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ADOLESCENTS' SEXUAL BEHAVIOR AND ACADEMIC ATTAINMENT*

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Abstract

High school students today have high ambitions but do not always make choices that maximize their likelihood of educational success. This is the motivation for investigating relationships between high school sexual behavior and two important academic attainment milestones: earning a high school diploma and enrollment in distinct postsecondary programs. Analysis of data from 7,915 National Education Longitudinal Study of 1988–1994 participants indicates that timing of sexual initiation, contraceptive nonuse, and parenthood all predict female and male students' academic attainment. Furthermore, sexual behavior has more ramifications as attainment milestones become more competitive. These findings point to the importance of considering how students' choices across multiple life domains influence academic attainment, an important predictor of adult socioeconomic opportunity.

Keywords

academic attainment; adolescent parenthood; aligned ambitions; contraceptive use; timing of first sex

INTRODUCTION

Today's high school students pursue future opportunity in a different context than previous generations. Shifts in the labor market economy, postsecondary opportunities, and the women's and civil rights movements have changed the U.S. high school experience. Students today also have more freedom and choices in day to day life, yet the trajectory through secondary and postsecondary education most likely to result in adult economic stability is more rigid (Schneider and Stevenson 1999). The sexual revolution has also redefined high school students' sexual behavior. Premarital sex and non-marital childbearing are more acceptable (Laumann, Gagnon, Michael, and Michaels 1994), birth control methods are better and widely available (Tyrer 1999), young people delay marriage (Fields and Casper 2001) and have sex earlier (O'Donnell, O'Donnell, and Stueve 2001), and there are fewer gender disparities in sexual behavior (Terry and Manlove 2000). Thus, most teenagers have sex with partners who are not future spouses before high school graduation

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(Laumann, Michael, Michaels, and Gagnon 2000), but utilize effective contraceptive methods to avoid non-marital parenthood (Alan Guttmacher Institute 2006).

Research has examined relationships between adolescent sexual behavior and academic attainment extensively. Many findings have emerged, but two surface consistently. First, one way that adolescent sexual activity influences educational attainment is through a negative consequence: non-marital parenthood (Hofferth, Reid, and Mott 2001; Hoffman, Foster, and Furstenberg 1993). Second, very early sexual initiation and academic success are related (Billy, Landale, Grady, and Zimmerle 1988; Brooke, Balka, Abernathy, and Hamburg 1994), although which comes first is unclear (Schvandeveltdt, Berry, and Lee 2001). These findings are important and policy relevant, but do not describe relationships between sexual behavior and academic attainment for most U.S. teenagers. Few become pregnant, even fewer become parents (Amba, Martinez, Mosher, and Dawson 2004) and most delay sex until the high school years (grades 9–12) or beyond. In addition, most teens complete high school and expect to enroll in college (Schneider and Stevenson 1999).

To better understand how typical adolescents' sexual behavior and academic attainment are related, this study adopts Schneider and Stevenson's (1999) conception of aligned ambitions. Teenagers with aligned ambitions have high educational and occupational goals and resources to meet these goals. They may also make smart decisions about other aspects of their lives, such as sexual behavior, which may pose considerable distractions for academic success and navigating through academic trajectories.

Using data from the National Education Longitudinal Study of 1988–1994 (NELS:88–94), this study estimates whether important aspects of sexual behavior like timing of first sex, contraceptive use during first sex, and high school parenthood are related to two significant attainment milestones, earning a high school diploma and enrollment in postsecondary programs (four year colleges/universities, other programs or none). Separate estimates are obtained for female and male students given the greater historical concern over the sexual behavior of young women versus young men and all associations are estimated net of important aspects of adolescents' family, educational, and social background prior to high school entry and sexual initiation. This study will begin to show how students' choices in domains outside of education shape their ability to reach attainment milestones that influence adult socioeconomic opportunity.

BACKGROUND

Aligned Ambitions & Academic Attainment

Educational attainment predicts occupational success and marks the nature of the transition to adulthood (Jekielek and Brown 2005). High school students today are more ambitious than ever and students' and parents' expectations about educational success have increased markedly in recent years. Unfortunately, many students do not make the decisions necessary to reach attainment goals. Schneider and Stevenson (1999) argue that students most likely to succeed have aligned ambitions, meaning that they have high educational aspirations, complementary educational and occupational goals, and resources and detailed life plans for reaching goals. They also understand the sequential nature of life events and consequences of their actions, leading them to use time wisely and make smart decisions about academic activities.

The first attainment threshold that students must plan for and reach is earning a high school diploma. This credential provides fewer opportunities today than it did in previous eras, but it is a prerequisite for most professional jobs and postsecondary programs. Students today are more likely than ever to earn a high school diploma. Many also pursue higher education,

but a relatively low percentage of students earn a bachelor's degree within five years (Wirt, Choy, Rooney, Provasnik, Sen, and Tobin 2004).

Enrolling in a four year college or university after high school is the postsecondary plan most likely to lead to earning a Bachelor's degree (Wirt et al. 2004), obtaining professional employment (Horn and Zahn 2001), and adult economic stability. Unfortunately, four-year college and university expansion has not kept pace with enrollment demands and college admission is more competitive now than ever before (Attewell 2001). Most schools have clear requirements about SAT or ACT scores, grade point averages (GPAs), and course work completion (Cabrera and LaNasa 2001), which makes academic engagement and success pivotal for reaching these goals. Aligned ambitions maximize the likelihood of gaining admission into these postsecondary institutions.

The limited space and stringent admission requirements of four year colleges and universities make postsecondary programs like community colleges and vocational training popular alternatives for some students (Karin 2002). The credentials granted by these programs provide fewer opportunities than a four year degree, but they have less rigorous admissions requirements, cost less, and better allow for part-time attendance. Gaining admission requires less planning and preparation, but aligned ambitions may still help students prepare for these postsecondary options.

Sexual Behavior and Academic Attainment

Schneider and Stevenson (1999) focus on the way that students' educational choices indicate aligned or misaligned ambitions. This study extends this concept to adolescents' sexual behavior, which can distract them from academic pursuits mentally or through unintended consequences of becoming sexually active. Adolescents with aligned ambitions may not only be strategic academically. They may also be aware of the way that other aspects of their life, like sexual behavior, may influence their likelihood of attaining educational success.

Life course theory and research on the structure of secondary education help to explain why the aligned ambitions framework may extend to other life domains like timing of first sex and why timing of first sex may influence academic attainment. Life course theory posits that the meaning and consequences of transitions like sexual initiation are tied to their timing. Those occurring off-time and early affect later transitions and other life domains (Elder and Shanahan 2006). As such, sexual initiation early, later, and after high school may have different consequences for distinct attainment thresholds.

Sexual initiation early in high school is earlier than average (Amba et al. 2004) and may distract students from educational plans and pursuits. Initiating sex early may therefore be inconsistent with ambitions for educational success and may distract students in ways that decrease their likelihood of reaching both attainment thresholds that this study examines: high school graduation and postsecondary enrollment.

Later in high school, sexual initiation is more normative (Amba et al. 2004), but educational stratification and decision-making increase. Students either continue with more demanding curriculum or enroll in fewer core courses (Heck and Thomas 2004; Muller and Schiller 2000). They also consider postsecondary programs and some students actively begin the application process. Students who initiate sex later in high school may have ambitions that are better aligned than their counterparts initiating sex early in high school. They delay sex until their life plans and course trajectories are more established, sexual initiation is more normative, and they are better prepared to balance academic challenges and becoming sexually active. Therefore, reaching basic attainment thresholds like high school graduation may be more likely. Of course, coping with sexual initiation, academic challenges, and

looming educational transitions may still be overwhelming and decrease students' likelihood of postsecondary enrollment—especially in four year colleges or universities. Therefore, students with ambitions most in line with high academic attainment goals may delay first sex until after high school when their immediate postsecondary plans are set.

Considering timing of first sex within the context of the typical U.S. high school experience and recognizing that it may be a social aspect of (mis)aligned ambitions that influences academic attainment recognizes that early first sex is a high-risk behavior (e.g., Manlove, Terry-Hunman, Papillo, Franzetta, Williams, and Ryan 2002) and an off-time transition that influences adolescents' educational trajectories through unintended consequences (Elder and Shanahan 2006). That being said, earlier and later sexual initiators are qualitatively different from each other (O'Donnell, O'Donnell, and Stueve 2001) and the consequences of later sexual initiation for academic attainment are less understood—especially as they relate to different attainment thresholds, some of which are more demanding and competitive than others.

In fact, no study has estimated relationships between timing of first sex and different postsecondary enrollment options that require different levels of planning and preparation for admission. Only one has considered how timing of first sex (measured in reference to age, not the structure of schooling) and high school graduation are related (Mensch and Kandell 1988). This study suggests that timing of first sex is negatively associated with high school dropout, but its sample represents a previous generation of adolescents and there are few controls for students' academic background. Furthermore, no other aspects of sexual behavior are considered as predictors of high school graduation.

In this study, other aspects of sexual behavior are considered. It is unlikely that timing of sexual initiation is the only facet of sexual behavior that influences different educational attainment milestones. Contraceptive use and teenage parenthood may also be important. Contraceptive use marks an ability to plan for the future (Frisco 2005), a key feature of aligned ambitions. Conversely, high school parenthood is consistent with misaligned ambitions. Young women with low educational expectations and those perceiving little future opportunity for success are at greater risk of having a teenage birth (Luker 1997, Brewster 1994). Even in low opportunity settings, educational expectations negatively predict adolescent births among White, Latina and low SES young women (Droscoll, Sugland, Manlove and Papillo 2005). These findings are consistent with the life course perspective on transitioning to parenthood during high school; it is off-time and early (Mylod, Whitman, and Borkowski 1997; Elder and Shanahan 2006) and impedes adult opportunity and economic stability (Hofferth, Reid, and Mott 2001; Hoffman, Foster, and Furstenberg 1993; Nock 1998). Considering timing of first sex, contraceptive use at first sex, and high school parenthood in tandem as important social aspects of aligned ambitions recognizes that each may tap high school students' ability to plan for the future and consider consequences of sexual behavior for other life domains like academic attainment.

Using the aligned ambitions framework to consider how timing of sexual initiation, contraceptive use at first sex and teenage parenthood each predicts educational attainment contributes theoretically and substantively to understanding how some students inadvertently place themselves at risk of falling short of attainment goals. There is a general recognition that educational expectations and perceptions of future opportunity predict teenage pregnancy and academic attainment. What the aligned ambitions framework adds is that students must also plan for and take steps to reach goals. Students who plan sexual decisions such that they delay first sex and utilize contraception reduce (or eliminate) the risk of parenthood and the hurdle that this poses to academic attainment.

The Current Study

Students with aligned ambitions make smart educational decisions that increase their likelihood of educational success. They may also make smart decisions about other aspects of their lives like their sexual behavior. This premise is the basis for investigating whether high school students' timing of sexual initiation, contraceptive use during first sex, and parenthood status are related to high school graduation and postsecondary enrollment. Using data from the NELS:88–94, this study estimates whether these aspects of sexual behavior are related to academic attainment alone and when they are all included in the same model. It also asks whether sexual behavior may be more consequential for reaching more competitive and demanding attainment thresholds. Separate estimates are presented by gender to reflect the fact that non-marital parenthood and sexual behavior have historically had a greater social impact (and in the case of parenthood, financial impact) on young women.

All predicted estimates of sexual behavior on attainment milestones are presented net of adolescents' background characteristics prior to high school entry and sexual initiation. Most control variables (e.g., parents' and students' educational expectations, parental involvement in school) tap aspects of aligned ambitions identified by Schneider and Stevenson (1999). Others tap risk-taking behavior (e.g., smoking) and parental supervision (e.g., whether students are home alone after school, parental monitoring) to reduce the likelihood that estimated effects of sexual behavior are attributable to alternative explanations of its significance, such as problem behavior theory (Jessor and Jessor 1977) or a lack of parental monitoring and control (Longmore, Manning, and Giordano, 2001). The control variables used as part of this study and the timing of their measurement allow for speculation that observed associations between sexual behavior and academic attainment are causal, but the exact nature of how sexual behavior derails students is not explicitly tested.

It is important to state that this study's findings do not generalize to young people who report sexual initiation prior to high school. The framework for understanding relationships between very early sexual behavior and academic attainment is likely quite different than the one developed here.

DATA AND METHOD

Sample

The NELS:88–94 is a nationally representative sample of 24,599 eighth graders. It is an excellent source of information for investigating why some young people are more successful than others (Schneider, Carnoy, Kilpatrick, Schmidt and Shavelson 2007). Students were first surveyed in 1988 (the base year) and were followed up in 1990, 1992 and 1994. The NELS includes extensive information about students' background, family and academic progress from eighth grade until two years after most had graduated from high school. During the third follow-up (1994), students were asked about sexual initiation.

The third follow-up includes data from 13,822 base year respondents. Analyses are restricted to non-Hispanic, White, Black, and Hispanic respondents who participated in both surveys and reported high school graduation and postsecondary enrollment status. The sample is then constrained to students who report timing of and contraceptive use during first sex and parenthood status in 1992, grade twelve for most respondents.

The sample is further restricted to students who delayed sexual initiation until high school or beyond. NELS:88–94 data on timing of first sex were collected two years after expected high school completion and reports of first sex before high school entry may be unreliable. The time between date at first sex and interview is negatively associated with reporting

accuracy (Wu, Martin, and Long 2001). Young people who initiate sex prior to high school are also at an exceptionally high risk of academic failure. Excluding these respondents from the study (N = 786) allows me control for students' backgrounds prior to first sex, decreasing the odds that the predisposition to become sexually active and succeed academically explains estimated relationships between sexual behavior and academic attainment. Finally, constraining the sample to a lower risk group will result in more conservative, reliable and policy relevant findings for typical U.S. teenagers. Policies addressing very early sexual initiators' needs are likely quite different. Constraints lead to a final sample of 7,915 respondents (4,232 young women and 3,683 young men). Compared to the base year NELS:88–94 sample, the study sample reports slightly higher academic achievement and expectations and their parents are slightly more educated and involved in school. In addition, smaller proportions of the study sample live in stepparent and single parent households, participate in risk taking behaviors, or report being Black.

In the NELS:88–94 sample design, students are nested in schools, so students within a school are more alike than a random sample drawn from the U.S. population at large. Models that treat respondents as a random sample yield coefficients with smaller standard errors than models accounting for the NELS:88–94 design effect. Some sample members were also followed-up less successfully than others. Methods suggested by Ingles et al. (1994) are used to weight and adjust estimates for design effects and attrition.ⁱ

Educational Attainment

Timely high school graduation (by Spring 1992) and postsecondary enrollment are the study's dependent variables. Both are assessed at the 1994 NELS:88–94 third follow-up. High school graduation is constructed from transcript data and is supplemented by 1994 survey responses. This dichotomous variable signifies whether students earned a diploma on time in 1992 (1 = yes). Students who received or were working towards a GED/other certificate in 1992 are included in the “not graduated” category. The value of these credentials is not equivalent to the value of a diploma (Cameron and Heckman 1993).ⁱⁱ

Postsecondary enrollment is a three-category variable constructed from answers to questions about higher education between October 1992 and October 1993, the year after high school graduation for most respondents.ⁱⁱⁱ The study distinguishes between students who (1) did not enroll in postsecondary programs (reference category), (2) enrolled continuously and full-time in a four-year college or university, and (3) enrolled in other postsecondary programs such as community colleges or vocational/technical schools. This category includes part-time students and those enrolled in postsecondary programs during part of the academic year.^{iv} These distinctions recognize that most professional jobs require at least a bachelor's degree (Horn and Zahn 2001) and students enrolled continuously and full-time in four-year colleges or universities are most likely to obtain this credential (Adleman 1999; Wirt et al.

ⁱDebates exist about use of weights with subsamples. Weights are utilized because the NELS weighting process suggested by Ingles et al. (1994) also corrects for design effects. Use of weights also produces slightly more conservative estimates of predicted effects of independent variables, but results estimated with and without weights are not significantly different.

ⁱⁱAttempts to analyze earning a GED or equivalent credential as a distinct 3rd category did not produce reliable estimates because of the few respondents classified in this group (N = 159).

ⁱⁱⁱPostsecondary enrollment is only estimated for respondents who earned a diploma or GED by 1992. Including dropouts would bias results since they did not meet a basic postsecondary requirement.

^{iv}In this sample, 3,117 respondents reported no postsecondary enrollment, 3,042 reported full-time, continuous enrollment in four-year institutions, and 1,023 reported continuous, full-time enrollment in other institutions. Students with irregular enrollment patterns included 791 respondents enrolled in four-year programs full-time during one year but other programs during the other year, and 1,558 respondents with other postsecondary enrollment patterns from 1992–1993. Exploratory analyses revealed that students with irregular enrollment patterns closely resembled those in other programs even if they were initially enrolled in a four-year institution, which is consistent with prior research by Adleman (1999).

2004). For simplicity, these categories are referred to as enrollment in four-year, other, or no postsecondary programs.

Adolescent Sexual Behavior

Three NELS questions tap high school sexual behavior. They can be used to construct indicators of timing of first sex, contraceptive use during first sex, and (expected) parenthood before graduation. Timing of first sex is based on retrospective responses about sexual initiation.^v During the third follow-up survey, respondents were asked “Have you ever had sexual intercourse? If yes, when did you have sexual intercourse for the first time?” These responses are used to construct dummy variables indicating no sexual initiation before high school graduation (reference) or that first sex occurred during (1) ninth or tenth grade, most students’ first two years of high school, or (2) eleventh or twelfth grade, most students’ last two years of high school.^{vi} While timing of first sex is often defined within a single year (or month) and in reference to chronological age rather than grade level, this operationalization reflects this study’s aim: evaluating whether timing of sexual initiation in relation to the academic structure of typical U.S. high schools matters for academic attainment.^{vii} Retrospective responses about sexual initiation are generally consistent with responses from repeated panel questions (Lauritsen and Swicegood 1997). Inconsistent responses are largely random (Upchurch, Lillard, Aneshensel, and Li 2002; Wu, Martin, and Long 2001), but when interpreting predicted effects of first sex, note that young men’s (versus women’s) reports are less consistent (Upchurch, Lillard, Aneshensel, and Li 2002).

Respondents were also asked whether they or their partner used birth control during sexual initiation. This is the only NELS:88–94 question that taps contraceptive use during high school. Responses are used to construct a measure of no birth control use (1 = no), which compares non-users to users and those respondents who remained virgins.

In 1992, most students’ senior year, sample members were also asked whether they had children (1 = yes, 2 = no, 3 = no, but expecting a child). These responses are used to construct an indicator of (expected) parenthood in 1992 (1 = yes). When interpreting results, note that young men tend to underreport parenthood and paternity (Forste 2002).

Control Variables

Aspects of students’ background associated with aligned ambitions, sexual behavior and academic attainment are held constant in all statistical models. These variables include indicators of students’ 8th grade risk-taking behavior, race/ethnicity and educational and family background. To retain sample size, mean and mode substitution are used to replace missing data on control variables.^{viii} The Appendix includes detailed operationalizations of and descriptive statistics for all analytic variables.

Analytic Approach

Weighted multivariate models predict how sexual behavior is related to academic attainment using STATA 9.0. Logistic regression models predict high school graduation and

^vTwenty-nine females reported virginity status in grade twelve but being pregnant or a parent. These young women are classified as sexual initiators during the later high school years, the modal category of sexual initiation for young women. Excluding these respondents produces no significant differences in results.

^{vi}The NELS distribution of age at first sex is similar to those published by the Alan Guttmacher Institute (1999) using data from the National Survey of Family Growth and the 1995 Survey of Adolescent Males.

^{vii}Furthermore, the NELS is representative of eighth graders, not students of a certain age and outcomes are more closely tied to grade level than age. Analyses defining timing of first sex by chronological age or by each grade level produce similar results.

^{viii}Supplementary analysis using dummy variables to represent missing cases for each variable (not included in final models due to statistical insignificance) evaluated whether mean and mode substitution biased results. Furthermore, models using listwise deletion and imputation produce no significant differences in results.

multinomial logistic regression models predict postsecondary enrollment.^{ix} A series of models are estimated for male and female students. Each controls for respondents' eighth grade background. The first model includes timing of first intercourse, the second includes contraceptive non-use, and the third includes (expected) parenthood. These models predict independent effects of each indicator of sexual behavior on academic attainment. The fourth model includes all three measures of sexual behavior to assess whether considering them in tandem provides a clearer picture of relationships between high school sexual behavior and academic attainment. STATA's calculation of BIC (Bayesian Information Criterion) is used to estimate model fit. When comparing models, a smaller value of BIC suggests better model fit.

RESULTS

High School Graduation

Table 1 presents results from models that estimate whether timing of first sex, contraception nonuse at first sex, and (expected) parenthood predict young women's and men's likelihood of earning a diploma net of control variables. Column 1 reveals a negative association between first sex early and later in high school and young women's odds of earning a diploma when no other indicators of sexual behavior are included in models. Estimates from the same model for young men are presented in Column 2 and suggest that first sex early, but not later in high school predicts their odds of earning a diploma. Columns 3 through 6 indicate that contraceptive nonuse and (expected) parenthood are also negatively associated with female and male high school students' likelihood of earning a diploma when models include no other measures of sexual behavior. Together, findings in Columns 1 through 6 indicate that each measure of sexual behavior is related to earning a diploma in expected ways. Young people who initiate sex early in high school, those who do not use contraception and those who become parents during high school are all less likely to earn a diploma.

Estimated effects of each of these measures of sexual behavior are reduced when they are all included in the same statistical models (see Columns 7 and 8). Furthermore, contraceptive nonuse is no longer associated with young women's or men's odds of earning a diploma and (expected) parenthood is no longer associated with young men's odds of earning a diploma. Only sexual initiation early in high school is related to earning a diploma among male students, reducing the odds of graduation by 67%.^x Among young women, sexual initiation at any time during high school and expectant motherhood both reduce the odds of earning a high school diploma. While the magnitude and statistical significance of the effects of sexual behavior vary by gender, supplementary analyses reveal that these gender differences are not statistically significant. In other words, the estimated effects of sexual behavior on earning a diploma are relatively similar for female and male high school students in multivariate models.

^{ix}While categories of postsecondary enrollment are ordered and represent different levels of attainment and a pathway/lack of a path towards 4-year college completion, they are best viewed as distinct enrollment patterns yielding different market returns and affected differently by students' decisions and background. Multinomial logit models allow for different estimated effects of independent variables on each enrollment pattern, thus allowing for non-proportional covariate effects. Some efficiency is gained by using ordered logit models, but at the expense of making (and testing) proportional odds assumptions about variables.

^xTo derive odds ratios from coefficients estimated using logistic and multinomial regression models, positive coefficients are exponentiated and multiplied by 100. Negative coefficients are also exponentiated but are subtracted from one and then multiplied by 100. In this case, $[(1 - \exp(-1.102)) * 100]$.

Postsecondary Enrollment

Table 2 presents a series of multinomial logistic regression models predicting relationships between sexual behavior and postsecondary enrollment for young men and women. The top panel predicts four year versus no postsecondary enrollment. The bottom panel predicts other versus no postsecondary enrollment. An “a” superscript next to coefficients in the top panel signifies that a variable has a significantly different predicted effect on the likelihood of four year versus other postsecondary enrollment.

Results in the top panel indicate that sexual behavior during high school is negatively related to young women’s and men’s odds of four year versus no postsecondary enrollment. Columns 1 and 2 indicate that young men and women who experience sexual initiation early and later in high school (versus after high school) are less likely to enroll in four year colleges or universities than they are to skip postsecondary enrollment after high school graduation. Columns 3 through 6 indicate that contraceptive non-use and (expected) parenthood also negatively influence the odds of four year versus no postsecondary enrollment when they are the only indicator of sexual behavior in a model. When each of these indicators of sexual behavior are included in the same model (see Columns 7 and 8), the estimated effects of each are reduced, but they are all still related to the likelihood of four year versus no postsecondary enrollment with one exception. Contraceptive nonuse is no longer associated with young women’s odds of four year college/university enrollment. Taken together, these findings suggest that high school students who delay sexual initiation until after high school and those who avoid high school parenthood are making decisions that increase their likelihood of four year college/university enrollment.

Estimates in the top panel of Table 2 also indicate that these same decisions influence young women’s odds of enrolling in four year versus other postsecondary enrollment programs (see Columns 1, 3, & 5). Even when these indicators of sexual behavior are all included in the same model (see Column 7), sexual initiation earlier and later in high school and (expected) parenthood have larger estimated effects on four year versus other postsecondary enrollment. In fact, the estimated effects of earlier sexual initiation and (expected) parenthood are almost twice as large for four year college/university enrollment.

Among young men, estimated effects of timing of first sex and contraceptive nonuse for four year versus other postsecondary enrollment are similar, but (expected) parenthood has a much larger effect on four year versus other postsecondary enrollment regardless of whether it is the only measure of sexual behavior in the model or not (see Columns 6 and 8). Young men’s underreporting of parenthood should be considered when interpreting this finding.

Sexual behavior also has estimated effects on other versus no postsecondary enrollment. Findings in the bottom panel of Table 2 indicate that sexual initiation earlier and later in high school both reduce the odds of other versus no postsecondary enrollment among young women and men when no other indicators of sexual behavior are included in models (see Columns 1 and 2). Contraceptive nonuse also reduces young men’s odds of enrolling in other versus no postsecondary programs by 33% (see Column 5), while (expected) parenthood reduces young women’s odds of enrolling in other versus no postsecondary programs by 64% (see Column 6).

Estimates in columns 7 and 8 are similar to those obtained when predicting whether young people earn a high school diploma. Among young men, only sexual initiation early in high school predicts other versus no postsecondary enrollment. It reduces the odds of other postsecondary enrollment by 39%. Among young women, sexual initiation early and later in high school and (expected) parenthood predict other versus no postsecondary enrollment.

They reduce girls' odds of other postsecondary enrollment by 38%, 40%, and 58%, respectively.

As was the case with models estimating the effects of sexual behavior on earning a diploma, there are observed gender differences in the way that timing of first sex, contraceptive nonuse and (expected) parenthood are related to enrollment in four year versus no postsecondary programs, four year versus other postsecondary programs, and other versus no postsecondary programs. Supplementary analyses reveal that these differences are not statistically significant. In summary, high school sexual behavior (high school sexual initiation and parenthood, in particular) has negative ramifications for all high school students' postsecondary enrollment net of their demographic, social, and academic background.

DISCUSSION

Findings suggest a strong association between high school sexual behavior and academic attainment, which is robust to controlling for background characteristics associated with aligned ambitions, adolescent sexual behavior, and academic attainment. These associations are relatively similar for young women and men.

The timing of sexual initiation is particularly important for female and male high school students' academic attainment. Sexual initiation early in high school, a time when sexual initiation is not normative behavior (Amba et al. 2004), consistently predicts earning a diploma and both other and four year (versus no) postsecondary enrollment. These associations retain statistical significance once young people's contraceptive nonuse at first sex and parenthood status are considered.

Supplementary analyses (available upon request) also suggest that the *length* of time that young people delay sexual initiation has different consequences depending on attainment level. Among young men, only the earliest sexual initiators are at risk of not earning a diploma. Their odds of reaching this basic attainment milestone are 46% lower than their counterparts who delay sex until later in high school and almost 70% lower than those who delay sex until after high school. Young men who initiate sex later in high school and after high school are equally likely to earn a diploma, most likely because both groups are well on their way to meeting graduation requirements by the time they initiate first sex. Conversely, when the attainment milestone of interest is postsecondary enrollment, young men who initiate sex later in high school more closely resemble those who initiate sex earlier in high school. There are no significant differences in the way that either predicts enrollment in two year and four year (versus no) postsecondary programs or four year versus two year postsecondary enrollment. This suggests that the postsecondary plans and academic trajectories of young men who initiate sex in high school may not be well enough established for their behavior to have no impact on postsecondary enrollment.

Similar patterns emerge among young women. As was the case among young men, sexual initiation earlier and later in high school has similar estimated effects on enrollment in two year and four year (versus no) postsecondary programs. Where young women differ from young men is that sexual initiation earlier and later in high school both predict earning a diploma and enrollment in other versus four year postsecondary programs, but estimated effects of earlier first sex are larger. These findings show the importance of considering the consequences of timing of sexual initiation with respect to the high school experience and in relation to different attainment milestones.

Contraceptive nonuse at first sex is not as important for academic attainment as hypothesized. It predicts earning a diploma and postsecondary enrollment, but only when

other aspects of sexual behavior are excluded from statistical models. Ancillary analyses indicate that sexual initiation early in high school explains almost every association between contraceptive nonuse and each attainment threshold studied here (the exception being the association between young men's contraceptive nonuse and four year college/university enrollment). This supports research showing that contraceptive nonuse is more common among earlier sexual initiators (Mosher, Martinez, Anjani, Amba, and Wilson 2004) and suggests that the relationship between timing of first sex and academic attainment may be multifaceted.

This study's findings regarding contraceptive nonuse should not be used to argue that it has no relationship to academic attainment or that it may not represent a social aspect of aligned ambitions. Instead, results may reflect the very limited nature of information about contraceptive use included in the NELS:88-94. Other aspects of contraceptive use, such as consistency of use or use of more reliable methods, may better predict academic attainment.

Expected parenthood largely operates as predicted for young women. It reduces their likelihood of earning a diploma, of enrolling in four year versus no postsecondary programs, other versus no postsecondary programs, and four year versus other postsecondary programs. In other words, it significantly impedes young women's progress towards every attainment threshold in this study as suggested by previous research on the nature of the transition to parenthood during high school (Mylod, Whitman, and Borkowski 1997; Elder and Shanahan 2006).

As previously noted, estimated relationships between different aspects of sexual behavior and academic attainment vary by gender, but these differences are not statistically significant. These findings may reflect the increasing similarity of young women's and men's sexual behavior (Terry and Manlove 2000). They may also reflect young women's increased focus of educational attainment over the last few decades.

This study makes several contributions to research on adolescent sexual behavior and academic attainment. It estimates more detailed measures of academic attainment than prior studies and assesses the importance of sexual initiation within the context of the typical U.S. high school experience. It also considers the ramifications of different sexual decisions—timing of first sex, contraceptive use during first sex, and becoming a parent during high school. As expected, high school parenthood reduces the odds of reaching important attainment milestones, but so do the sexual decisions that lead up to this off-time life transition. Therefore, policy should aim at expanding messages to high school students such that prevention campaigns focus on reducing the risk of teenage parenthood, prompting teenagers to make smarter sexual decisions, and helping them understand how sexual decisions influence other life domains. As noted earlier, policies aimed at very early sexual initiators must be quite different and more targeted, but this highlights a strength of this study. It sheds light on how sexual behavior may matter for typical U.S. teens.

There are several ways that future research can build on this study's findings. First, studies should estimate whether measures of sexual behavior such as consistency of contraceptive use, frequency of intercourse, or number of sexual partners may also matter for attainment and reflect (mis)aligned ambitions. Research should also consider whether the relationship context of sexual behavior matters for educational success given that recent studies have begun addressing this aspect of adolescents' sexual behavior (Manning, Giordano, and Longmore 2006, Manning, Longmore, and Giordano 2000) and its importance for adolescents' lives (Crouter and Booth, 2006, Giordano, Manning, and Longmore 2006a, Giordano, Manning, and Longmore 2006b, Raley, Crissy and Muller 2007). An additional avenue for future research is estimating how sexual substitution, which is commonplace

among teenagers who abstain from sex, and academic attainment are related. Exploring the actual processes that may lead sexual decisions to influence academic attainment should also be a focus of future studies as should research that specifically tests whether sexual behavior signifies aligned ambitions. Studies—especially those using qualitative methods—that prompt adolescents to talk about whether and how their sexual decisions fit into their long-term life plans would be especially useful for clarifying whether sexual decisions represent aligned ambitions.

This study's findings should be considered in light of its limitations. Causal order is always difficult to establish. I control for students' academic expectations and achievement prior to becoming sexually active and exclude the youngest sexual initiators from my sample to better establish causality, but these safeguards may not fully eliminate the role of academic success for predicting sexual behavior. The NELS:88–94 also follows up some respondents more successfully than others. Sample weights help account for response rates but may not fully do so. Thus, results may be more applicable to better-represented population subgroups. Findings may also be less applicable for understanding how parenthood and young men's academic attainment are related given that the male sample may underreport non-marital parenthood. Some bias in findings may additionally emerge because very early sexual initiators and respondents with missing information about sexual behavior are excluded from analyses. Because sample attrition and sexual behavior non-response are highest among the lowest achievers and sexual risk-takers, these limitations likely result in underestimation of effects of sexual behavior. The final limitation is that reliable estimates of racial/ethnic differences in relationships between sexual behavior and academic attainment cannot be estimated due to sparse data in some cells. Future research should make this a priority.

Despite these limitations, this study's findings indicate that high school students' timing of sexual initiation in relation to their stage of schooling predicts academic attainment, both directly and through its association with contraceptive nonuse. High school parenthood also has serious ramifications for young women's attainment and possibly for young men's enrollment in four year postsecondary programs. Furthermore, sexual decisions become more critical as the attainment thresholds that adolescents try to reach become more competitive, especially among female adolescents. High school students today navigate a more complex road towards adult economic opportunity than previous generations and academic attainment is more crucial than ever for occupational success. One misstep may not derail students' life chances, but a series of missteps, especially those that could lead to off-time life transitions like parenthood, may reduce young people's likelihood of reaching attainment thresholds that better guarantee adult economic opportunity. Students today have high ambitions, but the freedom and choices afforded to them makes aligned ambitions across multiple life domains vital for reaching educational goals.

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Appendix. Weighted Descriptive Statistics and Detailed Operationalizations of All Study Variables¹

Variable	Mean or Proportion [*]		NELS	
	Young Women	Young Men	Measure	Operationalization
<u>Academic Attainment</u>				
High School Graduation	.955	.954	F3DIPLOM	Dichotomous dependent variables indicating that students earned a diploma (1 = yes)
<u>Postsecondary Enrollment</u>				
Continuous enrollment in 4 yr. college/university	.375	.347	ENRL1092 ENRL1093	Categorical dependent variable indicating postsecondary enrollment in the year following high school (Fall 1992-Fall 1993)
Part-time enrollment/enrollment in a 2 yr program or vocational program	.376	.360		
No postsecondary enrollment (reference)	.249	.293		
<u>Sexual Behavior</u>				
Timing of Sexual Initiation			FIRSTSXM FIRSTSXY	Dummy variables indicating timing of first sex within the context of the stages of schooling
Early high school years	.158	.248		
Later high school years	.314	.324		
No high school sexual initiation (reference)	.528	.428		
Contraceptive nonuse at sexual initiation	.097	.129	USEBIRCN	Dummy variable indicating that comparing respondents who were contraceptive non-users at first sex to respondents who used birth control or remained a virgin
(Expected) Parenthood	.052	.018	F2S76	Dummy variable indicating (expected) parenthood during 2 nd follow-up

Variable	Mean or Proportion*		NELS	Operationalization
	Young Women	Young Men	Measure	
				interview; grade 12 for most students
<u>Control Variables</u>				
<i>8th Grade Academic Background & Success</i>				
Educational expectations	4.811 (.022)	4.692 (.032)	BYS45	Continuous variable indicating how far in school students expect to go. Ranges from 1–6; 1 = won't finish high school (hs), 2 = will finish hs, 3 = will attend trade/vocational school after hs, 4 = will attend college, 5 = will complete college, 6 = will pursue graduate studies
Mathematics course-taking				
Algebra	.388	.384	BYS67A	Two dummy variables indicating whether respondents attended algebra once per week (1 = yes) or attended remedial mathematics once per week (1 = yes). Reference is attending general math (BYS67B)
Remedial mathematics	.048	.055	BYS67C	
Mathematics grades	4.088 (.019)	3.978 (.028)	BYS81B	Continuous variable indicating mathematics grades from grades 6–8. Ranges from 1–5; was reverse coded so that 1 = mostly F's and 5 = mostly A's.
Mathematics test scores	36.944 (.258)	37.840 (.288)	BY2XMIRR	Continuous variable indicating respondents score on the NELS administered mathematics achievement test. Test scores have been rescaled to account for potential floor and ceiling effects
<i>8th Grade Family Background</i>				
Family structure				
Stepparent household	.133	.121	BYFCOMP	Four dummy variables indicating family structure. Categories include living with both parents (reference), a single parent, a stepparent or in some other family structure
Single parent household	.165	.153		
Other household	.018	.025		
Both parents (reference)	.684	.701		
Yearly family income	9.909 (.047)	10.297 (.060)	BYFAMINC	Variable ranging from one to fifteen, or income categories ranging from "no income" to "\$200,000 or more. For reference, the mean values of family income indicate yearly family incomes that fall

Variable	Mean or Proportion*		NELS	
	Young Women	Young Men	Measure	Operationalization
Parents' education level	3.080 (.024)	3.334 (.037)	BYPARED	roughly around \$25,000 and \$34,999 in 1988. Continuous variable representing the highest level of education reported by <i>either</i> parent. Ranges from 1–6; 1 = did not finish high school, 2 = high school graduate, 3 = some college, 4 = college graduate, 5 = M.A. or equiv., 6 = Ph.D., M.D. or equiv.
Parents' educational expectations for R	8.992 (.052)	8.983 (.055)	BYP76	How far in school parent expects their son or daughter to go. This continuous variable was recoded into a dummy variable indicating whether respondents expected their son or daughter to graduate from college. This measure suggests whether parents are helping adolescents align their ambitions
Parental involvement in school	2.498 (.009)	2.372 (.014)	BYS36A BYS36B BYS36C	This is a parental involvement scale constructed from students' reports of how often they discuss programs at school, school activities and things studied in class with parents. Each variable ranges from 1 (not at all) to 3 (3 more times/wk). We average these variables to produce a validated measure of parental involvement. See Muller, Chandra. 1995. "Maternal Employment, Parent Involvement, and Mathematics Achievement." <i>Journal of Marriage and the Family</i> 57:85–100, for one of the original pieces using this measure of parental involvement in school.
Supervision & monitoring Home alone after school	.536 (.011)	.533 (.011)	BYS41	The average amount of time a respondent spends at home after school with no adult present. This continuous variable ranges from 0 to 4; 0 = none, 1 = less than 1 hour, 2 = 1–2 hours, 3 = 2–3 hours, 4 = 3+ hours (3 + hours)
# of activities rarely or never monitored (adolescent-reported)	1.222 (.023)	1.186 (.023)	BYS38A BYS38B BYS38C BYS38D	Continuous variable ranging from 0–4 indicating how many of the following activities are rarely/never monitored: homework, chore completion, television, going out with friends

Variable	Mean or Proportion*		NELS	
	Young Women	Young Men	Measure	Operationalization
# of activities not monitored (parent-reported)	1.272 (.032)	1.136 (.030)	BYS64A BYS64B BYS64C BYS64D BYS65A BYS65B BYS65C	Continuous variable ranging from 0–7 indicating behaviors for which adolescents' parents have no rules: TV programs adolescent may watch, how early/late tv may be watched, how many hours he/she may watch television overall, maintaining a certain GPA, doing homework, doing house hold chores
<i>Risk-Taking Behavior</i>				
Adolescent is a daily smoker	.036 (.003)	.039 (.006)	BYS43	Dummy variable indicating that adolescents smoke 1 or more cigarette each day
Frequency of class cutting			BYS76	Dummy variables
Frequently	.008	.021		Indicates that adolescents skip classes once a week or more, less than once a week, or never
Occasionally	.040	.050		
Never (reference)	.952	.929		
<i>Race and Ethnic Identity</i>				
Black	.137	.105	RACE	Dummy variables
Latino/a	.103	.087		Indicates reported racial/ethnic identity; Black, Latino/a, or non-Hispanic, White
Non-Hispanic, White (reference)	.760	.808		
N	4,232	3,683		

Source: National Education Longitudinal Study of 1988–1994 (NELS).

*Standard deviations are denoted in parentheses for continuous variables

¹The following continuous variables were also included in models as a series of dummy variables: students' educational expectations, students' grades, parents' education level, family income, and parents' educational expectations of their son or daughter, time spent alone after school, adolescent-reported and parent-reported monitoring, and cigarette smoking. These alternative operationalizations produced no significant differences in results.

Table 1
 Estimates from Weighted Logistic Regression Models Predicting Earning a Diploma by Gender¹

	First Sex Only		Birth Control only		Parenthood only		Full model	
	1	2	3	4	5	6	7	8
	Young Women	Young Men	Young Women	Young Men	Young Women	Young Men	Young Women	Young Men
Sexual initiation								
Early high school	-1,800 (.318) ***	-1,186 (.273) ***					-1,596 (.364) ***	-1,102 (.282) ***
Later high school	-1,004 (.287) ***	-.541 (.305)					-.854 (.303) **	-.494 (.316)
No contraception during first sex			-.703 (.262) **	-.525 (.234) *			.104 (.270)	-.179 (.245)
(Expected) Parenthood					-1.395 (.274) ***	-.930 (.428) *	-.939 (.287) **	-.733 (.411)
Intercept	.062 (.734)	.203 (.744)	-.570 (.693)	-.342 (.734)	-.277 (.738)	-.411 (.745)	.223 (.760)	.224 (.749)
N	4232	3683	4232	3683	4232	3683	4232	3683
BIC	1352.91	1310.45	1405.69	1326.73	1376.08	1328.14	1352.84	1322.92
DF	23	23	22	22	22	22	25	25

Source: National Education Longitudinal Study of 1988–1994 (NELS).

* $p < .05$

** $p < .01$

*** $p < .001$ (two-tailed test)

¹ All models control for indicators of respondents' 8th grade academic background (educational expectations, mathematics course taking, mathematics grades & mathematics test scores), 8th grade family background (family structure, yearly family income, parents' education level, parents' educational expectations, parental involvement in school, & parental supervision), 8th grade risk-taking behavior (daily smoking & frequency of class cutting), and race/ethnicity.

Table 2

Estimates from Weighted Multinomial Logistic Regression Models Predicting Four Year and Other Postsecondary Enrollment (versus No Postsecondary Enrollment) by Gender^a

	First Sex Only		Birth Control only		Parenthood only		Full model	
	1	2	3	4	5	6	7	8
	Young Women	Young Men	Young Women	Young Men	Young Women	Young Men	Young Women	Young Men
Four Year College/University Enrollment (versus No Postsecondary Enrollment)								
Sexual initiation								
Early high school	-1.274 (.182) *** <i>a</i>	-.675 (.171) ***					-1.067 (.186) *** <i>a</i>	-.539 (.180) **
Later high school	-.881 (.141) *** <i>a</i>	-.490 (.165) **					-.765 (.147) *** <i>a</i>	-.413 (.170) *
No contraception during first sex (Expected) Parenthood			-.852 (.217) *** <i>a</i>	-.683 (.195) ***	-2.163 (.425) *** <i>a</i>	-2.838 (1.102) * <i>a</i>	-.205 (.231)	-.451 (.209) *
Intercept	-10.909 (.649) *** <i>a</i>	-12.072 (.736) *** <i>a</i>	-11.291 (.653) *** <i>a</i>	-12.318 (.726) *** <i>a</i>	-11.053 (.654) *** <i>a</i>	-12.301 (.721) *** <i>a</i>	-10.839 (.656) *** <i>a</i>	-12.014 (.739) *** <i>a</i>
Other Postsecondary Enrollment (versus No Postsecondary Enrollment)								
Sexual initiation								
Early high school	-.541 (.149) ***	-.561 (.150) ***					-.479 (.160) ***	-.499 (.157) **
Later high school	-.558 (.121) ***	-.336 (.148) *					-.509 (.126) ***	-.294 (.152)
No contraception during first sex (Expected) Parenthood			-.159 (.169)	-.393 (.165) *			.192 (.183)	-.194 (.174)
Intercept	-3.372 (.512) ***	-4.437 (.504) ***	-3.566 (.512) ***	-4.674 (.495) ***	-1.017 (.218) ***	-2.63 (.378)	-.857 (.229) ***	-.177 (.350)
N	4232	3683	4232	3683	4232	3683	4232	3683
BIC	7366.11	6437.51	7421.63	6436.50	7389.44	6439.64	7356.95	6449.23
DF	46	46	44	44	44	44	50	50

Source: National Education Longitudinal Study of 1988–1994 (NELS).

* $p < .05$

**
 $p < .01$

 $p < .001$ (two-tailed test)

¹ All models control for indicators of respondents' 8th grade academic background (educational expectations, mathematics course taking, mathematics grades & mathematics test scores), 8th grade family background (family structure, yearly family income, parents' education level, parents' educational expectations, parental involvement in school, & parental supervision), 8th grade risk-taking behavior (daily smoking & frequency of class cutting), and race/ethnicity.

² Indicates a significantly larger estimated effect of an independent variable on four year versus other postsecondary enrollment.