and Home Context, Ages 10–11	4.8	19.8	5.9	7.9
Behavior, Effort, and Achievement, Ages 12–13	31.7	66.7	26.6	40.4
Grade Retention, Ages 14–17, and Educational Expectations, Ages 14–15	15.1	41.3	25.6	43.3

Note: The simplified baseline decomposition model includes only early externalizing problems and the demographic controls shown in Table 2. The full decomposition model includes early externalizing problems and all groups of *x*'s (mediators) indicated in column 1 of this table. So that differences in the contribution of levels or effects of early externalizing problems are comparable across columns, I rescaled the differences (from the full model or the model with demographic controls) into percentages. I divided the absolute value of the difference by the relevant baseline contribution. Baselines are .126 years of schooling due to the mean gender difference in level ofearly externalizing problems, and .203 years due to the mean gender difference in effects of early externalizing problems.

Source: The 1983 to 1986 birth cohorts of the Children of the National Longitudinal Survey of Youth:1979 (NLSY-C; https://www.nlsinfo.org/content/cohorts/nlsy79-children) and matched National Longitudinal Survey of Youth:1979 (mother sample). The low-income white and military oversamples are excluded. The National Longitudinal Survey of Youth-Child Supplement (NLSY-C) consists of a nationally representative sample of children born to women age 14 to 21 in 1979; after excluding the poor white and military oversamples, the working sample in this study is restricted to the 1,857 children born 1983 to 1986, whose mothers were therefore 18 to 29 years at birth. Children born 1983 to 1986 were born early enough to be age 26 to 29 as of the 2012 follow-up survey, but late enough to have early behavior problems information measured at age 4 to 5 beginning in 1986, at which point these items were introduced for children age 4 to 16. I used multiple imputation of 20 datasets to handle item-missingness. Model estimates use inverse-probability weighting to deal with stratified sample design (minority oversampling) and sample attrition by the 2012 follow-up wave (weights aredescribed at: https://www.nlsinfo.org/weights/nlsy79). Once inverse-probability survey weights are applied, the working sample with complete attainment and behavior information drops from 1,857 to 1,661 children (881 girls, 780 boys).

Table 5

Detailed Results for Relationships between Externalizing Problems and Conditional Educational Transitions (Logit Regressions) (Corresponds to Figure 3)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Logit: GED Completion		**Logit: HS Completion**		**Logit: College Enrollment**		**Logit: College Completion**	
	Girls	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**
Externalizing Problems 4 to 5	0.113	0.047	−0.039	−0.150**	0.031	−0.102*	−0.052	−0.179*
	(0.064)	(0.057)	(0.058)	(0.052)	(0.059)	(0.050)	(0.071)	(0.071)
	[−0.012,0.238]	[−0.065,0.159]	[−0.153,0.075]	[−0.252,−0.048]	[−0.085,0.147]	[−0.200,−0.004]	[−0.191,0.087]	[−0.318,−0.040]
Observations	881	780	881	780	805	692	654	453
Adj. R-Squared or Pseudo R-squared	0.104	0.087	0.177	0.143	0.111	0.147	0.158	0.139
Wald Chi-square(13 df)[a]	59.48***	35.92***	98.14***	67.63***	63.57***	89.66***	78.57***	44.47***

*** p<0.001,

** p<0.01,

* p<0.05,

+ p<0.10 (two-tailed *t*-tests for a statistically significant difference from 0). Displaying logit coefficients. Standard errors are in parentheses followed by 95% confidence intervals in brackets. Models control for all early childhood factors and demographic controls shown in Table 2.

Source: The 1983 to 1986 birth cohorts of the Children of the National Longitudinal Survey of Youth:1979 (NLSY-C; https://www.nlsinfo.org/content/cohorts/nlsy79-children) and matched National Longitudinal Survey of Youth:1979 (mother sample). The low-income white and military oversamples are excluded.

Note: The National Longitudinal Survey of Youth-Child Supplement (NLSY-C) consists of a nationally representative sample of children born to women age 14 to 21 in 1979; after excluding the poor white and military oversamples, the working sample in this study is restricted to the 1,857 children born 1983 to 1986, whose mothers were therefore 18 to 29 years at birth. Children born 1983 to 1986 were born early enough to be age 26 to 29 as of the 2012 follow-up survey, but late enough to have early behavior problems information measured at age 4 to 5 beginning in 1986, at which point these items were introduced for children age 4 to 16. I used multiple imputation of 20 datasets to handle item-missingness. Model estimates use inverse-probability weighting to deal with stratified sample design (minority oversampling) and sample attrition by the 2012 follow-up wave (weights are described at: https://www.nlsinfo.org/weights/nlsy79). Once inverse-probability survey weights are applied, the working sample with complete attainment and behavior information drops from 1,857 to 1,661 children (881 girls, 780 boys). Cell sizes decrease across models because a given educational transition is conditional on the prior educational transition (e.g., college enrollment is conditional on high school or GED completion).