Assessing the Benefits of Delayed Sexual Activity: A Synthesis of the Literature

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ASSESSING THE BENEFITS OF DELAYED SEXUAL ACTIVITY: A SYNTHESIS OF THE LITERATURE

OPRE Report 2020-04

May 2020

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OVERVIEW

For several decades, the federal government has supported programs that encourage adolescents to wait to have sex. This support stems in part from the evidence and expectations that delaying sexual activity can have important benefits for adolescents and society as a whole. The most direct of these benefits are reductions in teen pregnancy and sexually transmitted infections (STIs). However, research has also found benefits of delayed sexual activity extending beyond these physical outcomes, particularly for girls.

This report synthesizes the current research literature on the benefits of delayed sexual activity. Although we include research on teen pregnancy and STIs, a main purpose of the synthesis is to assess the evidence for potential benefits extending beyond these physical outcomes. We also discuss the methodological approaches researchers have developed to study the benefits of delayed sexual activity for these outcomes. The synthesis was part of a broader economic analysis that Mathematica is conducting under contract for the U.S. Department of Health and Human Services (HHS).

The project team reviewed 57 studies. These studies find that delaying sexual activity has the following effects:

- Delaying sexual activity from the early teen years to the later teen years reduces the chances of a pregnancy early in adolescence but does not result in a substantial effect on the chances of any pregnancy before age 20.
- Delayed sexual activity reduces the chances of STI transmission.
- Delayed sexual activity until age 20 reduces the chances of being married at ages 24 to 32, reduces the chances of living with an unmarried partner at ages 24 to 32, and improves reported relationship satisfaction among couples who do get married or live together at those ages.
- Among girls, delayed sexual activity until age 18 reduces the future chances of a first marriage ending in divorce, separation, or annulment.
- Delayed sexual activity does not appear to be associated with changes in other relationships.
- By reducing the chances of early childbearing, delayed sexual activity increases the chances of high school graduation among girls.
- For girls who either had sex early relative to their peers or broke up with a romantic partner in the same year they first had sex, delaying sexual activity would have reduced reported symptoms of depression in the short term.

Many studies have found associations between the timing of first sexual activity and measures of adolescent and adult development beyond those listed above. Further research is needed to understand the causal pathways underlying these associations.

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INTRODUCTION

For several decades, the federal government has supported programs that encourage adolescents to wait to have sex (Huber and Firmin 2014). In 1981, Congress authorized the Adolescent Family Life program in an effort to reduce the teen birth rate and address a perceived need for new prevention approaches. For 30 years, this program funded demonstration projects aimed at delaying adolescent sexual activity and reducing teen pregnancy through community-based educational interventions. In the 1990s, Congress authorized the Title V Abstinence Education grant program as part of the 1996 welfare reform bill. The authors of welfare reform viewed the program as part of a broader package of reforms intended to address the rise in single parenthood and nonmarital childbearing in the United States, and the associated increased risk for poverty. In 2018, Congress reauthorized the Title V program as the Sexual Risk Avoidance Education (SRAE) Program. The purpose of this program is to fund projects to implement sexual risk avoidance education, teaching participants how to voluntarily refrain from nonmarital sexual activity. As specified by the legislation, SRAE Programs must also teach the benefits associated with self-regulation, success sequencing for poverty prevention, healthy relationships, goal setting, and resisting sexual coercion, dating violence, and other youth risk behaviors, such as underage drinking or illicit drug use (U.S. Congress 2018).

Federal support for these programs stems in part from the expectation that delaying sexual activity can have important benefits for adolescents and society as a whole. The most direct of these benefits are reductions in teen pregnancy and sexually transmitted infections (STIs). If adolescents wait to have sex, they avoid the risk of teen pregnancy and the most common way of getting an STI. However, as described in this report, long-standing research has also examined the potential for the benefits of delayed sexual activity to extend beyond these physical outcomes. For example, delaying sexual activity might improve the stability or quality of youths' romantic relationships, if it gives them more time to develop their relationship skills or to learn more about what they want in a romantic partner (Harden 2012). Other studies have examined whether becoming sexually active early in life can distract from a person's performance in school (for example, Sabia and Rees 2009) or adversely affect their self-esteem or mental health (for example, Meier 2007). These studies are motivated in part by evidence that the timing of first sexual activity is correlated with a broad range of other adolescent risk behaviors and outcomes.

This report synthesizes the current research literature on the benefits of delayed sexual activity. Although we include research on teen pregnancy and STIs, a main purpose of the synthesis is to assess the evidence for potential benefits extending beyond these physical outcomes. The synthesis encompasses studies from multiple academic disciplines and many potential outcomes, including education, mental health, substance use, relationships, and delinquency and criminal activity. We also discuss the methodological approaches researchers have developed to study the benefits of delayed sexual activity for these outcomes. An appendix to the report details findings from 57 research studies the team reviewed in depth to conduct the synthesis. The synthesis was part of a broader economic analysis that Mathematica is conducting under contract for the U.S. Department of Health and Human Services (HHS). This research, referred to as the Savings from

Sexual Avoidance and Empowerment over Risks (SSAvER) project, aims to quantify the potential benefits of delayed sexual activity by estimating what happens when adolescents delay sexual activity and the economic savings that might result. The SSAvER team will use the findings from this research synthesis to inform its approach to conducting an economic analysis of these potential savings.

BACKGROUND

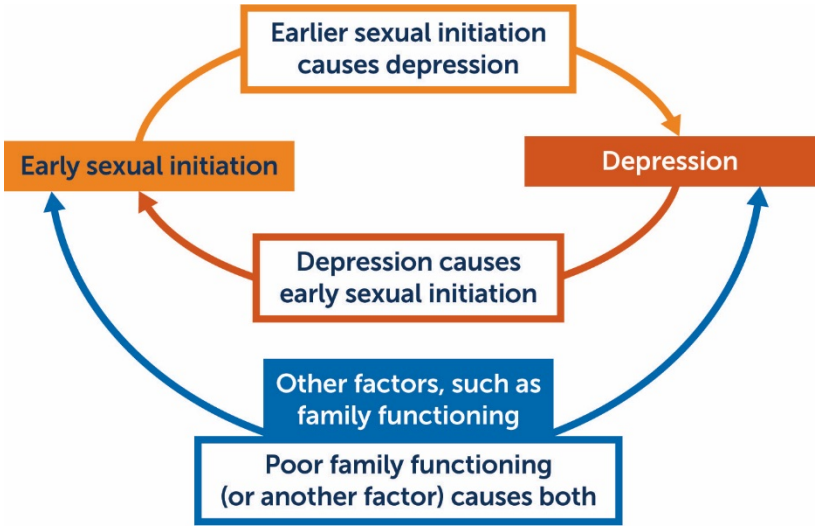
Data from national surveys show that the timing of first sexual activity varies widely in the United States. As of 2017, about 38 percent of high school girls and 41 percent of high school boys report ever having had sexual intercourse (Kann et al. 2018). By ages 18 to 24, these percentages increase to 82 percent of women and 84 percent of men (Copen et al. 2016). By ages 35 to 44, a full 99 percent of men and women report having had sexual intercourse (Copen et al. 2016). Rates of reported sexual activity among high school students have fallen in recent decades and are at their lowest since the early 1990s, when the Youth Risk Behavior Surveillance System first collected data on sexual risk avoidance (Twenge and Park 2019). Recent declines in sexual activity are apparent for black, white, and Hispanic adolescents and in most states, suggesting this trend is not driven by a particular demographic group (Ethier et al. 2018).

The variation in the timing of sexual activity happens at the same time people are going through many other changes and milestones in life. The developmental periods from adolescence through early adulthood are marked by significant changes in a person's relationships, social roles, and responsibilities. Beginning in adolescence, many people have their first romantic relationships, which in turn can shape the relationship experiences, skills, and attitudes they carry into adulthood. High school completion and postsecondary education are also widely seen as important milestones in the transition from adolescence to adulthood. And, after completing school, people are expected to become self-sufficient and find productive ways to contribute to the economy. The period from adolescence through early adulthood also marks a time of increasing rates of alcohol and substance use, and of delinquent behaviors that in some cases lead to involvement with the criminal justice system or to adult criminal activity (Thornberry and Krohn 2001, Kann et al. 2018).

Researchers have often found a correlation between the timing of first sexual activity and other measures of adolescent and adult development. For example, studies of educational outcomes have found a correlation between the timing of first sexual activity and measures of high school grade point average, high school dropout and completion, and postsecondary aspirations and enrollment (for example, McCarthy and Grodsky 2011; Rector and Johnson 2005). Similarly, studies of crime and delinquency have found a correlation between the timing of first sexual activity and measures of delinquent behaviors in adolescence (such as property damage or shoplifting) and more serious criminal convictions as adults (for example, Armour and Haynie 2007; Donahue 2012). Studies of mental health have found a correlation between the timing of first sexual activity and measures including self-esteem and depression (for example, Jamieson and Wade 2011; Meier 2007).

If a girl delays sexual initiation, her chances of becoming pregnant are zero. The causal pathway is clear. However, for other outcomes, correlations may be open to multiple interpretations. As illustrated in Exhibit 1, a correlation of sexual initiation with depression might indicate that sexual initiation causes depression. Alternatively, adolescents may be more likely to have sex at younger ages if they feel depressed. Finally, the correlation might result from an unmeasured third factor, such as poor family functioning, causing both depression and early sexual initiation.

Exhibit 1. Potential associations between delayed sexual activity and depression



Much of the existing research literature has focused on understanding whether delaying sexual initiation causes changes in outcomes in order to strengthen the evidence base for policy-making and program design.

SEARCH PARAMETERS AND METHODS

To synthesize the current research literature on the benefits of delayed sexual activity, the SSAvER team sought to identify studies from diverse fields, representing a range of methodologies and examining many different outcomes of potential interest. The literature on the benefits of delayed sexual activity is large and diverse, spanning the fields of public health, economics, education, sociology, demography, criminology, psychology, and medical sciences. The team sought to capture this diversity in the synthesis by identifying studies from multiple sources and considering a broad range of outcomes of potential interest.

Working with a research librarian, the team started by conducting a keyword search of nine electronic citation databases (Academic Search Premier, CINAHL, Scopus, Cochrane, MEDLINE, PsycINFO, Education Research Complete, Education Research Information Center, and EconLit). To identify relevant studies from these databases, the team developed search terms indicative of the subject matter, such as "delayed sexual activity" or "early intercourse," and paired them with terms indicative of study methodology, such as "longitudinal study" or "quasi-experimental" (Exhibit 2). Studies had to include at least one subject term and one

methodological term to be identified through the search. The search included studies published from 2000 to 2018.

The SSAvER team supplemented the keyword search with four other search strategies. First, the team reviewed the reference lists of existing research syntheses conducted by Ascend (2016) and by the team conducting the HHS Model on Risk Avoidance Theory and Research, Informing an Optimal Health Model project (see Adamek et al. 2019). Both efforts included recent, comprehensive reviews of research on potential outcomes correlated with sexual initiation. Second, the team conducted a "snowball" search by looking for studies both cited by and citing the studies in the reference list of the Ascend (2016) research synthesis. Third, the team examined the curricula vitae of the authors who wrote many of the initially identified studies. Fourth, the team asked colleagues for additional recommendations of studies and conducted informal Internet searches.

Exhibit 2. Search terms

Subject terms	"first sex*" or "first intercourse" or "sex*" within five words of "before age" or "early sex*" or "early intercourse" or "delay* sex*" or "delay* intercourse" or "sex*" within three words of "initiat*".
Methodological terms	"longitudinal stud*" or "time varying effect model*" or "regression" or "quasi-experimental" or "quasiexperimental" or "statistic*" within three words of "techniques" or "statistic*" within three words of "adjust*" or "cross-sectional stud*" or "instrumental variable*" or "fixed effect*" or "difference-in-differences" or "comparison group*"

Note: The "*" denotes a wildcard that can capture any combination of letters or words appearing in its place.

These search strategies uncovered an initial list of over 350 relevant studies. Most of these studies used data from the United States, though some examined data from other high-income countries, such as the United Kingdom, the Netherlands, and South Korea. The team did not search for studies on individuals from low- or middle-income countries. Among the studies focusing on the United States, many used data from nationally representative surveys, such as the National Longitudinal Surveys of Youth or the National Longitudinal Study of Adolescent to Adult Health (Add Health). Other studies used smaller data sets for a single city, state, or community. The studies reflected a variety of research questions and hypotheses. Some studies sought to narrowly estimate the relationship between delayed sexual activity and a single outcome of interest, whereas others examined relationships across multiple outcomes. Similarly, some studies focused narrowly on delayed sexual activity as the main or only predictor variable of interest, whereas others included delayed sexual activity as one of many predictor variables.

From these initial search results, the SSAvER team selected a purposive sample of 57 studies for more in-depth review. To help identify studies providing the most rigorous evidence on cause-and-effect relationships, the team first selected studies that focused on delayed sexual activity as the main predictor variable of interest. The team excluded studies that used delayed sexual activity as only one of many control variables and were therefore unlikely to provide rigorous evidence on cause-and-effect relationships between delayed sexual activity and the outcomes of interest. It should be noted that the exclusion of these studies does not necessarily mean that there is no causal relationship between delayed sexual activity and the outcomes they examined. It does mean, however, that more research is needed to demonstrate whether the correlation found in the excluded research is truly causal or if other factors are at work. In addition, because

the effects of delayed sexual activity might vary by national social or political context, the team also excluded studies that were conducted outside the United States. Within the set of studies that remained, the team aimed to select a subset of 55 to 60 that captured the diversity of the research in terms of the statistical methods applied, outcomes examined, and authors' academic disciplines (public health, demography, psychology, and so on). The number of studies was determined based on available resources.

For each selected study, the team read the full text of the study, documented the methods and data used, and recorded all relevant estimates of the relationship between delayed sexual activity and any outcome of interest. The team recorded information for two types of estimates: (1) comparisons of individuals who had initiated sexual activity at different times or ages (for example, before or after age 18, or before or after marriage) and (2) contemporaneous comparisons of adolescents who had and had not yet initiated sexual activity. For each estimate, the team also noted the outcome examined, the groups contrasted, the sample used for the estimate, and the substantive finding. The completed study descriptions appear in the appendix to this report, organized by outcome domain.

After distilling information from each study, the SSAvER team analyzed the literature both as a whole and by the type of outcome considered. When looking across outcome domains, the team sought to understand the methods and definitions used by study authors, with a focus on identifying the most rigorous methods employed to assess the causal effects of delaying sexual initiation. When looking within outcome domains, the study team aimed to understand the extent of the evidence on the causal effects of delayed sexual initiation. The team grouped outcomes into the following eight domains: (1) pregnancy and childbearing; (2) physical health, including the transmission of STIs; (3) relationships; (4) the path to economic self-sufficiency; (5) delinquency and criminal activity; (6) mental health and emotional well-being; (7) risky sexual behavior; and (8) substance use. Then the team assessed the extent of evidence based on the number of studies that examined outcomes in the domain, the rigor of the methods they used, and the variation in their findings.

FINDINGS

This section of the report synthesizes key findings from the 57 studies included in the SSAvER team's in-depth review. Because this analysis aimed to identify estimates of the causal effects of delayed sexual activity on outcomes, the team focused on those studies that used more rigorous statistical methods to identify impacts of sexual initiation with a causal interpretation. Detailed findings for each individual study, regardless of methods, are provided in the appendix.

The analysis generated insights both on how this research has been conducted and the findings it has produced. Authors used a wide variety of methods and definitions in assessing the effects of delayed sexual initiation. The extent of evidence available also varied greatly across domains. As expected, we find evidence of relationships between delayed sexual initiation and both pregnancy and STI transmission. We also find some evidence of effects within the domains of relationships, high school graduation, and mental health. Research examining outcomes related to delinquency and criminal activity, risky sexual behavior, and substance use is less definitive.

1. Findings on the methods used in reviewed studies

Studies define sexual activity and measure the timing of first sexual activity in different ways

A key consideration for interpreting the substantive findings from this synthesis is understanding how the studies define sexual activity and measure the timing of first sexual activity. Studies used a wide variety of definitions, with variation based on type of activity and treatment of consent.

Most studies define sexual activity as vaginal intercourse. A smaller number also include oral or anal intercourse. According to national estimates, age at first vaginal intercourse captures the age of first oral, anal, or vaginal intercourse for 80 percent of adolescents (Halpern and Haydon 2012). For the other 20 percent, oral or anal intercourse occur at earlier ages than vaginal intercourse. The age at first vaginal intercourse is also the same as the age of first oral, anal, or vaginal intercourse for 70 percent of adolescents who either report having had same-sex partners or not identifying as heterosexual (Goldberg and Halpern 2017). To measure variation in the timing of first sexual activity, some studies have used a continuous variable for age at sexual initiation (usually in years, but sometimes in months). Other studies use categorical measures such as initiating sexual activity before a certain age, school grade level at initiation, or age at initiation compared with an individual's peers.

Most studies assess the benefits of delayed sexual activity without respect to the specific reasons a person might or might not have sex. For example, adolescents who delay sexual activity might be doing so either by choice or from lack of opportunity. Reasons for choosing to engage in sexual activity (or not) also vary widely (Meston and Buss 2007). Some researchers statistically adjust their analyses for an individual's dating behavior or relationship status. In a few cases, researchers have also adjusted for an individual's reported attitudes or desire to have sex. However, none of the studies identified by the SSAvER team reported estimates specific to individuals who have voluntarily delayed sexual activity as a conscious choice. As another example, to distinguish the consequences of voluntary sexual activity from the consequences of sexual assault or abuse, some researchers omit individuals who initiated sexual activity at a very young age (for example, before age 11 or 12). This approach is based on research indicating that a substantial amount of sexual activity at these ages is involuntary (for example, Finer and Philbin 2013). For similar reasons, other researchers statistically adjust their analyses for the experience of forced sexual activity. In many cases, however, studies cannot distinguish voluntary from involuntary sexual activity with the available data.

Researchers have developed three strategies to more rigorously identify the impacts of delayed sexual initiation

Most studies included in our review examined the correlation between delayed sexual initiation and outcomes of interest using regression analysis. But the SSAvER team identified three strategies used by authors to more rigorously identify impacts of sexual initiation with a causal interpretation: propensity score analysis, analysis of siblings or twins, and instrumental variables (IV) analysis.

Several studies used propensity score analyses to test for cause-and-effect relationships. These analyses try to estimate the probability that an individual will delay sexual activity and statistically adjust for this probability. Several different techniques for using the propensity score are feasible, including adding the propensity score to a regression model as a predictor of the outcome, weighting data based on the propensity score, stratifying analysis based on the propensity score, or matching individuals in the data based on the propensity score. Past research has shown that propensity score methods can provide estimates of causal relationships when the method is carefully applied and the propensity score is based on measures closely related to the outcomes of interest (Cook et al. 2008; Imbens and Wooldridge 2009). However, unmeasured confounding factors still present a risk when using this method (Pearl 2000).

Other studies have used data for siblings or twins to produce estimates of the benefits of delayed sexual activity. By analyzing individuals in the same family, these studies can eliminate a large number of intrinsic factors that are difficult to measure and potentially confound estimates. Using twins has further allowed some researchers to compare individuals who were in the same family and experienced family-level events at the same age; studies of identical twins go one step further to compare individuals with the exact same genes. By comparing such similar individuals, these analyses remove the potential for a large number of confounding factors to influence the outcomes of interest. However, they cannot eliminate concerns about confounding factors that differ for siblings or twins. For example, even though identical twins have the same genes, they can still have different experiences, abilities, and personality traits. If not controlled for in regression analyses, these differences can lead to misleading estimates of causal effects.

A third group of studies has used instrumental variable analyses to test for cause-and-effect relationships. To use this technique to estimate the benefits of delayed sexual activity on an outcome of interest, researchers must find a variable (called an instrument) that is related to the timing of sexual initiation but does not otherwise predict the outcome. For example, Sabia and Rees (2009) used a girl's age at first menstruation as an instrument when analyzing the impact of age at sexual initiation on educational outcomes. Age at first menstruation is correlated with age at sexual initiation but does not likely predict educational achievement in other ways, if characteristics like socioeconomic background are held constant. Instrumental variables can provide credible causal estimates when an instrument has the required properties. However, if an instrument does not satisfy these requirements, the estimates might not reflect the intended relationship (Bound et al. 1995, Angrist and Krueger 2001).

2. Findings related to the causal effects of delayed sexual initiation

Delaying sexual activity until age 20 eliminates the chances of teen pregnancy

Delaying sexual activity until age 20 eliminates the chances of becoming pregnant or getting someone pregnant as a teen. The magnitude of this effect can be measured by looking at pregnancy rates among teens who report having had sex. Finer and Philbin (2013) calculated national estimates of teen pregnancy rates by combining survey data on rates of sexual activity with administrative data on births and abortions by age. They further adjusted the rates to account for the estimated number of pregnancies resulting in miscarriage. According to their estimates, 19.4 percent of women who had sex as teenagers (that is, before they turned 20)

became pregnant during the course of the year they were age 19. Therefore, if the average woman who initiated sexual activity in her teens chose to delay sex until her 20th birthday, it would reduce her chances of becoming pregnant during the year she was 19 from 19.4 percent to 0 percent (and would reduce her chances of any pregnancy before age 20 by at least this amount).

Delaying sexual activity from the early teen years to the later teen years reduces the chances of a pregnancy early in adolescence but does not result in a substantial effect on the chances of any pregnancy before age 20

Delaying sexual activity until a certain age or developmental milestone will necessarily reduce the chances of pregnancy before that point. But, the evidence does not indicate that delaying sex from the early teen years to the later teen years has much effect on the overall chances of teen pregnancy.

Research by Finer and Philbin (2013) suggests that pregnancy is rare in early adolescence, even among sexually active teens. For example, the authors show that 3 percent of girls who initiated sexual activity at or before age 13 became pregnant during the year they were age 13. Delaying sexual activity until age 14 would decrease the chances of pregnancy at or before age 13 to zero. But, because of low rates of pregnancy among young, sexually active teenagers, delaying sexual initiation from age 13 until age 14 or 15 might have only a modest effect on the chances of any pregnancy before age 20. Finer and Philbin suggest that the lower pregnancy rate among younger adolescents likely reflects less frequent sexual activity at those ages.

Studies by Huibregtse et al. (2011) and Donahue (2012) found consistent results using data from siblings. The use of sibling data allowed these studies to account for all the characteristics shared by siblings, broadly termed *family characteristics*, that might affect both the timing of sexual initiation and the chances of teen pregnancy (for example, childhood poverty, household composition, and family dynamics). Huibregtse et al. (2011) found that, after controlling for such family characteristics, there was no statistically significant difference in the chances of teen pregnancy for individuals who initiated sexual activity at age 16 or earlier and those who did so later. Donahue (2012) found a similar result, comparing siblings who initiated sexual activity at age 15 or earlier and those who did so later.

Delayed sexual activity reduces STI transmission

As with teen pregnancy, the physical connection between sexual activity and STI transmission means that delaying sexual activity helps to reduce the chances of acquiring an STI. The literature explores the magnitude of this effect in both adolescence and emerging adulthood.

Forhan et al. (2009) used nationally representative data from the National Health and Nutrition Examination Survey to calculate STI rates for teens ages 14 to 19. These rates can be used to quantify the magnitude of the effect of sexual initiation on STI transmission. Forhan et al. found that about 38 percent of females in this age range who had ever had vaginal, anal, or oral sex had one of five common STIs (gonorrhea, chlamydia, trichomonas, herpes simplex virus 2, or human papillomavirus), compared with 7 percent of females who had never had sex. For the latter

group, the rate of 7 percent reflects STI transmission through a means other than sexual intercourse, such as through medical procedures or from one's mother during birth. The study authors also estimated that the odds of having an STI were 70 to 80 percent lower for females who reported having never had sex than for those who reported having had sex with (exactly) one lifetime partner.

Additional evidence on how delayed sexual activity affects the chances of STI diagnoses comes from a study by Kugler et al. (2017). This study used data from the Add Health to examine the impacts of initiating sexual activity (defined as vaginal intercourse) before age 15 on the chances of being diagnosed with an STI between ages 19 and 21. To help separate the causal effects of the timing of sexual activity from other potential confounding factors, the study authors used propensity score methods to account for 59 baseline characteristics measured before any of the sample members had become sexually active (at ages 11 to 13). For the overall sample, the study found that adolescents who initiated sexual activity before age 15 were 2.7 times as likely to report a recent STI diagnosis at ages 19 to 21. Although the higher rates of STI diagnoses at these ages could result from greater STI transmission at these ages (for example, because of riskier sexual behavior), STI diagnoses might be higher because of youth-acquired STIs earlier in adolescence. Many individuals living with STIs are asymptomatic and do not know or suspect they might have an infection (Fanfair et al. 2013). Therefore, differences in diagnosis rates at ages 19 to 21 do not necessarily imply differences in transmission rates at these ages. Additional subgroup analyses showed that the effects found in this study were driven primarily by women; differences estimated for men were not statistically significant.

Delayed sexual activity has longer-term consequences for romantic relationships but results vary by measure of delay and individual characteristics

Many studies have examined whether and how the timing of first sexual activity affects a person's future romantic relationships. Some of these studies look at whether people who become sexually active earlier in life go on to have a greater number of partners. Other studies examine how the timing of first sexual activity might affect the characteristics of romantic relationships, including the future chances of cohabitation, marriage, and divorce. In general, these studies have found that delayed sexual activity affects romantic relationships for some, though not all, individuals. The measure of delay is also an important determinant of the extent of the effect.

Five studies used careful methodological approaches to assess the link between the timing of first sexual activity and the number of future relationships. Overall, these studies suggest that delaying sexual initiation from mid to late adolescence decreases the number of sexual partners in emerging and early adulthood, with stronger evidence of an association for men than for women. However, findings differed across the analyses, and in some cases there was no evidence of a statistically significant effect. Huibregtse et al. (2011) used data from a sample of twins ages 24 to 29 to account for family-level differences among individuals and examined whether initiating sexual activity before or after turning 17 affected the number of partners the sample members reported as adults. The study authors constructed separate measures for (1) the number of sexual partners the sample members described as "regular" and (2) the number of partners

they described as "casual." For men ages 24 to 29, the study authors found that initiating sexual activity before age 17 was associated with a larger number of casual partners in the past year but no significant change in the number of regular partners in the last year or the number of lifetime partners (regular or casual). In contrast, estimates were not statistically significant for women. Donahue (2012) conducted a similar analysis using a different data set on siblings ages 18 to 21. Specifically, this study examined whether initiating sexual activity before or after turning 16 predicted the total number of sexual partners sample members (ages 18 to 21) reported having in the past year. Donahue found that, after accounting for shared family characteristics, there were no significant differences in the number of reported sexual partners based on timing of sexual initiation. In a third analysis using a similar approach, Harden (2012) found that delaying sexual initiation until age 20 was associated with having fewer romantic partners compared with initiating sexual activity between ages 15 and 19 (but there was no significant difference in the number of partners for those who initiated before 15 versus between 15 and 19). A fourth study, by Kugler et al. (2017), used propensity score methods applied to data from Add Health. This study found that adolescents who initiated sexual activity before age 15 were about three times as likely to report having had more than one partner in the past year at ages 19 to 21.

Harden (2012) also examined other relationship outcomes and found that delaying sexual activity until age 20 or later could affect individuals' romantic relationships in their 20s and early 30s. This study used data on siblings ages 24 to 32 to estimate the effects of sexual initiation controlling for factors that vary at the family level. The specific outcomes examined included scores on a relationship dissatisfaction scale, the likelihood of cohabiting with a nonmarital partner, and the likelihood of having ever been married. Harden's analysis compared two types of sibling pairs: (1) pairs in which one sibling initiated sexual activity before age 15 and one sibling initiated between ages 15 and 19 and (2) pairs in which one sibling initiated sexual activity between ages 15 and 19 and one sibling initiated after age 19. For the first group of sibling pairs, the study found no statistically significant difference in relationship outcomes at ages 24 to 32. By contrast, for the second group of sibling pairs, the study found several differences. Compared to their siblings who initiated sexual activity between ages 15 and 19, siblings who delayed sexual activity until after 19 reported having lower average scores on a relationship dissatisfaction scale. They were also less likely to have ever cohabited with a nonmarital partner or to have ever been married. Taken together, these differences suggest that delaying sexual activity until age 20 or later may both slow entry into cohabitation and marriage and improve reported quality of relationships. The study did not measure impacts on relationship outcomes beyond ages 24 to 32. Examining older individuals could be useful to measure outcomes such as marriage and divorce, especially given recent increases in the typical ages individuals experience these outcomes (Rotz 2016).

Finally, Paik (2011) used a method similar to those based on the propensity score to examine the relationship between delayed sexual activity and the likelihood of divorce among women ages 16 to 44 who had ever been married. The results suggest that individuals who delayed sex until age 18 or later were less likely to have their first marriage result in separation, divorce, or annulment. Further analyses suggest these differences were driven by women who initiated sexual activity prior to age 16 or said that their first sexual activity was not fully wanted.

Delayed sexual activity does not appear to be associated with changes in other relationships

There is less evidence suggesting that delayed sexual activity affects nonromantic relationships. Several papers examined whether sexual initiation influenced an adolescent's relationship with their parents and communities but results were mixed. For example, Sabia (2007b) used instrumental variables analysis and several other methodological approaches to examine the link between whether or not youth ages 13 to 18 had initiated sexual activity and the adolescents' feelings of connectedness to their schools. McCarthy and Grodsky (2011) also used a technique similar to propensity score methods to explore the relationship between whether or not students in grades 8 to 12 had initiated sexual activity and school attachment. Across the two studies, the results showed no consistent pattern of evidence favoring students who delayed sexual activity or those who had already initiated sexual activity.

By reducing the chances of early childbearing, delayed sexual activity increases the chances of high school graduation among girls

A series of related studies by Sabia and colleagues provided rigorous evidence on how the timing of first sexual activity influences educational outcomes (Sabia 2007a; Sabia 2007b; Sabia and Rees 2009; Sabia and Rees 2011), finding mixed evidence of effects. These studies used instrumental variables analyses, sibling data, and several other methodological approaches to examine the impacts of delayed sexual activity on outcomes including high school grade point average, college aspirations, high school graduation, and college attendance. For girls, some (though not all) of the instrumental variables analyses show that early sexual activity reduces the chances of graduating high school. But the effect of early sexual activity on high school completion becomes statistically insignificant once the authors control in their regressions for early childbearing. This suggests that early childbearing might act as a mechanism through which early sexual activity increases the risk of high school dropout. For other educational outcomes for girls, and for all educational outcomes for males, there is no consistent evidence of a statistically significant impact across estimation strategies.

Delayed sexual activity may have short-term benefits for mental health among girls in some contexts

Studies using rigorous methods suggest that the timing of first sexual activity has some short-term effects on depression for girls, but that the effects depend on the context of the relationship and do not persist into adulthood. Meier (2007) applied propensity score methods to Add Health data to study the short-term links between the timing of first sexual activity and subsequent depression. Looking across two survey waves about one year apart, the study found a statistically significant association between sexual initiation and depression among girls ages 11 to 18. The association was driven largely by girls who (1) had sex early relative to their peers or (2) broke up with a romantic partner in the same year they initiated sexual activity. For boys, the study found no statistically significant association between sexual initiation and average depression scores. A subsequent study by Sabia and Rees (2008) reached similar conclusions based on the same data set but using different methods. Sabia and Rees used instrumental variables analysis and several other methodological approaches to examine scores on an overall depression scale and an indicator for major depression, among adolescents ages 14 to 18. For girls, the study

found that sexual initiation at these ages was associated with an increased likelihood of major depression. Findings for boys' and for girls' scores on other outcomes, namely the overall depression scale, were not statistically significant in most models that used statistical methods to isolate causal effects.

There is little evidence to suggest that these short-term effects on depression transfer to other aspects of mental health or persist into adulthood. The study by Meier (2007) found some evidence that self-esteem dips after sexual initiation among adolescent girls who have sex earlier than their peers, especially if the sexual activity occurred outside of a romantic relationship. However, the subsequent study by Sabia and Rees (2008) found no link between the timing of first sexual activity and self-esteem using instrumental variables analysis and other methods that adjust for confounding personal factors. Both Donahue (2012) and Kugler et al. (2017) also examined whether age at sexual initiation has longer-term impacts on depression for older adolescents. Both studies found no evidence of longer-term impacts after adjusting for personal and family characteristics that could influence both the timing of first sexual activity and later depression.

More research is needed to determine whether delayed sexual activity affects delinquency or crime

Several studies have used careful methodological approaches to assess the link between the timing of first sexual activity and adolescent delinquency and crime, but estimates vary substantially across these studies. Harden et al. (2008) examined data for pairs of twins ages 18 to 28. The study measured delinquency with a composite index of behaviors such as property damage, theft, and drug dealing. The study found that when comparing pairs of same-sex twins, the twin with the later age at first sexual activity had the higher delinquency score—a pattern opposite of expectations. Donahue (2012) used a different sibling data set to analyze criminal convictions among older adolescents ages 18 to 21. The study found that, after accounting for family background, there was no statistically significant difference in criminal convictions between adolescents who had initiated sexual activity before or after they turned 16. Similarly, Butera et al. (2014) found no causal effect of sexual initiation before age 15 on delinquent behaviors among a sample of 11th- and 12th-grade students. These authors used propensity score methods to account for possible differences between groups of students who initiated sexual activity at different ages.

Other studies have examined the potential link between the timing of first sexual activity and school disciplinary outcomes, such as unexcused absences or suspensions, producing similarly variable results. For example, Sabia (2007b) used instrumental variables analysis and several other methodological approaches to study the effects of sexual initiation on the likelihood of receiving an out-of-school suspension or having any unexcused absences. The study produced separate estimates for girls and boys and younger (ages 13 to 15) and older (ages 16 to 18) adolescents. Sabia found some evidence that delaying sexual activity reduced the likelihood of unexcused absences for boys ages 13 to 15, but the results otherwise suggested no statistically significant relationship between sexual activity and school disciplinary outcomes. Using a method similar to those based on a propensity score, McCarthy and Grodsky (2011) also

analyzed measures of problems in school, truancy, and school disciplinary action among students in grades 8 to 12. Although some estimates suggest sexual initiation increases problem behaviors, others suggest no statistically significant link.

More evidence is needed to determine the impact of delayed sexual activity on substance use and involvement in sexual risk behaviors

Despite a well-known correlation between adolescent sexual activity and other risk behaviors, including underage alcohol consumption, substance use, and risky sexual behaviors, few studies have used rigorous statistical methods to examine the causal effects of delayed sexual activity on these outcomes. Therefore, more evidence is needed on these relationships.

Few studies have examined whether this connection reflects an impact of first sexual activity on later substance use. One exception is the study by Donahue (2012) cited earlier in this section. This study used sibling data to explore the relationship between sexual initiation before age 16 and alcohol consumption at ages 18 to 21. It found higher levels of alcohol consumption among adolescents who initiated sexual activity before age 16 than for those who initiated later. None of the other studies identified in the review used more rigorous methods to assess the relationship between the timing of first sexual activity and later substance use.

Similarly, evidence on sexual risk behaviors that might be linked to the timing of first sexual activity, such as the consistency of contraceptive use or sexual activity with high-risk partners, is limited, with few rigorous studies having examined these outcomes. Two exceptions are studies by Huibregtse et al. (2011) and Samek et al. (2014). Both studies used the same sibling data set to examine whether the timing of first sexual activity could lead to riskier sexual activity later in life. Huibregtse et al. examined sexual behavior under the influence of drugs or alcohol at ages 24 and 29. Samek et al. examined a composite index of (1) sexual activity under the influence of drugs or alcohol at age 24 and (2) the number of casual sex partners at age 24. Both studies found that any correlation between the timing of first sexual activity and later risk-taking behavior likely occurs because an unmeasured confounding factor, such as impulse control, affects both outcomes, rather than the timing of first sexual activity causing later risk-taking behavior. None of the studies identified in the review estimated the impacts of delayed sexual activity for subsequent contraceptive use.

SUMMARY AND CONCLUSIONS

What are the benefits of waiting to have sex? The potential benefits for teen pregnancy and STIs are clear. Researchers have also found correlations between the timing of first sexual activity and a host of outcomes, including educational attainment, single motherhood, poverty, depression, and overall happiness in adulthood.

The SSAvER team conducted an in-depth assessment of the literature. Included studies spanned multiple academic fields, substantive areas, and analytic approaches. Many attempted to move beyond the estimation of correlations and toward the development of an understanding of the causal effects of the timing of sexual initiation.

Based on reviews of 57 studies, the SSAvER team found that researchers have used a variety of methods to address the challenge of identifying cause and effect. Three methods in particular stood out: propensity score analysis, analysis of differences among siblings or twins, and instrumental variables analysis. Studies based on these methods provide the most rigorous estimates of the benefits of delayed sexual activity. In addition, the team found that studies define sexual activity and measure the timing of first sexual activity in different ways, which can affect the substantive interpretation of results.

Delaying sexual activity until age 20 eliminates the chances of becoming pregnant as a teen. However, while delaying sexual activity from the early teen years to the later teen years eliminates the chances of a pregnancy early in adolescence, it does not significantly reduce the chances of any pregnancy before age 20. For STIs, one study found that the odds of having an STI were 70 to 80 percent lower for adolescent girls who reported having never had sex than for girls who reported having had (exactly) one lifetime sexual partner. Because people can get STIs for reasons other than sexual activity (for example, through medical procedures or from one's mother during birth), delayed sexual activity does not completely eliminate the chances of getting an STI.

Delaying sexual activity affects non physical outcomes as well. Studies find that delayed sexual activity affects romantic partnering in adulthood. In particular, delaying sexual activity until age 20 or later reduces the chances of being married at ages 24 to 32, reduces the chances of living with an unmarried partner at ages 24 to 32, and improves reported relationship satisfaction among couples who do get married or live together at those ages. Furthermore, among girls, delaying sexual activity until age 18 reduces the future chances of a first marriage ending in divorce, separation, or annulment.

For females but not males, studies find benefits of delayed sexual activity for certain educational and mental health outcomes. For education, delayed sexual activity increases the chances of graduating high school. This effect appears to be driven by childbearing among individuals who are sexually active during high school. For mental health, delayed sexual activity has short-term effects in reducing the chances of depression—an effect driven largely by girls who (1) had sex early relative to their peers or (2) reported breaking up with a romantic partner in the same year as they initiated sexual activity.

Studies have found correlations between timing for first sexual activity and numerous other outcomes, such as juvenile delinquency, adult criminal activity, alcohol and substance abuse, and later sexual risk-taking. Further research is needed to identify the causal pathways underlying these associations.

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Appendix:
Detailed study findings

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This appendix provides details on each study reviewed by the Savings from Sexual Avoidance and Empowerment over Risks (SSAvER) team to conduct this synthesis. In total, the team reviewed 57 studies; details on each are provided in this appendix. For each study, team members read the full text, documented the methods and data used, and recorded all relevant estimates of the relationship between delayed sexual activity and any outcome of interest. For each estimate, the team also noted the outcome examined, the groups contrasted, the sample used for the estimate, and the substantive finding. Substantive findings highlighted in the main body of the report are based on the subset of studies that used one of three methods to more rigorously identify the causal effects of delayed sexual activity: propensity score analysis, analysis of siblings or twins, and instrumental variables. We again note that the exclusion of research findings that did not reach the level of methodological rigor necessary for this report does not necessarily mean that there is not a cause-and-effect relationship between sexual delay and certain findings. It does mean that further research is needed to confirm whether the relationship is causal or if the findings are due to other factors.

This appendix groups studies into eight domains based on the outcomes considered: pregnancy and childbearing (Section A), physical health (Section B), relationships (Section C), the path to economic self-sufficiency (Section D), delinquency and criminal activity (Section E), mental health and emotional well-being (Section F), risky sexual behavior (Section G), and substance use (Section H). In our discussion of findings for each domain presented in this appendix, we provide information on both (1) the total number of studies reviewed and (2) which studies used more rigorous methods to identify causal effects and are therefore highlighted in the main body of the report. Studies examining outcomes in multiple domains are listed in each relevant section.

A. Findings within the pregnancy and childbearing domain

The Savings from Sexual Avoidance and Empowerment over Risks (SSAvER) team reviewed seven studies that examined at least one outcome related to pregnancy and childbearing (Table A.1). Finer and Philbin (2013) constructed national estimates of rates of pregnancy outcomes by age. Donahue (2012) and Huibregtse et al. (2011) used different data sets to examine whether the timing of sexual initiation in adolescence affects the chances of teen pregnancy. Finger et al. (2004), Goldberg (2018), Scott et al. (2011), and Wu and Martin (2015) examined whether timing of sexual initiation had possible longer-term consequences for pregnancy and birth outcomes in adulthood.

The studies used a variety of data sets and methods. Finer and Philbin (2013) calculated descriptive pregnancy rates by combining data from multiple sources. Donahue (2012) and Huibregtse et al. (2011) used sibling data to help separate the causal effects of the timing of sexual initiation from other factors. Within these studies, Donahue's bivariate family model and Huibregtse et al.'s discordant twin model provided the most plausibly causal information. The studies by Finger et al. (2004), Goldberg (2018), Scott et al. (2011), and Wu and Martin (2015) used regression analysis to correct for some observable differences between individuals who initiated sexual activity at different ages, but the studies did not use propensity score methods, sibling data, or instrumental variables analysis to identify causal effects.

Table A.1. Studies examining outcomes related to pregnancy and childbearing

Outcome	Sample characteristics	Contrast	Findings
Donahue (2012): *Using longitudinal data from the Children of the National Longitudinal Survey of Youth, the author explored the relationship between sexual initiation before age 16 and a number of outcomes. The author fit several regression models, using logit models for binary outcomes, multinomial regression for categorical outcomes, and ordinary least squares for other outcomes. All models included a family-level random effect. Models 1 and 2 included all individuals, with Model 1 including no covariates and Model 2 adjusting for the characteristics of individuals' mothers, including mothers' demographic and socioeconomic characteristics and mothers' adolescent behavior. Models 3, 4, and 5 included only individuals with a sibling in the data set. Model 3 included controls for mother's characteristics, Model 4 included controls for mother's characteristics and siblings' ages at sexual initiation, and Model 5 included controls for mother's characteristics, siblings' ages at sexual initiation, and a propensity score measuring the likelihood of sexual initiation before age 16. The author estimated the propensity score using measures of an individual's demographic characteristics, substance use before age 14, dating behavior before age 14, problem behavior, peer pressure, impulsivity, sensation seeking, home environment, and cognitive ability. The author then used bivariate family models to estimate the proportion of the relationship between sexual initiation and each outcome of interest within the sample of siblings that is attributable to siblings' common genes, shared environment, and other influences.*			
Pregnancy before age 20	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 5.28 times as likely to have had an adolescent pregnancy as those who initialed sexual activity at age 16 or later. In a model that adjusted for mother-level covariates, these individuals were 3.83 times as likely to have had an adolescent pregnancy. The differences were statistically significant.
Pregnancy before age 20	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 3.95, 3.12, and 2.66 times as likely (respectively) to have had an adolescent pregnancy as those who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that the association was mostly attributable to common genetic factors.
Finer and Philbin (2013): *The authors presented descriptive statistics on rates of pregnancy outcomes (that is, abortions, births, or fetal losses) by age, using 2008 data from the National Center for Health Statistics, Guttmacher Institute, and U.S. Census.*			
Any pregnancy outcome	Female Age 11 or younger	Ever had sex vs. never had sex	0.7 percent of females who initiated sexual activity at or before age 11 had any pregnancy outcome at age 11 or earlier. The ratio of births to abortions for this group was 0.69.
Any pregnancy outcome	Female Age 12	Ever had sex vs. never had sex	1.2 percent of females who initiated sexual activity at or before age 12 had any pregnancy outcome at age 12. The ratio of births to abortions for this group was 0.69.

Outcome	Sample characteristics	Contrast	Findings
Any pregnancy outcome	Female Age 13	Ever had sex vs. never had sex	3.3 percent of females who initiated sexual activity at or before age 13 had any pregnancy outcome at age 13. The ratio of births to abortions for this group was 0.79.
Any pregnancy outcome	Female Age 14	Ever had sex vs. never had sex	5.8 percent of females who initiated sexual activity at or before age 14 had any pregnancy outcome at age 14. The ratio of births to abortions for this group was 1.16.
Any pregnancy outcome	Female Age 15	Ever had sex vs. never had sex	8.6 percent of females who initiated sexual activity at or before age 15 had any pregnancy outcome at age 15. The ratio of births to abortions for this group was 1.40.
Any pregnancy outcome	Female Age 16	Ever had sex vs. never had sex	11.0 percent of females who initiated sexual activity at or before age 16 had any pregnancy outcome at age 16. The ratio of births to abortions for this group was 1.71.
Any pregnancy outcome	Female Age 17	Ever had sex vs. never had sex	13.3 percent of females who initiated sexual activity at or before age 17 had any pregnancy outcome at age 17. The ratio of births to abortions for this group was 2.01.
Any pregnancy outcome	Female Age 18	Ever had sex vs. never had sex	15.7 percent of females who initiated sexual activity at or before age 18 had any pregnancy outcome at age 18. The ratio of births to abortions for this group was 2.24.
Any pregnancy outcome	Female Age 19	Ever had sex vs. never had sex	19.4 percent of females who initiated sexual activity at or before age 19 had any pregnancy outcome at age 19. The ratio of births to abortions for this group was 2.25.
Any pregnancy outcome	Female Age 20	Ever had sex vs. never had sex	20.4 percent of females who initiated sexual activity at or before age 20 had any pregnancy outcome at age 20. The ratio of births to abortions for this group was 2.30.
Finger et al. (2004): *The authors used data from the National Longitudinal Study of Youth (1979–2000) to examine the relationship between sexual initiation by age 18 and 10 outcomes that captured economic, health, and social well-being in middle adulthood. The authors performed simple comparisons of means and estimated logistic regressions for dichotomous outcomes and ordinary least squares regressions for continuous outcomes, with controls for adolescent demographic and socioeconomic characteristics, religiosity, and employment status (variables were retained in a model only if they changed a coefficient by more than 10 percent).*			
Ever became a parent	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, about 68 percent of males who had not had sex by age 18 were ever parents compared with 76 percent of males who had sex by that age. In a regression without controls (none were retained), males who had not had sex by age 18 were 0.66 times as likely as those who had sex by that age of ever being a parent. This difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Ever became a parent	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression without controls (none were retained), among males who were not fathers by age 19, those who had not had sex by age 18 were 0.67 times as likely as those who had sex by that age of ever being a parent. This difference was statistically significant.
Ever became a parent	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Ever became a parent	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, about 78 percent of females who had not had sex by age 18 were ever parents compared with 84 percent of females who had sex by that age. In a regression with controls, females who had not had sex by age 18 were 0.72 times as likely as those who had sex by that age of ever being a parent. This difference was statistically significant.
Ever became a parent	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Ever became a parent	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Goldberg (2018): *Using Add Health data, the author estimated five survival models predicting first birth. Model 1 controlled for age at sexual initiation and demographic and socioeconomic characteristics; Model 2 added to Model 1 controls for family structure and dynamics in childhood; Model 3 added to Model 1 controls for childhood neighborhood characteristics; Model 4 included all controls from Models 1, 2, and 3; and Model 5 added to Model 4 controls for childhood school attachment, expectations for educational attainment, and nonsexual risk behavior.*			
Transition to first birth following sexual initiation	Female Initiated sexual activity by age 24	Age at sexual initiation	The time between sexual initiation and first birth did not vary significantly based on age at sexual initiation.

Outcome	Sample characteristics	Contrast	Findings
Huibregtse et al. (2011): *The authors used two cohorts of same-sex adolescent twins from the Minnesota Twin Family Study (born 1977–1984, assessed at age 24 or 29) to estimate the relationship between adolescent sexual initiation (oral, anal, or vaginal initiation at or before age 16) and early pregnancy, sexual partnering, and adult risky sexual behavior using regression analyses. The first regression controlled for gender, years sexually active (for measures of number of lifetime partners only), age of assessment, and cohort. The authors estimated two additional analyses if the first regression demonstrated a significant relationship. The second regression compared twins who did and did not experience adolescent sexual initiation in a discordant-twin model. As part of this analysis, the authors also estimated differences across twins from different families. The final regression added a sexual initiation propensity score as a control in the twin-level analysis (the propensity score model included controls for parent-child relationships, externalizing and internalizing pathology, peer factors, psychosexual development, and stressful life events).*			
Got someone pregnant before age 20	Male twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, male twins who initiated sex at age 16 or younger were significantly more likely to have an early pregnancy than male twins who initiated after age 16. The between-twin pair and discordant-twin models were run only for a combined sample of male and female twins.
Became pregnant before age 20	Female twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, female twins who initiated sex at age 16 or younger were significantly more likely to have an early pregnancy than female twins who initiated after age 16. The between-twin pair and discordant-twin models were run only for a combined sample of male and female twins.
Became pregnant or got someone pregnant before age 20	Twins Age 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the between-pair models, male and female twins who initiated sex at age 16 or younger were more likely to have an early pregnancy than those who initiated after age 16. All between-pair differences were statistically significant except between fraternal twin pairs after controlling for a sexual initiation propensity score. There were no statistically significant differences in the discordant-twin models.
Scott et al. (2011): *Using Add Health data, the authors used logistic regressions to estimate the relationship between age of sexual initiation and three outcomes related to sexual partnering, sexually transmitted infections, and childbearing. The regressions included controls for sociodemographic characteristics, childhood household composition, attachment to parents, substance use, cognitive ability, educational attainment and aspirations, contraceptive use, discussion of contraception with sexual partners, and characteristics of sexual partners.*			
Had a planned birth at age 20–24 (compared with no birth)	Age 26–34 Initiated sexual activity by Wave III (Age 20–27)	Initiated sexual activity at age 15 or younger vs. initiated sexual activity at age 16 or older	Individuals who initiated sex before age 16 had 0.6 times the odds of those who initiated at age 16 or older of having a child from a planned pregnancy. This difference was statistically significant.
Had an unplanned birth at age 20–24 (compared with no birth)	Age 26–34 Initiated sexual activity by Wave III (Age 20–27)	Initiated sexual activity at age 15 or younger vs. initiated sexual activity at age 16 or older	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Had a planned birth at age 20–24 (compared with unplanned)	Age 26–34 Initiated sexual activity by Wave III (Age 20–27)	Initiated sexual activity at age 15 or younger vs. initiated sexual activity at age 16 or older	There was no statistically significant difference.
Wu and Martin (2015): *Using data from the National Longitudinal Survey of Youth 1979 cohort, the authors estimated survival models predicting the time between a woman's age at sexual initiation and a premarital birth. They used Cox and Gompertz models for the survival analysis, including controls for demographic characteristics, family background, cognitive ability, and religion. Observations for which a premarital birth was not observed were treated as censored data. Age at sexual initiation entered the regression as a continuous variable for age at initiation and indicator variables for age at initiation being younger than 15 or older than 20.*			
Transition to first premarital birth following sexual initiation	Female Age 28–36	Age at sexual initiation	A one-year increase in age at sexual initiation is associated with a 7 to 10 percent decrease in the relative risk of a premarital birth. The difference is statistically significant.
Transition to first premarital birth following sexual initiation	Female Age 28–36	Initiated sexual activity before age 15 vs. initiated sexual activity between ages 15 and 20	Controlling for a continuous variable measuring age at sexual initiation and other variables, there is no statistically significant difference in the relative risk of a premarital birth for women who initiated sexual activity before age 15 and those who did between ages 15 and 20.
Transition to first premarital birth following sexual initiation	Female Age 28–36	Initiated sexual activity at age 21 or later vs. initiated sexual activity between ages 15 and 20	Controlling for a continuous variable measuring age at sexual initiation and other variables, there is no statistically significant difference in the relative risk of a premarital birth for women who initiated sexual activity between ages 15 and 20 and those who did at age 21 or later.

B. Findings within the physical health domain

The SSAvER team reviewed 12 studies that examined at least one outcome related to physical health. Eight of these 12 studies focused on sexually transmitted infection (STI) diagnoses or other measures of sexual health (Edelstein et al. 2013; Epstein et al. 2014; Forhan et al. 2009; Kaestle et al. 2005; Kugler et al. 2017; Sandfort et al. 2008; Scott et al. 2011; Vasilenko et al. 2015). Five studies examined more general health outcomes, such as the prevalence of chronic health problems or self-rated health (Brody 2012; Epstein et al. 2018; Finger et al. 2004; Ngueta and Ndjaboue 2018; Sandfort et al. 2008). The study by Kugler et al. (2017) was the only one within this domain to use more rigorous methods for distinguishing the causal effects of delayed sexual activity from other potential confounding factors (weighting data based on the propensity score).

Table A.2. Studies examining outcomes related to physical health

Outcome	Sample characteristics	Contrast	Findings
Brody (2002): *Using researcher-collected data from a clinical trial, the author examined the relationship between age at first sex and stress responses. The sample consisted of 79 generally healthy adults. Salivary cortisol, measuring the biological response to stress, was measured twice before and four times after completing a task designed to produce stress and once before and twice after a hormonal injection biologically associated with stress. The study used analysis of variance and regression models to analyze the data. Controls included those for age, smoking, body mass index, menstrual cycle phase, depression, intercourse frequency, and oral contraceptive use.*			
Salivary cortisol in response to stressful task	Age 19–38 Female	Initiated sexual activity before age 18 vs. initiated sexual activity at age 18 or later	Females who initiated sexual activity before age 18 had a weaker biological response to stress that those who initiated sexual activity at age 18 or later. The difference was statistically significant.
Salivary cortisol in response to stressful task	Age 19–38 Female	Initiated sexual activity before age 17 vs. initiated sexual activity at age 17 or later	Females who initiated sexual activity before age 17 had a weaker biological response to stress that those who initiated sexual activity at age 17 or later. The difference was statistically significant.
Salivary cortisol in response to hormone injection	Age 19–38 Female	Initiated sexual activity before age 18 vs. initiated sexual activity at age 18 or later	There were no statistically significant differences.
Salivary cortisol in response to stressful task	Age 19–38 Male	Initiated sexual activity before age 19 vs. initiated sexual activity at age 19 or later	There were no statistically significant differences.
Salivary cortisol in response to stressful task	Age 19–38 Male	Initiated sexual activity before age 17 vs. initiated sexual activity at age 17 or later	There were no statistically significant differences.
Salivary cortisol in response to hormone injection	Age 19–38 Male	Initiated sexual activity before age 19 vs. initiated sexual activity at age 19 or later	There were no statistically significant differences.

Outcome	Sample characteristics	Contrast	Findings
Edelstein et al. (2013): *Using a population-based epidemiologic data set from the National Cancer Institute, drawing on individuals from the Seattle-Puget Sound region, the authors used linear regression modeling to estimate the relationship between age at first intercourse and age at squamous cell cervical cancer (SCC) diagnosis. The authors also accounted for the number of male sex partners a woman had before age 20, which could be another measure of early sexual experience and could confound or modify the association between age at first intercourse and age at SCC diagnosis. The study reported on four models. Model 1 was a simple univariate model regressing age at first intercourse on age at SCC diagnosis. Model 2 was a multivariate model, adjusting for number of sexual partners before age 20. Model 3 adjusted for number of sexual partners before age 20 and birth year. Model 4 adjusted for number of sexual partners before age 20, birth year, age at menarche, and annual income at SCC diagnosis. The study authors considered, and ultimately decided not to include, other independent variables as controls in Model 4—including demographics, pregnancy measures, and other sexual health variables—based on an exercise in which they added potential covariates to the model, conducted likelihood ratio tests, and checked whether the coefficient on age at first intercourse changed by at least ten percent.*			
Age at SCC diagnosis	Age 22–53 Female Diagnosed with SCC	Initiated sexual activity between ages 15 and 18 vs initiated sexual activity at age 19 or later	Across all models, females who initiated sexual activity at ages 15 to 19 had SCC diagnoses at ages 2.6 to 3.5 years younger than those who initiated sexual activity at age 19 or later. The difference was largest in Model 1 and smallest in Model 4. All were statistically significant.
Age at SCC diagnosis	Age 22–53 Female Diagnosed with SCC	Initiated sexual activity before age 15 vs initiated sexual activity at age 19 or later	Across all models, females who initiated sexual activity before age 15 had SCC diagnoses at ages 3.1 to 5.8 years younger than those who initiated sexual activity at age 19 or later. The difference was largest in Model 1 and smallest in Model 4. All were statistically significant.
Age at SCC diagnosis	Age 22–53 Female Diagnosed with SCC Zero or one sexual partner before age 20	Initiated sexual activity between ages 15 and 18 vs initiated sexual activity at age 19 or later	In Model 4, among those with fewer than two sexual partners before age 20, females who initiated sexual activity at ages 15 to 19 had SCC diagnoses at ages 2.3 years younger than those who initiated sexual activity at age 19 or later. The difference was statistically significant. The difference estimated using Model 1 was not statistically significant. Models 2 and 3 were not estimated for this contrast.
Age at SCC diagnosis	Age 22–53 Female Diagnosed with SCC Zero or one sexual partner before age 20	Initiated sexual activity before age 15 vs initiated sexual activity at age 19 or later	There were no statistically significant differences estimated using Models 1 and 4. Models 2 and 3 were not estimated for this contrast.

Outcome	Sample characteristics	Contrast	Findings
Epstein et al. (2014): *Using data from the Seattle Social Development Project (SSDP) and Raising Health Children (RHC), both studies conducted in the greater Seattle, Washington area, the authors examined the relationship between age at sexual initiation and sexually transmitted infection (STI) transmission by age 19 to 25. Path models were estimated in which STI diagnosis was modeled as a function of age at sexual initiation; age at pubertal development; number of sexual partners; sexual activity under the influence of alcohol or drugs; age at initiation of alcohol use; demographic characteristics; involvement in the SSDP and RHC interventions; and measures of childhood behavioral disinhibition, peers, attachment to school, and family dynamics. The authors estimated both a saturated model that allowed for flexible associations between predictors and outcomes as well as several restricted models that placed structure on these associations. Probit models were used to estimate effects for binary outcomes.*			
Reported ever being diagnosed with an STI	Age 19–25	Initiated sexual activity before age 15 vs. initiated sexual activity at age 15 or later	In the most flexible model, sexual initiation before age 15 was associated with a statistically significant increase in the probability of an STI diagnosis in the RHC data but not the SSDP data. In all other models, sexual initiation before age 15 was associated with a statistically significant increase in the probability of an STI diagnosis.
Epstein et al. (2018): *Using data from the Seattle Social Development Project in Seattle, Washington, the authors used logistic regressions to examine the relationship between age of sexual initiation and six adult health outcomes. The paper reports on two models: the unmediated model controls for measures of demographic characteristics, socioeconomic status, pubertal age, sexual abuse in childhood, alcohol or tobacco use at ages 10 to 12, and teacher reports of child behavior and weight at ages 10 through 12; the mediated model also includes controls for early adolescent pregnancy (before age 18), lifetime STI acquisition at age 21, and number of sexual partners (an indicator for 10 or more lifetime partners at age 24). The authors also reported testing for nonlinearity using a measure of age at sexual initiation squared but rejected this addition to the model because of no consistent pattern of statistical significance. Note that part of the sample was exposed to a preventative intervention in elementary school, which is accounted for by controlling for intervention status in the regression models.*			
Poor health at 30, 33, or 39 (self-reported)	Age 30–39 Seattle area	Age at sexual initiation	In both the mediated and unmediated models, a one-year delay in age of sexual initiation was associated with a 13 percent decrease in the odds of being in poor health. The differences were statistically significant.
Body mass index above obesity cutoff at 30, 33, or 39 (researcher-measured)	Age 30–39 Seattle area	Age at sexual initiation	In the unmediated model, a one-year delay in age of sexual initiation was associated with a 12 percent decrease in the odds of obesity. This difference was statistically significant. In the mediated model, this difference increased to 15 percent and remained significant.
Finger et al. (2004): *The authors used data from the National Longitudinal Study of Youth (1979–2000) to examine the relationship between sexual initiation by age 18 and 10 outcomes that captured economic, health, and social well-being in middle adulthood. The authors performed simple comparisons of means and estimated logistic regressions for dichotomous outcomes and ordinary least squares regressions for continuous outcomes, with controls for adolescent demographic and socioeconomic characteristics, religiosity, and employment status (variables were retained in a model only if they changed a coefficient by more than 10 percent).*			

Outcome	Sample characteristics	Contrast	Findings
Had a chronic health problem	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, about half of males who had sex by age 18 and half of males who had not had sex by age 18 had a chronic health problem. A regression with controls confirmed that there was no statistically significant difference between these two groups.
Had a chronic health problem	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Had a chronic health problem	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Had a chronic health problem	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, about half of females who had not had sex by age 18 had a chronic health problem compared with 61 percent of females who had sex by age 18. In a regression with controls, women who had not had sex by age 18 were 0.71 times as likely as women who had sex by that age of having a chronic health problem. This difference was statistically significant.
Had a chronic health problem	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Had a chronic health problem	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.

Forhan et al. (2009): *Using data for females ages 14 to 19 from the National Health and Nutrition Examination Survey 2003–2004, the authors examined STI prevalence rates. They presented comparisons of STI rates by number of sexual partners (one category was never had sex), as well as regression analysis controlling for sociodemographic factors, socioeconomic factors, and duration of sexual activity. STIs were measured using laboratory tests.*

Outcome	Sample characteristics	Contrast	Findings
Had gonorrhea, chlamydia, trichomonas, herpes simplex virus 2, or human papillomavirus	Female Age 14–19	Never had sex vs. had sex and had one lifetime sexual partner	Based on a simple comparison of prevalence rates, female adolescents who never had sex were 0.3 times as likely as those who had sex and had one sexual partner to have had gonorrhea, chlamydia, trichomonas, herpes simplex virus 2, or human papillomavirus. The difference was statistically significant. Using regression analysis, the estimated difference did not change but became statistically insignificant.
Had human papillomavirus	Female Age 14–19	Never had sex vs. had sex and had one lifetime sexual partner	Female adolescents who never had sex were 0.2 to 0.3 times as likely as those who had sex and had one sexual partner to have had human papillomavirus. The differences were statistically significant.
Had gonorrhea, chlamydia, trichomonas, or herpes simplex virus 2	Female Age 14–19	Never had sex vs. had sex and had one lifetime sexual partner	Based on a simple comparison of prevalence rates, female adolescents who never had sex were 0.3 times as likely as those who had sex and had one sexual partner to have had gonorrhea, chlamydia, trichomonas, or herpes simplex virus 2, but the difference was not statistically significant. Based on regression analysis, female adolescents who never had sex were 0.2 times as likely as those who had sex and had one sexual partner to have had gonorrhea, chlamydia, trichomonas, or herpes simplex virus 2. The difference was statistically significant.
Kaestle et al. (2005): *Using Add Health data, the authors used a series of logistic regressions to estimate the relationship between age at sexual initiation and contracting a STI and how this relationship differed by gender, race/ethnicity, and current age. They start with simple regressions without controls then estimate multivariate regressions with controls for gender, race/ethnicity, current age, parental education, and the interaction between current age and age at sexual initiation. Because the relationship did not differ by gender, race/ethnicity, or parental education, the authors did not present models with these interaction terms.*			
Tested positive for STI in past year	Age 18–26 Ever had sex	Age at sexual initiation	In the regression without controls, a one-year increase in the age at sexual initiation was associated with a statistically significant 11 percent decrease in the odds of having an STI. In the regression with controls, the authors show that this relationship fades with age. For example, an 18 year old who initiated sex at age 13 would be 2.25 times as likely as an 18 year old who initiated at age 17 to have an STI (a significant difference), but a 24 year old who initiated sex at age 13 would be 1.11 times as likely as a 24 year old who initiated at age 17 to have an STI (a statistically insignificant difference).
Kugler et al. (2017): *Using data from Add Health, the authors estimated the relationship between age at sexual initiation and several outcomes, also testing for gender differences in these associations. The authors first estimated the propensity score using generalized boosted modeling and 59 variables measured when respondents were age 11 to 13 and had not yet initiated sexual activity, including measures related to a respondent's demographic characteristics, family structure and processes, peers, school, mental health, religion, problem behavior, and neighborhood. They then estimated logistic regressions using data weighted based on the propensity score.*			

Outcome	Sample characteristics	Contrast	Findings
Diagnosed with an STI in the past year	Age 19–21	Initiated sexual activity at age 14 or younger vs. initiated sexual activity at age 15 or older	Individuals who initiated sexual activity at age 14 or younger were 2.70 times as likely as those who initiated when older to have been diagnosed with an STI in the past year. The difference was statistically significant.
Diagnosed with an STI in the past year	Male Age 19–21	Initiated sexual activity at age 14 or younger vs. initiated sexual activity at age 15 or older	There was no statistically significant difference.
Diagnosed with an STI in the past year	Female Age 19–21	Initiated sexual activity at age 14 or younger vs. initiated sexual activity at age 15 or older	Females who initiated sexual activity at age 14 or younger were 3.12 times as likely as females who initiated when older to have been diagnosed with an STI in the past year. The difference was statistically significant.
Ngueta and Ndjaboue (2018): *Using data on 39,788 women ages 20 to 69 (excluding those taking antihypertensive or other medicinal drugs and pregnant women) from the National Health and Nutrition Examination Survey, the authors examined the association of age at first sexual intercourse and hypertension. The authors used a logistic regression without other covariates (Model 1) and three models with control variables (Model 2 added a control for age at interview; Model 3 additionally added controls for race, poverty-to-income ratio, and waist-to-height ratio; and Model 4 additionally added controls for serum cotinine levels, uric acid levels, and diabetes).*			
Hypertension	Female Age 20–69	Initiated sexual intercourse at age 19 or later and after menarche vs. initiated sexual intercourse before age 19 but after menarche	In a model without controls, there was no significant difference. When age at interview was added as a control variable, individuals who first had intercourse at age 19 or later were 0.80 to 0.82 times as likely to have hypertension as those who initiated intercourse before age 19. These differences were statistically significant. The authors also estimated Models 1 and 2 by race, finding different patterns. Non-Hispanic white females who first had intercourse at age 19 or later were 0.76 (Model 1) or 0.66 (Model 2) times as likely to have hypertension as those who initiated intercourse before age 19. Both differences were statistically significant. Non-Hispanic black females who first had intercourse at age 19 or later were 0.75 (Model 1) or 0.83 (Model 2) times as likely to have hypertension as those who initiated intercourse before age 19. Only the difference from Model 1 was statistically significant. Hispanic females and females of other races did not exhibit statistically significant differences in either model.

Outcome	Sample characteristics	Contrast	Findings
Hypertension	Female Age 20–69	Initiated sexual intercourse before menarche vs. initiated sexual intercourse before age 19 but after menarche	In a model without controls, females that initiated sexual intercourse before menarche were 1.82 times as likely to have hypertension as those who initiated before age 19 but after menarche. The difference is statistically significant. However, when the authors controlled for age at interview, the difference became small (-2 to 1 percent) and statistically insignificant. The authors also estimated Models 1 and 2 by race. For non-Hispanic white, non-Hispanic black, and Hispanic females, there were no statistically significant differences. For females of another race, sexual initiation before menarche was associated with 40 to 58 percent lower odds of hypertension (differences are statistically significant).
Sandfort et al. (2008): *Using a sample from the National Sexual Health Survey (1995–1996), the authors classified respondent's age at sexual initiation as "early" (25 percent), "normative" (50 percent), or "late" (25 percent) based on the distribution of age at first intercourse for those with the same gender, race/ethnicity, and educational background. The authors used ordinary least squares and logistic regression to estimate relationships between age at sexual initiation and sexual initiation before marriage and various outcomes, controlling for demographics (race/ethnicity, education, place of residence in youth, age, and migration status) and sexual history (nonconsensual sex, whether first orgasm was from masturbation, and sexual activity before first intercourse).*			
STI history	Male adults	Early vs. normative sexual initiation	Male early initiators were 2.21 times as likely to have had a history of STIs as male normative initiators. The difference was statistically significant.
Sexual arousal problems	Male adults	Early vs. normative sexual initiation	Male early initiators were 1.58 times as likely to have sexual arousal problems as male normative initiators. The difference was statistically significant.
Erectile problems	Male adults	Early vs. normative sexual initiation	Male early initiators were 1.83 times as likely to have erectile problems as male normative initiators. The difference was statistically significant.
Orgasm problems	Male adults	Early vs. normative sexual initiation	Male early initiators were 2.34 times as likely to have orgasm problems as male normative initiators. The difference was statistically significant.
General health status	Male adults	Early vs. normative sexual initiation	Male early initiators scored 0.23 points lower on the general health status index than male normative initiators. The difference was statistically significant.
STI history	Female adults	Early vs. normative sexual initiation	Female early initiators were 1.64 times as likely to have had a history of STIs as female normative initiators. The difference was statistically significant.
Sexual arousal problems	Female adults	Early vs. normative sexual initiation	The difference was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Orgasm problems	Female adults	Early vs. normative sexual initiation	The difference was not statistically significant.
General health status	Female adults	Early vs. normative sexual initiation	The difference was not statistically significant.
STI history	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Sexual arousal problems	Male adults	Late vs. normative sexual initiation	Male late initiators were 1.59 times as likely to have sexual arousal problems as male normative initiators. The difference was statistically significant.
Erectile problems	Male adults	Late vs. normative sexual initiation	Male late initiators were 1.46 times as likely to have erectile problems as male normative initiators. The difference was statistically significant.
Orgasm problems	Male adults	Late vs. normative sexual initiation	Male late initiators were 1.74 times as likely to have orgasm problems as male normative initiators. The difference was statistically significant.
General health status	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.
STI history	Female adults	Late vs. normative sexual initiation	Female late initiators were 0.49 times as likely to have had a history of STIs as female normative initiators. The difference was statistically significant.
Sexual arousal problems	Female adults	Late vs. normative sexual initiation	Female late initiators were 0.75 times as likely to have sexual arousal problems as female normative initiators. The difference was statistically significant.
Orgasm problems	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
General health status	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
STI history	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Sexual arousal problems	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Erectile problems	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Men who waited until marriage to first have sex were 1.87 times as likely to have erectile problems as men who did not wait. The difference was statistically significant.
Orgasm problems	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
General health status	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
STI history	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Women who waited until marriage to first have sex were 0.44 times as likely to have a history of STIs as women who did not wait. The difference was statistically significant.
Sexual arousal problems	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Orgasm problems	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
General health status	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Scott et al. (2011): *Using Add Health data, the authors used logistic regressions to estimate the relationship between age of sexual initiation and three outcomes related to sexual partnering, STIs, and childbearing. The regressions included controls for sociodemographic characteristics, childhood household composition, attachment to parents, substance use, cognitive ability, educational attainment and aspirations, contraceptive use, discussion of contraception with sexual partners, and characteristics of sexual partners.*			
Tested positive for an STI in the past year	Age 20–27 Ever had sex	Initiated sexual activity at age 15 or younger vs. initiated sexual activity at age 16 or older	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Vasilenko et al. (2015): *Using Add Health data, the authors first used latent class analysis to identify classes of sexual behavior when respondents were ages 16 to 18. The classes were abstinent, had oral sex only, low-risk sexual activity, multi-partner sexual activity with normative sexual initiation, and multi-partner sexual activity with early sexual initiation. The authors estimated whether class was predictive of being diagnosed with an STI in the past year.*			
STI in past year	Female Age 28–30	Abstinent class vs. low-risk sexual activity class	Nine percent of females in the abstinent class reported contracting an STI compared with 16 percent of females in the low-risk sexual activity class. The difference is statistically significant.
STI in past year	Female Age 28–30	Abstinent class vs. oral sex only class	There was no statistically significant difference.
STI in past year	Female Age 28–30	Abstinent class vs. multi-partner sexual activity with normative sexual initiation class	Nine percent of females in the abstinent class reported contracting an STI compared with 13 percent of females in the multi-partner sexual activity with normative sexual initiation class. The difference is statistically significant.
STI in past year	Female Age 28–30	Abstinent class vs. multi-partner sexual activity with early sexual initiation class	Nine percent of females in the abstinent class reported contracting an STI compared with 16 percent of females in the multi-partner sexual activity with early sexual initiation class. The difference is statistically significant.
STI in past year	Male Age 28–30	Abstinent class vs. low-risk sexual activity class	There was no statistically significant difference.
STI in past year	Male Age 28–30	Abstinent class vs. oral sex only class	There was no statistically significant difference.
STI in past year	Male Age 28–30	Abstinent class vs. multi-partner sexual activity with normative sexual initiation class	There was no statistically significant difference.
STI in past year	Male Age 28–30	Abstinent class vs. multi-partner sexual activity with early sexual initiation class	Two percent of males in the abstinent class reported contracting an STI compared with about 12 percent of males in the multi-partner sexual activity with early sexual initiation class. The difference is statistically significant.

C. Findings within the relationships domain

The SSAvER team reviewed 17 studies that examined at least one outcome related to romantic or other relationships (Table A.3). The studies in this domain covered three broad groups of outcomes:

1. **Sexual partners.** Six of the 17 studies examined whether the timing of sexual initiation affected the number or characteristics of sexual partners a person has in the future (Donahue 2017; Huibregtse et al. 2011; Kugler 2017; Magnusson et al. 2015; Sandfort et al. 2008; Scott et al. 2011). Two of these studies used sibling data to help separate causal effects from confounding factors (the bivariate family model in Donahue et al. [2012] and the discordant twin model in Huibregtse et al. [2011]); one study alternatively used propensity score methods to do this (Kugler et al. 2017).
2. **Romantic relationships.** Nine of the 17 studies in this domain examined whether the timing of sexual initiation affected other aspects of romantic relationships, such as the likelihood of marriage or divorce, or exposure to interpersonal violence (Akers et al. 2017; Finger et al. 2004; Halpern et al. 2009; Harden 2012; Heaton 2002; Magnusson et al. 2015; Paik 2011; Ramisetty-Mikler et al. 2006; Sandfort et al. 2008). Of these 9 studies, only Harden (2012) used rigorous methods to identify causal effects across a broad range of relationship outcomes, estimating impacts using both regression analysis and more rigorous within-family models. Paik (2011) also used a method similar to those based on the propensity score to estimate the relationship between sexual initiation and marital dissolution.
3. **Other types of relationships.** Four of the 17 studies in this domain examined the link between sexual initiation and other types of interpersonal relationships, such as attachment to school or religion (McCarthy and Grodsky 2011; Ream 2006; Sabia 2007b; Vasilenko and Lefkowitz 2014). Of these 4 studies, only Sabia (2007b) and McCarthy and Grodsky (2011) used more rigorous methods to identify causal effects (instrumental variables and a method similar in nature to propensity score methods, respectively).

Table A.3. Studies examining outcomes related to relationships

Outcome	Sample characteristics	Contrast	Findings
Akers et al. (2017): *Using longitudinal data from the Pittsburgh Girls Study (an ongoing survey that began in 2001 when girls were ages 5 to 8), the authors analyzed the relationship between age at sexual initiation and dating behavior. They used logistic regressions controlling for measures of socioeconomic and demographic characteristics, age at menarche, susceptibility to peer influences, depression, and self-esteem.*			
In a dating relationship	Female Age 18	Never had sex vs. initiated sex between ages 15 and 17	Females who never had sex were 0.26 times as likely to be in a dating relationship as those who initiated sexual activity between ages 15 and 17. The difference is statistically significant.
Donahue (2012): *Using longitudinal data from the Children of the National Longitudinal Survey of Youth, the author explored the relationship between sexual initiation before age 16 and a number of outcomes. The author fit several regression models, using logit models for binary outcomes, multinomial regression for categorical outcomes, and ordinary least squares for other outcomes. All models included a family-level random effect. Models 1 and 2 included all individuals, with Model 1 including no covariates and Model 2 adjusting for the characteristics of individuals' mothers, including mothers' demographic and socioeconomic characteristics and mothers' adolescent behavior. Models 3, 4, and 5 included only individuals with a sibling in the data set. Model 3 included controls for mother's characteristics, Model 4 included controls for mother's characteristics and siblings' ages at sexual initiation, and Model 5 included controls for mother's characteristics, siblings' ages at sexual initiation, and a propensity score measuring the likelihood of sexual initiation before age 16. The author estimated the propensity score using measures of an individual's demographic characteristics, substance use before age 14, dating behavior before age 14, problem behavior, peer pressure, impulsivity, sensation seeking, home environment, and cognitive ability. The author then used bivariate family models to estimate the proportion of the relationship between sexual initiation and each outcome of interest within the sample of siblings that is attributable to siblings' common genes, shared environment, and other influences.*			
One sexual partner in the past 12 months (versus no partners)	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 1.40 times as likely to have had one partner in the past 12 months as individuals that initiated sexual activity at age 16 or later. Similar findings hold in a model that adjusts for mother-level covariates. The differences were statistically significant.
Two sexual partners in the past 12 months (versus no partners)	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 2.43 times as likely to have had two sexual partners in the past 12 months as individuals that initiated sexual activity at age 16 or later. Similar findings hold in a model that adjusts for mother-level covariates. The differences were statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Three or more sexual partners in the past 12 months (versus no partners)	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 4.29 times as likely to have had three or more sexual partners in the past 12 months as individuals that initiated sexual activity at age 16 or later. Similar findings hold in a model that adjusts for mother-level covariates. The differences were statistically significant.
One sexual partner in the past 12 months (versus no partners)	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 1.52, 1.94, and 2.18 times as likely (respectively) to have had one sexual partner in the past 12 months as individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that the association was mostly attributable to common genetic factors.
Two sexual partners in the past 12 months (versus no partners)	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 2.70, 2.95, and 2.95 times as likely (respectively) to have had two sexual partners in the past 12 months as individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that the association was mostly attributable to common genetic factors.
Three or more sexual partners in the past 12 months (versus no partners)	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 4.39, 4.58, and 4.11 times as likely (respectively) to have had three or more sexual partners in the past 12 months as individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that the association was mostly attributable to common genetic factors.
Finger et al. (2004): *The authors used data from the National Longitudinal Study of Youth (1979-2000) to examine the relationship between sexual initiation by age 18 and 10 outcomes that captured economic, health, and social well-being in middle adulthood. The authors performed simple comparisons of means and estimated logistic regressions for dichotomous outcomes and ordinary least squares regressions for continuous outcomes, with controls for adolescent demographic and socioeconomic characteristics, religiosity, and employment status (variables were retained in a model only if they changed a coefficient by more than 10 percent).*			
Ever married	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, about 81 percent of males who had and had not had sex by age 18 were ever married. The authors analyzed this outcome using a regression, but inconsistencies in the paper prevent its interpretation.

Outcome	Sample characteristics	Contrast	Findings
Ever married	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	The authors analyzed this outcome, but inconsistencies in the paper prevent its interpretation.
Ever married	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	The authors analyzed this outcome, but inconsistencies in the paper prevent its interpretation.
Ever married	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, about 86 percent of females who had and had not had sex by age 18 were ever married. The authors analyzed this outcome using a regression, but inconsistencies in the paper prevent its interpretation.
Ever married	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	The authors analyzed this outcome, but inconsistencies in the paper prevent its interpretation.
Ever married	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	The authors analyzed this outcome, but inconsistencies in the paper prevent its interpretation.
Divorce ratio (number of divorces divided by number of years married)	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, the divorce ratio for males who had not had sex by age 18 was 0.04 compared with 0.06 for males who had sex by that age. In a regression with controls, the ratio was a statistically significant 0.03 points lower for males who had not had sex by age 18 than males who had sex by that age.
Divorce ratio (number of divorces divided by number of years married)	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who were not fathers by age 19, the divorce ratio was a statistically significant 0.02 points lower for males who had not had sex by age 18 than males who had sex by that age.

Outcome	Sample characteristics	Contrast	Findings
Divorce ratio (number of divorces divided by number of years married)	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who lived in a single-parent urban household at age 14, the divorce ratio was a statistically significant 0.03 points lower for males who had not had sex by age 18 than males who had sex by that age.
Divorce ratio (number of divorces divided by number of years married)	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	The authors analyzed this outcome, but inconsistencies in the paper prevent its interpretation.
Divorce ratio (number of divorces divided by number of years married)	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression without controls (none were retained), among females who were not pregnant by age 18 years and 3 months, the divorce ratio was a statistically significant 0.03 points lower for females who had not had sex by age 18 than females who had sex by that age.
Divorce ratio (number of divorces divided by number of years married)	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression without controls (none were retained), among females who lived in a single-parent urban household at age 14, the divorce ratio was a statistically significant 0.03 points lower for females who had not had sex by age 18 than females who had sex by that age.
Halpern et al. (2009): *Using Add Health data, the authors examined the predictors of intimate partner violence (IPV), including age at sexual initiation. They did this by estimating logistic regressions including controls for demographic characteristics, family structure in adolescence, adolescent depression, adolescent socioeconomic status, number of partnerships in adolescence and adulthood, age of partners during adolescence, and abuse during childhood. IPV in adolescence was measured as reporting at Wave II of Add Health (at ages 11–17) that any partner had ever threatened, thrown something at, or pushed or shoved them. IPV in adulthood was measured as reporting at Wave III of Add Health (at ages 18–23) that any partner had done any of the following in the past year: threatened, thrown something at, or pushed or shoved them; slapped, hit, or kicked them; insisted on having, or forced them to have, sexual relations; or caused them an injury in a fight.*			
IPV in adolescence but not adulthood (vs. no IPV)	At least one relationship reported at Add Health Waves II and III Heterosexual Age 18–23	Initiated sexual activity between ages 10 and 15 vs. initiated sexual activity at age 16 or later	Individuals who initiated sexual activity between ages 10 and 15 were 1.69 times as likely as individuals who initiated sexual activity at age 16 or later to have experienced IPV in adolescence (but not adulthood). The difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
IPV in adulthood but not adolescence (vs. no IPV)	At least one relationship reported at Add Health Waves II and III Heterosexual Age 18–23	Initiated sexual activity between ages 10 and 15 vs. initiated sexual activity at age 16 or later	Individuals who initiated sexual activity between ages 10 and 15 were 1.40 times as likely as individuals who initiated sexual activity at age 16 or later to have experienced IPV in adulthood (but not adolescence). The difference was statistically significant.
IPV in both adolescence and adulthood	At least one relationship reported at Add Health Waves II and III Heterosexual Age 18–23	Initiated sexual activity between ages 10 and 15 vs. initiated sexual activity at age 16 or later	Individuals who initiated sexual activity between ages 10 and 15 were 2.83 times as likely as individuals who initiated sexual activity at age 16 or later to have experienced IPV in adolescence and adulthood. The difference was statistically significant.
IPV in adulthood	At least one relationship reported at Add Health Waves II and III Heterosexual Experienced IPV in adolescence Age 18–23	Initiated sexual activity between ages 10 and 15 vs. initiated sexual activity at age 16 or later	Among individuals who experienced IPV in adolescence, individuals that initiated sexual activity between ages 10 and 15 were 1.74 times as likely as individuals who initiated sexual activity at age 16 or later to have experienced IPV in adulthood. The difference was statistically significant.
IPV in adolescence	At least one relationship reported at Add Health Waves II and III Heterosexual Ever experienced IPV Age 18–23	Initiated sexual activity between ages 10 and 15 vs. initiated sexual activity at age 16 or later	Among individuals who ever experienced IPV, individuals that initiated sexual activity between ages 10 and 15 were 1.53 times as likely as individuals who initiated sexual activity at age 16 or later to have first experienced IPV in adolescence. The difference was statistically significant.
Harden (2012): *Using data on 1,659 same-sex sibling pairs from Add Health, the author estimated effects of early sexual initiation. The author first compared the outcomes by gender using odds ratios (binary variables) and effect sizes (count variables) by gender. Then, the author estimated logistic (binary variables) and negative binomial (count variables) regression models, combining males and females. These models compared outcomes between sibling pairs to estimate differences across families and within sibling pairs to estimate outcomes for siblings with sexual initiation in different age categories. The between- and within-family models included controls for age, gender, and race/ethnicity. Some models also controlled for participants' opportunities for sexual activity (attractiveness, body mass index, and dating in adolescence), religiosity, education, and household income.*			
Ever married	Male siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, there were no statistically significant differences. No other gender-specific estimates were generated.

Outcome	Sample characteristics	Contrast	Findings
Ever married	Male siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	There were no statistically significant differences.
Nonmarital cohabitation	Male siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, males that initiated sexual activity before age 15 were 1.51 times as likely to have cohabitated with a partner (that they did not subsequently marry) as males who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Nonmarital cohabitation	Male siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, males that initiated sexual activity after age 19 were 0.37 times as likely to have cohabitated with a partner (that they did not subsequently marry) as males who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Mean number of romantic partners	Male siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, males that initiated sexual activity before age 15 had more romantic partners (on average) than males who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Mean number of romantic partners	Male siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, males that initiated sexual activity after age 19 had fewer romantic partners (on average) than males who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Relationship dissatisfaction	Male siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	There were no statistically significant differences.
Relationship dissatisfaction	Male siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, males that initiated sexual activity after age 19 had lower rates of relationship dissatisfaction than males who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.

Outcome	Sample characteristics	Contrast	Findings
Ever married	Female siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, females that initiated sexual activity before age 15 were 0.70 times as likely to have been married as females who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Ever married	Female siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	There were no statistically significant differences.
Nonmarital cohabitation	Female siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, females that initiated sexual activity before age 15 were 1.59 times as likely to have cohabitated with a partner (that they did not subsequently marry) as females who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Nonmarital cohabitation	Female siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, females that initiated sexual activity after age 19 were 0.26 times as likely to have cohabitated with a partner (that they did not subsequently marry) as females who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Mean number of romantic partners	Female siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, females that initiated sexual activity before age 15 had more romantic partners (on average) than females who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Mean number of romantic partners	Female siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, females that initiated sexual activity after age 19 had fewer romantic partners (on average) than females who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Relationship dissatisfaction	Female siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	There were no statistically significant differences.

Outcome	Sample characteristics	Contrast	Findings
Relationship dissatisfaction	Female siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	In a model without controls or family-based information, females that initiated sexual activity after age 19 had lower rates of relationship dissatisfaction than females who initialed sexual activity between the ages of 15 and 19. The difference was statistically significant. No other gender-specific estimates were generated.
Ever married	Siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	There were no statistically significant differences estimated in the between- or within-family models.
Ever married	Siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	Comparing between families, individuals who initiated sexual activity after age 19 were 0.60 to 0.72 times as likely as those who initiated between age 15 and 19 to have ever been married. Comparing within families, a sibling who initiated sexual activity after age 19 was 0.61 to 0.62 times as likely as their sibling who initiated between age 15 and 19 to have ever been married. These differences were statistically significant.
Nonmarital cohabitation	Siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	Comparing between families, individuals who initiated sexual activity before age 15 were 1.37 to 1.66 times as likely as those who initiated between age 15 and 19 to have ever cohabited with someone they did not marry. These differences are statistically significant. There were no statistically significant differences estimated in the within-family models.
Nonmarital cohabitation	Siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	Comparing between families, individuals who initiated sexual activity after age 19 were 0.22 to 0.31 times as likely as those who initiated between age 15 and 19 to have ever cohabited with someone they did not marry. Comparing within families, a sibling who initiated sexual activity after age 19 was 0.55 to 0.63 times as likely as their sibling who initiated between age 15 and 19 to have ever cohabited with someone they did not marry. These differences were statistically significant.
Mean number of romantic partners	Siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	Comparing between families, individuals that initiated sexual activity before age 15 had more romantic partners (on average) than individuals who initialed sexual activity between the ages of 15 and 19. These differences were statistically significant. Comparing within families, differences were not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Mean number of romantic partners	Siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	Comparing between families, individuals that initiated sexual activity after age 19 had fewer romantic partners (on average) than individuals who initialed sexual activity between the ages of 15 and 19. Comparing within families, individuals that initiated sexual activity after age 19 had fewer romantic partners (on average) than individuals who initialed sexual activity between the ages of 15 and 19. These differences were statistically significant.
Relationship dissatisfaction	Siblings Age 24–32	Initiated sexual activity before age 15 vs. initiated sexual activity between 15 and 19 years of age	There were no statistically significant differences.
Relationship dissatisfaction	Siblings Age 24–32	Initiated sexual activity after age 19 vs. initiated sexual activity between 15 and 19 years of age	Comparing between families, individuals that initiated sexual activity after age 19 had lower rates of relationship dissatisfaction (on average) than individuals who initialed sexual activity between the ages of 15 and 19. Comparing within families, a sibling who initiated sexual activity after age 19 had lower relationship dissatisfaction (on average) than their sibling who initiated between age 15 and 19. These differences were statistically significant.
Heaton (2002): *Using data from the 1995 National Survey of Family Growth, the author examined the relationship between premarital sex and divorce. The study used logistic regression and controlled for demographic characteristics; parents' relationship; religion; premarital cohabitation and childbearing; whether first intercourse was coerced; age at marriage; and whether the husband's and wife's age, race, education, and religion differed. The study shows outcomes of three models: a basic model with controls only for year, marital duration, premarital childbearing, and whether first intercourse was coerced; a complete model with all control variables included; and a trimmed model that excludes controls which did not have statistically significant coefficients in the complete model*			
First marriage ended in divorce or separation	Female Age 14–45	Had sex before marriage vs. did not have sex before marriage	Across all three models, individuals who had sex before marriage were 1.61 to 1.91 times as likely as those who did not have sex before marriage to have their first marriage end in divorce or separation. The differences were statistically significant.
Huibregtse et al. (2011): *The authors used two cohorts of same-sex adolescent twins from the Minnesota Twin Family Study (born 1977–1984, assessed at age 24 or 29) to estimate the relationship between adolescent sexual initiation (oral, anal, or vaginal initiation at or before age 16) and early pregnancy, sexual partnering, and adult risky sexual behavior using regression analyses. The first regression controlled for gender, years sexually active (for measures of number of lifetime partners only), age of assessment, and cohort. The authors estimated two additional analyses if the first regression demonstrated a significant relationship. The second regression compared twins who did and did not experience adolescent sexual initiation in a discordant-twin model. As part of this analysis, the authors also estimated differences across twins from different families. The final regression added a sexual initiation propensity score as a control in the twin-level analysis (the propensity score model included controls for parent-child relationships, externalizing and internalizing pathology, peer factors, psychosexual development, and stressful life events).*			

Outcome	Sample characteristics	Contrast	Findings
Number of regular partners in the past year (z-score)	Male twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, the number of regular partners among male twins who initiated sexual activity at age 16 or younger was not statistically significantly different than that for male twins who initiated sex after age 16. The between-pair and discordant-twin models were run only for a combined sample of male and female twins.
Number of regular partners in the past year (z-score)	Female twins Age 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, the number of regular partners among female twins who initiated sexual activity at or before age 16 was 0.12 standard deviations higher than that for female twins who initiated sex after age 16. This difference was statistically significant. The between-pair and discordant-twin models were run only for a combined sample of male and female twins.
Number of regular partners in the past year (z-score)	Twins Age 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	Between identical twin pairs, the number of regular partners was 0.12 to 0.19 standard deviations higher for twins who initiated sex at age 16 or younger than that for those after age 16. This difference was statistically significant for identical twins before adding a sexual initiation propensity score but was not statistically significant after controlling for the propensity score or for fraternal twins with or without adding the propensity score. There were no statistically significant differences in the discordant-twin regressions.
Number of casual partners in the past year (z-score)	Male twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, the number of casual partners among male twins who initiated sex at age 16 or younger was 0.82 standard deviations higher than that for male twins who initiated after age 16. This difference was statistically significant. This difference was lower (0.57 to 0.68) and statistically significant in the between-pair regressions for identical twins before and after adding a sexual initiation propensity score to the regression. There were no statistically significant differences between fraternal twins. In the discordant-twin regressions with or without the propensity score, the number of casual partners among male identical twins who initiated sexual activity at or before age 16 was 0.78 to 0.79 standard deviations higher than that for male identical twins who initiated sex after age 16. These differences were statistically significant. There were no statistically significant differences within the sample of fraternal twins.

Outcome	Sample characteristics	Contrast	Findings
Number of casual partners in the past year (z-score)	Female twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, the number of casual partners among female twins who initiated sexual activity at age 16 or younger was 0.24 standard deviations higher than that for male twins who initiated sex after age 16. The author states this difference was not statistically significant in the text but the table indicates it is. The between-pair and discordant-twin models were run only for male twins.
Lifetime number of causal partners (z-score)	Female twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	There were no statistically significant differences. The between-pair and discordant-twin models were run only for male twins.
Lifetime number of causal partners (z-score)	Male twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, the lifetime number of casual partners for male twins who initiated sex at age 16 or younger was 0.56 standard deviations higher than that for twins who initiated after age 16. This difference was statistically significant. This difference was higher (0.64 to 0.70 standard deviations) and remained statistically significant in the between-pair regressions for identical twins before and after controlling for a sexual initiation propensity score. There were no statistically significant differences between fraternal twin pairs. There were no statistically significant differences in the discordant-twin regressions.
Lifetime number of regular partners (z-score)	Female twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	There were no statistically significant differences. The between-pair and discordant-twin models were not analyzed for this outcome.
Lifetime number of regular partners (z-score)	Male twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, the lifetime number of regular partners for male twins who initiated sex at age 16 or younger was 0.21 standard deviations higher than that for twins who initiated after age 16. The difference was statistically significant. The between-pair and discordant-twin models were not analyzed for this outcome.

Kugler et al. (2017): *Using data from Add Health, the authors estimated the relationship between age at sexual initiation and several outcomes, also testing for gender differences in these associations. The authors first estimated the propensity score using generalized boosted modeling and 59 variables measured when respondents were age 11 to 13 and had not yet initiated sexual activity, including measures related to a respondent's demographic characteristics, family structure and processes, peers, school, mental health, religion, problem behavior, and neighborhood. They then estimated logistic regressions using data weighted based on the propensity score.*

Outcome	Sample characteristics	Contrast	Findings
Multiple partners in the past year	Age 19–21	Initiated sexual activity at age 14 or younger vs. initiated sexual activity at age 15 or older	Individuals who initiated sexual activity at age 14 or younger were 3.33 times as likely as those who initiated when older to have had two or more partners in the past year. The difference is statistically significant. The difference did not significantly vary by gender.
Magnusson et al. (2015): *Using data from the 2006-2010 National Survey of Family Growth, the authors organized women who had been sexually active in the past year into four groups based on the timing and number of their sexual partners: monogamy (one partner in the past year), serial monogamy with two or more partners in the past year but with a gap of one to three months between partners, serial monogamy with two or more partners in the past year but with a gap of four or more months between partners, and concurrent partnership (at least two partners in any month in the past year). They then used logistic regression to examine the relationship between age at sexual initiation and group. Regressions adjusted for age, race/ethnicity, educational attainment, marital status, income, maternal education, and paternal education.*			
Had more than one sexual partner in any month in the past year	Female Age 21–44 Heterosexual Had sex in the past year Voluntary first intercourse	Initiated sexual activity before age 15 vs. initiated sexual activity at age 18 or later	Women who initiated sexual activity before age 15 were 4.1 times as likely to have had concurrent partners as women who initiated sex at age 18 or later. After adjusting for demographic and background factors using regression analysis, this decreased to 3.7 times. Both estimates were statistically significant.
Serial monogamy with a gap of one to three months between partners	Female Age 21–44 Heterosexual Had sex in the past year Voluntary first intercourse	Initiated sexual activity before age 15 vs. initiated sexual activity at age 18 or later	Women who initiated sexual activity before age 15 were 2.1 to 2.2 times as likely to have been serially monogamous with a gap between partners of one to three months as women who initiated sex at age 18 or later. After adjusting for demographic and background factors using regression analysis, this decreased to 2.1 times. Both estimates were statistically significant.
Serial monogamy with a gap of four or more months between partners	Female Age 21–44 Heterosexual Had sex in the past year Voluntary first intercourse	Initiated sexual activity before age 15 vs. initiated sexual activity at age 18 or later	There were no statistically significant differences.
Had more than one sexual partner in any month in the past year	Female Age 21–44 Heterosexual Had sex in the past year Voluntary first intercourse	Initiated sexual activity at ages 15 to 17 vs. initiated sexual activity at age 18 or later	Women who initiated sexual activity between ages 15 and 17 were 1.9 times as likely to have had concurrent partners as women who initiated sex at age 18 or later. After adjusting for demographic and background factors using regression analysis, this decreased to 1.6 times. Both estimates were statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Serial monogamy with a gap of one to three months between partners	Female Age 21–44 Heterosexual Had sex in the past year Voluntary first intercourse	Initiated sexual activity at ages 15 to 17 vs. initiated sexual activity at age 18 or later	There were no statistically significant differences.
Serial monogamy with a gap of four or more months between partners	Female Age 21–44 Heterosexual Had sex in the past year Voluntary first intercourse	Initiated sexual activity at ages 15 to 17 vs. initiated sexual activity at age 18 or later	There were no statistically significant differences.
McCarthy and Grodsky (2011): *The authors used data from Add Health and the associated Adolescent Health Academic Achievement Study to estimate two regressions that capture the relationship between sexual abstinence and nine education outcomes (assessed in Wave II). The first regression controlled for age, race, parental education, public assistance, academic ability, self-control, physical maturity, ever having gotten someone pregnant or become pregnant, history of sexually transmitted infections, and delinquency. The second regression also controlled for an index capturing romantic behavior and included a correction for selection into sexual intercourse. The selection correction was introduced using the Heckman (1976) two-stage correction procedure. The authors first calculated the hazard of sexual initiation for each individual and then included that hazard as a control in the second stage regression. The authors used the following instruments for sexual intercourse in the first stage to compute the hazard: physical attractiveness, weight, attitudes towards sex, popularity, friendliness, parental attachment, parents' attitudes toward sex, virginity until marriage pledge, religiosity, self-control, and delinquency. The authors estimated regressions for ordinal, dichotomous, and count outcomes using ordinary least squares, logistic, and negative binomial regressions, respectively.*			
School attachment scale	Female Grades 8–12	Ever had sex vs. never had sex	School attachment among sexually active females was a statistically significant 0.18 points less (on a one-to-five scale) than that for abstinent females before controlling for selection and romantic behavior. After adding these controls the difference narrowed to 0.09 points but remained statistically significant.
School attachment scale	Male Grades 8–12	Ever had sex vs. never had sex	School attachment among sexually active males was a statistically significant 0.16 points less (on a one-to-five scale) than that for abstinent males before controlling for selection and romantic behavior. After adding these controls the narrowed to 0.11 points but remained statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Paik (2011): *Using data based on a sample of women from the 2002 National Survey of Family Growth, the author examined whether age at sexual initiation and premarital sex influence the risk of a first marriage ending in a separation, divorce, or annulment. The author first used discrete-time probit hazard models to investigate this relationship. These models included a correction for selection into sexual intercourse that was introduced using the Heckman two-step correction procedure, as well as controls for premarital sex, conception, birth, and cohabitation; years of marriage; marriage cohort; age at marriage; sociodemographic characteristics; religion; whether the husband was previously married or a father; and whether the husband's and wife's age and race differed. The author calculated the hazard (inverse Mills ratio) of sexual initiation for each individual, using age at menarche as an instrument, and then included that hazard as a control in the second-stage regression. The author then used a series of discrete-time logit survival models, with controls for either only age at marriage, marriage cohort, and years of marriage; all controls listed above except premarital sex, conception, and birth and the selection correction; and all controls listed above except the selection correction.*			
First marriage resulted in a separation, divorce, or annulment each year	Female Age 16–44 Ever married at age 16 or later	Initiated sexual activity at age 17 or younger vs. initiated sexual activity at age 18 or older	In a probit hazard regression with controls and the selection correction, women who initiated sexual activity before age 18 had a higher risk of marital instability than those who initiated at age 18 or older. The difference was statistically significant. Other survival models were not estimated for this contrast.
First marriage resulted in a separation, divorce, or annulment each year	Female Age 16–44 Ever married at age 16 or later	Initiated sexual activity at age 13 or younger vs. initiated sexual activity at age 18 or older	In logistic hazard regressions, women who initiated sexual activity at age 13 or younger had a relative risk of marital instability that was 1.9 to 3.5 times as high as those who initiated at age 18 or older. These differences were statistically significant in three of four regressions. Other survival models were not estimated for this contrast.
First marriage resulted in a separation, divorce, or annulment each year	Female Age 16–44 Ever married at age 16 or later	Initiated sexual activity at age 14 or 15 vs. initiated sexual activity at age 18 or older	In logistic hazard regressions, women who initiated sexual activity at age 14 or 15 had a relative risk of marital instability that was 1.8 to 3.1 times as high as those who initiated at age 18 or older. These differences were statistically significant. Other survival models were not estimated for this contrast.
First marriage resulted in a separation, divorce, or annulment each year	Female Age 16–44 Ever married at age 16 or later	Initiated sexual activity at age 16 or 17 vs. initiated sexual activity at age 18 or older	In logistic hazard regressions without controls for premarital sex, conception, and birth, women who initiated sexual activity at age 16 or 17 had a relative risk of marital instability that was 1.5 to 1.8 times as high as those who initiated at age 18 or older. These differences were statistically significant. Differences estimated using logistic hazard regressions controlling for premarital sex, conception, and birth were smaller and statistically insignificant. Other survival models were not estimated for this contrast.

Outcome	Sample characteristics	Contrast	Findings
Ramisetty-Mikler et al. (2006): *The authors analyzed data on dating violence from the 1999 Hawaii Youth Risk Behavior Survey. They estimated logistic regressions including controls for age at sexual initiation, demographic characteristics, number of lifetime sexual partners, alcohol and drug use, experience of rape, and suicidality in the past 12 months.*			
Dating partner hit, slapped, or otherwise purposefully physically hurt them in the past 12 months	Students in Hawaiian public high schools	Initiated sexual activity at age 13 or younger vs. never had sex	Individuals who first initiated sexual activity at age 13 or younger were 7.6 times as likely as individuals who never had sex to have experienced dating violence. The difference was statistically significant.
Dating partner hit, slapped, or otherwise purposefully physically hurt them in the past 12 months	Students in Hawaiian public high schools	Initiated sexual activity at age 14 or 15 vs. never had sex	Individuals who first initiated sexual activity at age 14 or 15 were 3.9 times as likely as individuals who never had sex to have experienced dating violence. The difference was statistically significant.
Dating partner hit, slapped, or otherwise purposefully physically hurt them in the past 12 months	Students in Hawaiian public high schools	Initiated sexual activity at age 16 or older vs. never had sex	Individuals who first initiated sexual activity at age 16 or older were 3.5 times as likely as individuals who never had sex to have experienced dating violence. The difference was statistically significant.
Ream (2006): *Using longitudinal data from Wave I and Wave II of Add Health, the author examined the relationship between sexual intercourse and several measures of depression and connection to one's environment. In analyses by gender predicting outcomes at Wave I, the author used linear regression analysis with controls for demographic and socioeconomic characteristics, relative pubertal maturation timing, cognitive ability, romantic relationships, sexually transmitted infection acquisition, experience of rape, and pregnancy of either self or a partner. In analyses by gender predicting outcomes at Wave II, the author also included a control for a measure of the outcome at Wave I. In addition, the author estimated differences in changes between outcomes at Wave I and Wave II for individuals with different patterns of sexual initiation, pooling males and females. Finally, for the Wave II depression outcome only, the author estimated a model controlling for Wave I depression; the cross-wave average indexes of parent problem-focused interactions, school belonging, and religious participation; and all previously described control variables.*			
Parent problem-focused interactions index (Wave I; range 0–3)	Male Age 11–17	Initiated sexual activity before Wave I vs. did not initiate sexual activity by Wave I	The parent problem-focused interactions index was 0.15 points higher at Wave I for males who had initiated sexual activity. The difference was statistically significant.
Parent problem-focused interactions index (Wave I; range 0–3)	Female Age 11–17	Initiated sexual activity before Wave I vs. did not initiate sexual activity by Wave I	The parent problem-focused interactions index was 0.21 points higher at Wave I for females who had initiated sexual activity. The difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Parent problem-focused interactions index (Wave II; range 0–3)	Male Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	There was no significant difference.
Parent problem-focused interactions index (Wave II; range 0–3)	Female Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	The parent problem-focused interactions index was 0.20 points higher at Wave II for females who had initiated sexual activity between Waves I and II compared with those who had not initiated by Wave II. The difference was statistically significant.
Parent problem-focused interactions index (Wave II; range 0–3)	Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	Using a regression model, the parent problem-focused interactions index was 0.22 points higher at Wave II for individuals who had initiated sexual activity between Waves I and II compared with those who had not initiated by Wave II. There was no significant difference in a model that compared changes in the outcome over time.
School belonging index (Wave I; range 1–5)	Male Age 11–17	Initiated sexual activity before Wave I vs. did not initiate sexual activity by Wave I	The school belonging index was 0.24 points lower at Wave I for males who had initiated sexual activity. The difference was statistically significant.
School belonging index (Wave I; range 1–5)	Female Age 11–17	Initiated sexual activity before Wave I vs. did not initiate sexual activity by Wave I	The school belonging index was 0.25 points lower at Wave I for females who had initiated sexual activity. The difference was statistically significant.
School belonging index (Wave II; range 1–5)	Male Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	The school belonging index was 0.14 points lower at Wave II for males who had initiated sexual activity between Waves I and II compared with those who had not initiated by Wave II. The difference was statistically significant.
School belonging index (Wave II; range 1–5)	Female Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	The school belonging index was 0.15 points lower at Wave II for females who had initiated sexual activity between Waves I and II compared with those who had not initiated by Wave II. The difference was statistically significant.
School belonging index (Wave II; range 1–5)	Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	The school belonging index was 0.18 to 0.30 points higher at Wave II for individuals who had initiated sexual activity between Waves I and II compared with those who had not initiated by Wave II. The differences were statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Religious participation index (Wave I; range 0–4)	Male Age 11–17	Initiated sexual activity before Wave I vs. did not initiate sexual activity by Wave I	The religious participation index was 0.37 points lower at Wave I for males who had initiated sexual activity. The difference was statistically significant.
Religious participation index (Wave I; range 0–4)	Female Age 11–17	Initiated sexual activity before Wave I vs. did not initiate sexual activity by Wave I	The religious participation index was 0.45 points lower at Wave I for females who had initiated sexual activity. The difference was statistically significant.
Religious participation index (Wave II; range 0–4)	Male Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	There was no significant difference.
Religious participation index (Wave II; range 0–4)	Female Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	The religious participation index was 0.14 points lower at Wave II for females who had initiated sexual activity between Waves I and II compared with those who had not initiated by Wave II. The difference was statistically significant.
Religious participation index (Wave II; range 0–4)	Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	There was no significant difference.

Sabia (2007b): *Using longitudinal data from Add Health and several analytic techniques, the author examined the relationship between sexual intercourse and school attachment. The approaches included ordinary least squares (OLS; two sets of estimates), school-fixed effects, first-differences regression, and instrumental variables (IV). The first-differences approach used changes in sexual behavior between Add Health Waves I and II to predict changes in the outcome between those waves. All other estimates use data from Wave I. Control variables for the OLS and school fixed-effects regressions included measures of demographic characteristics, socioeconomic status, household structure, parent's values, whether a family member or friend recently attempted suicide, family dynamics, physical health, mental health, employment, romantic relationships, religiosity, preference for attending college, innate intelligence, substance use, and school characteristics. The first-differences model included a subset of these controls that could vary over time, related to preference for attending college, parent's values, family dynamics, physical and mental health, whether a family member or friend recently attempted suicide, employment, religiosity, substance use, romantic relationships, and whether the student attended a public or private school. The author used two different IV estimation techniques, instrumenting for sexual initiation using seven variables: whether an adolescent's school provides daycare for parenting students; whether sex education and family planning or associated referrals are provided by the school; whether the adolescent considers themselves a born-again Christian and believes the bible is the word of God; schoolmates' perceptions of sex (two variables); parents' attitudes about sex; and whether a parent has spoken with the adolescent about sex.*

Outcome	Sample characteristics	Contrast	Findings
School disaffinity scale (does not feel like "a part of school")	Male Ages 13–15	Ever had sex vs. never had sex	Based on OLS models, sexual initiation was associated with a 0.14 to 0.15 point decrease (on a one-to-five scale) in school disaffinity. Only one of the two OLS estimates was statistically significant. Based on IV models, sexual initiation was associated with a 0.13 to 0.82 point increase (on a one-to-five scale) in school disaffinity. Only one of the two IV estimates was statistically significant. Estimated based on school fixed effects and first differences, models were not statistically significant.
School disaffinity scale (does not feel like "a part of school")	Male Ages 16–18	Ever had sex vs. never had sex	Based on the first differences model, sexual initiation was associated with a 0.25 point increase (on a one-to-five scale) in school disaffinity. In all other models, the differences were not statistically significant.
School disaffinity scale (does not feel like "a part of school")	Female Ages 13–15	Ever had sex vs. never had sex	Based on the model including school fixed effects, sexual initiation was associated with a 0.16 point increase (on a one-to-five scale) in school disaffinity. In all other models, the differences were not statistically significant.
School disaffinity scale (does not feel like "a part of school")	Female Ages 16–18	Ever had sex vs. never had sex	There were no statistically significant differences.
Sandfort et al. (2008): *Using a sample from the National Sexual Health Survey (1995–1996), the authors classified respondent's age at sexual initiation as "early" (25 percent), "normative" (50 percent), or "late" (25 percent) based on the distribution of age at first intercourse for those with the same gender, race/ethnicity, and educational background. The authors used ordinary least squares and logistic regression to estimate relationships between age at sexual initiation and sexual initiation before marriage and various outcomes, controlling for demographics (race/ethnicity, education, place of residence in youth, age, and migration status) and sexual history (nonconsensual sex, whether first orgasm was from masturbation, and sexual activity before first intercourse).*			
Relationship solidity	Male adults	Early vs. normative sexual initiation	The difference was not statistically significant.
Sexual relationship satisfaction	Male adults	Early vs. normative sexual initiation	The difference was not statistically significant.
Number of partners in past year	Male adults	Early vs. normative sexual initiation	Male early initiators had 0.20 more partners, on average, than male normative initiators. The difference was statistically significant.
Number of partners in past five years	Male adults	Early vs. normative sexual initiation	Male early initiators had 0.70 more partners, on average, than male normative initiators. The difference was statistically significant.
Relationship solidity	Female adults	Early vs. normative sexual initiation	The difference was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Sexual relationship satisfaction	Female adults	Early vs. normative sexual initiation	The difference was not statistically significant.
Number of partners in past year	Female adults	Early vs. normative sexual initiation	Female early initiators had 0.09 more partners, on average, than female normative initiators. The difference was statistically significant.
Number of partners in past five years	Female adults	Early vs. normative sexual initiation	Female early initiators had 0.28 more partners, on average, than female normative initiators. The difference was statistically significant.
Relationship solidity	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Sexual relationship satisfaction	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Number of partners in past year	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Number of partners in past five years	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Relationship solidity	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Sexual relationship satisfaction	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Number of partners in past year	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Number of partners in past five years	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Relationship solidity	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Men who waited until marriage to first have sex scored 0.12 points higher, on average, on the relationship solidity index, compared with men who did not wait. The difference is statistically significant.
Sexual relationship satisfaction	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Number of partners in past year	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Number of partners in past five years	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Men who waited until marriage to first have intercourse had 0.15 fewer partners, on average, in the past five years, compared with men who did not wait. The difference was statistically significant.
Relationship solidity	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Sexual relationship satisfaction	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Number of partners in past year	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Number of partners in past five years	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Women who waited until marriage to first have intercourse had 0.07 fewer partners, on average, in the past five years, compared with women who did not wait. The difference was statistically significant.
Scott et al. (2011): *Using Add Health data, the authors used logistic regressions to estimate the relationship between age of sexual initiation and three outcomes related to sexual partnering, sexually transmitted infections, and childbearing. The regressions included controls for sociodemographic characteristics, childhood household composition, attachment to parents, substance use, cognitive ability, educational attainment and aspirations, contraceptive use, discussion of contraception with sexual partners, and characteristics of sexual partners.*			
Had one sexual partner in the past year (compared with none)	Age 20–27 Ever had sex	Initiated sexual activity at age 15 or younger vs. initiated sexual activity at age 16 or older	There was no statistically significant difference.
Had two or more sexual partners in the past year (compared with none)	Age 20–27 Ever had sex	Initiated sexual activity at age 15 or younger vs. initiated sexual activity at age 16 or older	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Had two or more sexual partners in the past year (compared with one)	Age 20–27 Ever had sex	Initiated sexual activity at age 15 or younger vs. initiated sexual activity at age 16 or older	There was no statistically significant difference.
Vasilenko and Lefkowitz (2014): *The authors used four waves of longitudinal data on 434 college students who initiated sexual activity between the fall semesters of their first and fourth years of college to examine the relationship between (vaginal or anal) sexual initiation and religiosity. The authors used a hierarchical linear model, including fixed-effects for gender, age, and race/ethnicity and individual-level random-effects and time trends.*			
Number of times attended religious services in past 12 months	College students	0–6 months after first intercourse vs. more than 6 months before first intercourse	When asked about how many times they had attended religious services in the past 12 months, students indicated they attended services 5.4 times fewer if they were asked 0 to 6 months after sexual initiation compared with when they were asked more than 6 months before sexual initiation. The difference was statistically significant.
Number of times attended religious services in past 12 months	College students	6–12 months after first intercourse vs. more than 6 months before first intercourse	When asked about how many times they had attended religious services in the past 12 months, students indicated they attended services 7.3 times fewer if they were asked 6 to 12 months after sexual initiation compared with when they were asked more than 6 months before sexual initiation. The difference was statistically significant.
Number of times attended religious services in past 12 months	College students	More than 12 months after first intercourse vs. more than 6 months before first intercourse	There was no statistically significant difference.
Importance of religion scale	College students	0–6 months after first intercourse vs. more than 6 months before first intercourse	There was no statistically significant difference.
Importance of religion scale	College students	6–12 months after first intercourse vs. more than 6 months before first intercourse	Students responded 1.7 points lower on a 32-point scale measuring the importance of religion in their lives if they were asked to respond 6 to 12 months after sexual initiation compared with when they were asked more than 6 months before sexual initiation. The difference was statistically significant.
Importance of religion scale	College students	More than 12 months after first intercourse vs. more than 6 months before first intercourse	There was no statistically significant difference.

D. Findings within the path to economic self-sufficiency domain

The SSAvER team reviewed 13 studies that examined outcomes related to the path to economic self-sufficiency (Table A.4). These studies focused primarily on outcomes related to educational achievement and attainment:

- Eight studies examined high school completion or dropout (Frisco 2008; McCarthy and Grodsky 2011; Pham et al. 2013; Rector and Johnson 2005; Sabia and Rees 2009; Sabia and Rees 2011; Schvaneveldt et al. 2001; Steward et al. 2009).
- Three studies examined measures of educational achievement, such as high school grade point average (McCarthy and Grodsky 2011; Sabia 2007a; Schvaneveldt et al. 2001).
- Three studies examined postsecondary aspirations or expectations (McCarthy and Grodsky 2011; Sabia 2007b; Schvaneveldt et al. 2001).
- Seven studies examined postsecondary enrollment or completion (Frisco 2008; Pham et al. 2013; Rector and Johnson 2005; Sabia and Rees 2009; Sabia and Rees 2011; Spriggs and Halpern 2008a; Steward 2009).
- Three studies examined continuous or ordinal measures of the total number of years of schooling completed (Finger et al. 2004; Schvaneveldt et al. 2001; Torchiana 2013).

In addition to looking at educational outcomes, one study examined economic outcomes in adulthood, such as family income, receipt of welfare benefits, and positive net financial worth (Finger et al. 2004).

The series of studies by Sabia and colleagues used more rigorous methods to assess the link between the timing of first sexual activity and outcomes in this domain (Sabia 2007a; Sabia 2007b; Sabia and Rees 2009; Sabia and Rees 2011). These studies used a variety of approaches, the most rigorous of which included regressions with individual fixed-effects incorporating propensity score matching, regressions with family-fixed effects, and instrumental variable regressions. In addition, McCarthy and Grodsky (2011) used an application of the Heckman (1976) correction in much the same spirit as a propensity score-based method.

Table A.4. Studies examining outcomes related to the path to economic self-sufficiency

Outcome	Sample characteristics	Contrast	Findings
Finger et al. (2004): *The authors used data from the National Longitudinal Study of Youth (1979–2000) to examine the relationship between sexual initiation by age 18 and 10 outcomes that captured economic, health, and social well-being in middle adulthood. The authors performed simple comparisons of means and estimated logistic regressions for dichotomous outcomes and ordinary least squares regressions for continuous outcomes, with controls for adolescent demographic and socioeconomic characteristics, religiosity, and employment status (variables were retained in a model only if they changed a coefficient by more than 10 percent).*			
Years of education	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, males who had not had sex by age 18 completed 14.3 years of education compared with 12.9 years for males who had sex by that age. In a regression with controls, males who had not had sex by age 18 completed a statistically significant 0.90 more years of education than males who had sex by that age.
Years of education	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who were not fathers by age 19, those who had not had sex by age 18 completed a statistically significant 0.87 more years of education than males who had sex by that age.
Years of education	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who lived in a single-parent urban household at age 14, those who had not had sex by age 18 completed a statistically significant 1.2 more years of education than males who had sex by that age.
Years of education	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, females who had not had sex by age 18 completed 14.2 years of education compared with 13.1 years for females who had sex by that age. In a regression with controls, females who had not had sex by age 18 completed a statistically significant 0.76 more years of education than females who had sex by that age.
Years of education	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who were not pregnant by age 18 years and three months, those who had not had sex by age 18 completed a statistically significant 0.54 more years of education than females who had sex by that age.

Outcome	Sample characteristics	Contrast	Findings
Years of education	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who lived in a single-parent urban household at age 14, those who had not had sex by age 18 completed a statistically significant 0.72 more years of education than females who had sex by that age.
Per capita family income	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, males who had not had sex by age 18 had family per capita income of $27,507 compared with $24,777 for males who had sex by that age. In a regression with controls, there was no statistically significant difference.
Per capita family income	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Per capita family income	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who lived in a single-parent urban household at age 14, those who had not had sex by age 18 had a statistically significant $9,057 more per capita income than males who had sex by that age.
Per capita family income	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, females who had not had sex by age 18 had a per capita income of $23,037 compared with $18,729 for females who had sex by that age. In a regression with controls, females who had not had sex by age 18 had a statistically significant $2,496 more capita income than females who had sex by that age.
Per capita family income	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Per capita family income	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who lived in a single-parent urban household at age 14, those who had not had sex by age 18 had a statistically significant $3,700 more per capita income than females who had sex by that age.

Outcome	Sample characteristics	Contrast	Findings
Had positive financial net worth	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, 82 percent of males who had not had sex by age 18 had positive financial net worth compared with 74 percent of males who had sex by that age. In a regression with controls, males who had not had sex by age 18 were more likely to have positive net worth than males who had sex by that age. The difference was statistically significant.
Had positive financial net worth	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who were not fathers by age 19, those who had not had sex by age 18 were statistically significantly more likely to have positive net worth than males who had sex by that age.
Had positive financial net worth	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Had positive financial net worth	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, 82 percent of females who had not had sex by age 18 had positive financial net worth compared with 76 percent of females who had sex by that age. In a regression with controls, females who had not had sex by age 18 were more likely to have positive net worth than females who had sex by that age. The difference was statistically significant.
Had positive financial net worth	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who were not pregnant by age 18 years and 3 months, those who had not had sex by age 18 were more likely to have positive net worth than females who had sex by that age. The difference was statistically significant.
Had positive financial net worth	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who lived in a single-parent urban household at age 14, those who had not had sex by age 18 were more likely to have positive net worth than those who had sex by that age. The difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Ever received welfare benefits	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, 17 percent of males who had not had sex by age 18 ever received welfare benefits compared with 28 percent of males who had sex by that age. In a regression with controls, males who had not had sex by age 18 were 0.70 times as likely as males who had sex by that age to have ever received welfare benefits. This difference was statistically significant.
Ever received welfare benefits	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who were not fathers by age 19, those who had not had sex by age 18 were 0.71 times as likely as males who had sex by that age of ever receiving welfare benefits. This difference was statistically significant.
Ever received welfare benefits	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who lived in a single-parent urban household at age 14, those who had not had sex by age 18 were 0.69 times as likely as males who had sex by that age of ever receiving welfare benefits. This difference was statistically significant.
Ever received welfare benefits	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, 18 percent of females who had not had sex by age 18 ever received welfare benefits compared with 39 percent of females who had sex by that age. In a regression without controls (none were retained), females who had not had sex by age 18 were 0.35 times as likely as females who had sex by that age of ever receiving welfare benefits. This difference was statistically significant.
Ever received welfare benefits	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression without controls (none were retained), among females who were not pregnant by age 18 years and 3 months, those who had not had sex by age 18 were 0.48 times as likely as females who had sex by that age of ever receiving welfare benefits. This difference was statistically significant.
Ever received welfare benefits	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression without controls (none were retained), among females who lived in a single-parent urban household at age 14, those who had not had sex by age 18 were 0.36 times as likely as females who had sex by that age of ever receiving welfare benefits. This difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Frisco (2008): *Using data from the National Education Longitudinal Study of 1988–1994, the author analyzed the relationship between sexual initiation and educational attainment. The dataset was based on a nationally representative sample of 8th grade students in 1988 who were interviewed in 1988, 1990, 1992, and 1994 (when outcomes were assessed). The author estimated logistic regressions controlling for a number of characteristics measured in the first survey wave, including measures of academic background, family background, demographic characteristics, and risk-taking behavior. An additional model also controlled for contraceptive use at sexual initiation and whether a respondent had a child or was expecting to have a child in their senior year of high school.*			
On-time high school graduation	Female Delayed sexual initiation until at least high school	Initiated sexual activity in 9th or 10th grade vs. did not initiate sexual activity in high school	Females who initiated sexual activity in 9th or 10th grade had odds of graduating high school on time that were 80 to 83 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
On-time high school graduation	Female Delayed sexual initiation until at least high school	Initiated sexual activity in 11th or 12th grade vs. did not initiate sexual activity in high school	Females who initiated sexual activity in 11th or 12th grade had odds of graduating high school on time that were 57 to 63 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
On-time high school graduation	Male Delayed sexual initiation until at least high school	Initiated sexual activity in 9th or 10th grade vs. did not initiate sexual activity in high school	Males who initiated sexual activity in 9th or 10th grade had odds of graduating high school on time that were 67 to 69 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
On-time high school graduation	Male Delayed sexual initiation until at least high school	Initiated sexual activity in 11th or 12th grade vs. did not initiate sexual activity in high school	The differences were not statistically significant.
Enrolled full-time and continuously in a four-year postsecondary institution after on-time graduation (vs. no postsecondary enrollment)	Female Delayed sexual initiation until at least high school	Initiated sexual activity in 9th or 10th grade vs. did not initiate sexual activity in high school	Females who initiated sexual activity in 9th or 10th grade had odds of enrolling full-time in a four-year postsecondary institution that were 66 to 72 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
Enrolled full-time and continuously in a four-year postsecondary institution after on-time graduation (vs. no postsecondary enrollment)	Female Delayed sexual initiation until at least high school	Initiated sexual activity in 11th or 12th grade vs. did not initiate sexual activity in high school	Females who initiated sexual activity in 11th or 12th grade had odds of enrolling full-time in a four-year postsecondary institution that were 53 to 59 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Enrolled full-time and continuously in a four-year postsecondary institution after on-time graduation (vs. no postsecondary enrollment)	Male Delayed sexual initiation until at least high school	Initiated sexual activity in 9th or 10th grade vs. did not initiate sexual activity in high school	Males who initiated sexual activity in 9th or 10th grade had odds of enrolling full-time in a four-year postsecondary institution that were 42 to 49 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
Enrolled full-time and continuously in a four-year postsecondary institution after on-time graduation (vs. no postsecondary enrollment)	Male Delayed sexual initiation until at least high school	Initiated sexual activity in 11th or 12th grade vs. did not initiate sexual activity in high school	Males who initiated sexual activity in 11th or 12th grade had odds of enrolling full-time in a four-year postsecondary institution that were 34 to 39 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
Postsecondary enrollment other than full-time, full-year enrollment at a four-year institution in year after on-time graduation (vs. no postsecondary enrollment)	Female Delayed sexual initiation until at least high school	Initiated sexual activity in 9th or 10th grade vs. did not initiate sexual activity in high school	Females who initiated sexual activity in 9th or 10th grade had odds of postsecondary enrollment other than full-time, full-year enrollment at a four-year institution that were 38 to 42 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
Postsecondary enrollment other than full-time, full-year enrollment at a four-year institution in year after on-time graduation (vs. no postsecondary enrollment)	Female Delayed sexual initiation until at least high school	Initiated sexual activity in 11th or 12th grade vs. did not initiate sexual activity in high school	Females who initiated sexual activity in 11th or 12th grade had odds of postsecondary enrollment other than full-time, full-year enrollment at a four-year institution that were 40 to 43 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
Postsecondary enrollment other than full-time, full-year enrollment at a four-year institution in year after on-time graduation (vs. no postsecondary enrollment)	Male Delayed sexual initiation until at least high school	Initiated sexual activity in 9th or 10th grade vs. did not initiate sexual activity in high school	Males who initiated sexual activity in 9th or 10th grade had odds of postsecondary enrollment other than full-time, full-year enrollment at a four-year institution that were 39 to 43 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant.
Postsecondary enrollment other than full-time, full-year enrollment at a four-year institution in year after on-time graduation (vs. no postsecondary enrollment)	Male Delayed sexual initiation until at least high school	Initiated sexual activity in 11th or 12th grade vs. did not initiate sexual activity in high school	In a model not controlling for contraceptive use or childbearing, males who initiated sexual activity in 11th or 12th grade had odds of postsecondary enrollment other than full-time, full-year enrollment at a four-year institution that were 29 percent lower than those who did not initiate sexual activity in high school. The differences were statistically significant. The difference estimated in the model controlling for contraceptive use and childbearing was 25 percent but not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
McCarthy and Grodsky (2011): *The authors used data from Add Health and the associated Adolescent Health Academic Achievement Study to estimate two regressions that capture the relationship between sexual abstinence and nine education outcomes (assessed in Wave II). The first regression controlled for age, race, parental education, public assistance, academic ability, self-control, physical maturity, ever having gotten someone pregnant or become pregnant, history of sexually transmitted infections, and delinquency. The second regression also controlled for an index capturing romantic behavior and included a correction for selection into sexual intercourse. The selection correction was introduced using the Heckman (1976) two-stage correction procedure. The authors first calculated the hazard of sexual initiation for each individual and then included that hazard as a control in the second stage regression. The authors used the following instruments for sexual intercourse in the first stage to compute the hazard: physical attractiveness, weight, attitudes towards sex, popularity, friendliness, parental attachment, parents' attitudes toward sex, virginity until marriage pledge, religiosity, self-control, and delinquency. The authors estimated regressions for ordinal, dichotomous, and count outcomes using ordinary least squares, logistic, and negative binomial regressions, respectively.*			
High school GPA	Female Grades 8–12	Ever had sex vs. never had sex	High school GPA among sexually active females was a statistically significant 0.23 points lower (on a zero-to-four scale) than that for abstinent females before controlling for selection and romantic behavior. After adding these controls the difference narrowed to 0.15 points but remained statistically significant.
High school GPA	Male Grades 8–12	Ever had sex vs. never had sex	High school GPA among sexually active males was a statistically significant 0.31 points less (on a zero-to-four scale) than that for abstinent males before controlling for selection and romantic behavior. After adding these controls the difference narrowed to 0.23 points but remained statistically significant.
Aspires to go to college	Female Grades 8–12	Ever had sex vs. never had sex	Before controlling for selection and romantic behavior, sexually active females were 0.68 times as likely as abstinent females of having high college aspirations. This relationship was statistically significant. The multiplier increased to 0.78 after controlling for selection and romantic behavior and remained statistically significant.
Aspires to go to college	Male Grades 8–12	Ever had sex vs. never had sex	Before controlling for selection and romantic behavior, sexually active males were 0.58 times as likely as abstinent males of having high college aspirations. This relationship was statistically significant. The multiplier declined slightly to 0.57 after controlling for selection and romantic behavior and remained statistically significant.
Expects to go to college	Female Grades 8–12	Ever had sex vs. never had sex	Before controlling for selection and romantic behavior, sexually active females were 0.68 times as likely as abstinent females to believe they would go to college. This relationship was statistically significant. The multiplier increased to 0.77 after controlling for selection and romantic behavior and remained statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Expects to go to college	Male Grades 8–12	Ever had sex vs. never had sex	Before controlling for selection and romantic behavior, sexually active males were 0.57 times as likely as abstinent males to believe they would go to college. This relationship was statistically significant. The multiplier increased slightly to 0.58 after controlling for selection and romantic behavior and remained statistically significant.
Dropped out of high school	Female Grades 8–12	Ever had sex vs. never had sex	Sexually active females were 4.68 times as likely as abstinent females to have dropped out of high school before controlling for selection and romantic behavior. After controlling for selection and romantic behavior, this multiplier declined to 4.28 but remained statistically significant.
Dropped out of high school	Male Grades 8–12	Ever had sex vs. never had sex	Sexually active males were 4.05 times as likely as abstinent males to have dropped out of high school before controlling for selection and romantic behavior. This multiplier declined to 3.48 after controlling for selection and romantic behavior but remained statistically significant.
Pham et al. (2013): *The authors used data from the National Longitudinal Study of Youth 1997 cohort to examine the relationship between academic outcomes, dating, and the timing of sexual initiation. The authors used data on 2,895 survey respondents that completed 9th grade between 1997 and 2005. The authors first estimated a propensity score and then stratified students into five groups based on the predicted values (this regression specification is not explicitly specified). They then estimated differences between individuals who had and had not had sexual activity by the end of 9th grade in each strata and pooled the estimates to determine the overall effect. The analysis controlled for measures of demographic characteristics, socioeconomic characteristics, cognitive ability, 8th-grade course performance, family structure, school type (public or private), exposure to gang-related activity, and dating behavior. The authors do not explicitly state whether these variables were accounted for via the estimation of differences in outcomes by strata, the estimation of the propensity score, or both.*			
High school graduation	Age 20	Initiated sexual activity before 10th grade vs. did not initiate sexual activity before 10th grade	Individuals that initiated sexual activity before 10th grade were 12 percentage points less likely to have graduated high school by age 20 than individuals who did not initiate sexual activity before 10th grade. This difference was statistically significant.
High school graduation	Male Age 20	Initiated sexual activity before 10th grade vs. did not initiate sexual activity before 10th grade	Males that initiated sexual activity before 10th grade were about 10 percentage points less likely to have graduated high school by age 20 than males who did not initiate sexual activity before 10th grade. This difference was statistically significant.
High school graduation	Female Age 20	Initiated sexual activity before 10th grade vs. did not initiate sexual activity before 10th grade	Females that initiated sexual activity before 10th grade were about 15 percentage points less likely to have graduated high school by age 20 than females who did not initiate sexual activity before 10th grade. This difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Enrolled in college by 2005	Age 21–25	Initiated sexual activity before 10th grade vs. did not initiate sexual activity before 10th grade	Individuals that initiated sexual activity before 10th grade were 5 percentage points less likely to have enrolled in college than individuals who did not initiate sexual activity before 10th grade. This difference was statistically significant.
Enrolled in college by 2005	Male Age 21–25	Initiated sexual activity before 10th grade vs. did not initiate sexual activity before 10th grade	Males that initiated sexual activity before 10th grade were roughly 5 percentage points less likely to enroll in college than males who did not initiate sexual activity before 10th grade. This difference was statistically significant.
Enrolled in college by 2005	Female Age 21–25	Initiated sexual activity before 10th grade vs. did not initiate sexual activity before 10th grade	Females that initiated sexual activity before 10th grade were roughly 7 percentage points less likely to enroll in college than females who did not initiate sexual activity before 10th grade. This difference was statistically significant.
Rector and Johnson (2005): *Using Add Health data, the authors examined the relationship between abstaining from sex until age 18 and measures of educational attainment and school behavior. The authors used logistic regressions with controls for demographic and socioeconomic characteristics, family structure, self-esteem, and religiosity. An additional regression model also controlled for whether contraception was used at sexual initiation for those who initiated before age 18.*			
Dropped out of high school	Age 19–25	Abstained from sex until age 18 or later vs. had sex before age 18	Youth who abstained from sex until at least age 18 were 0.46 to 0.55 times as likely as youth who had sex before age 18 to have dropped out of high school. The differences were statistically significant.
Attended college	Age 19–25	Abstained from sex until age 18 or later vs. had sex before age 18	Youth who abstained from sex until at least age 18 were 1.58 to 1.88 times as likely as youth who had sex before age 18 to have attended college. The differences were statistically significant.
Currently attending or graduated from college	Age 19–25	Abstained from sex until age 18 or later vs. had sex before age 18	Youth who abstained from sex until at least age 18 were 1.94 to 2.15 times as likely as youth who had sex before age 18 to be attending or have graduated from college. The differences were statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Sabia (2007a): *Using Add Health data, the author examined the relationship between sexual initiation and self-reported high school GPA through five analysis methods: ordinary least squares (OLS), school-fixed effects, individual-fixed effects, individual fixed-effects with propensity score matching, and instrumental variables (IV). The OLS and school fixed-effects models controlled for demographic characteristics, socioeconomic status, household structure, parent's values, whether a family member or friend recently attempted suicide, family dynamics, physical health, mental health, employment, romantic relationships, religiosity, college aspirations, innate intelligences, and alcohol consumption. The individual-fixed effects model included a subset of these controls that could vary over time: college aspirations, parent's values, family dynamics, physical and mental health, whether a family member or friend recently attempted suicide, employment, religiosity, alcohol consumption, and romantic relationships. The fixed-effects propensity score matched estimates were generated by predicting initiation of sexual activity between Add Health Waves I and II using the set of baseline individual- and family-level observables, matching adolescents based on predictions from this model, then using the matched sample to produce a first-differences estimate. The IV approach used seven instruments for sexual initiation: the number of county-level family planning service providers per person; whether there is an abortion provider in the county; whether the adolescent's school provides or refers students to family planning materials; whether school policy requires the transfer of pregnant students to alternate schools; schoolmates' perceptions of sex; and parents' attitudes about sex. The author also conducted several sensitivity analyses to assess the robustness of the estimates. These produced broadly similar results except as noted below.*			
High school GPA (four-point scale)	Female Age 13–14	Ever had intercourse vs. never had intercourse	There were no statistically significant results. (IV regressions were not estimated for females.)
High school GPA (four-point scale)	Male Age 13–14	Ever had intercourse vs. never had intercourse	Across all five models, for males ages 13 to 14, sexual initiation is associated with a 0.16 to 0.26 point decline in GPA. This difference was only significant in the individual-fixed effects model (difference of 0.21 points).
High school GPA (four-point scale)	Female Age 15–16	Ever had intercourse vs. never had intercourse	In the OLS and school fixed-effects models, for females ages 15 to 16, sexual initiation was associated with a significant decrease in GPA of 0.23 to 0.25 points. In the individual fixed-effects models with and without propensity score matching, the difference is smaller and not statistically significant. IV regressions were not estimated for females.
High school GPA (four-point scale)	Male Age 15–16	Ever had intercourse vs. never had intercourse	Across the first four models, for males ages 15 to 16, sexual initiation is associated with a 0.18 to 0.36 point decline in GPA. This difference was significant for all four models. In the IV models, sexual initiation was associated with a 0.05 to 0.41 point decline in GPA, across four specifications. The estimate was significant only in the IV specification with the largest effect size.
High school GPA (four-point scale)	Female Age 17–18	Ever had intercourse vs. never had intercourse	There were no statistically significant results. (IV regressions were not estimated for females.)
High school GPA (four-point scale)	Male Age 17–18	Ever had intercourse vs. never had intercourse	There were no statistically significant results. (IV regressions were not estimated for males in this age group.)

Outcome	Sample characteristics	Contrast	Findings
Sabia (2007b): *Using longitudinal data from Add Health and several analytic techniques, the author examined the relationship between sexual intercourse and school attachment. The approaches included ordinary least squares (OLS; two sets of estimates), school-fixed effects, first-differences regression, and instrumental variables (IV). The first-differences approach used changes in sexual behavior between Add Health Waves I and II to predict changes in the outcome between those waves. All other estimates use data from Wave I. Control variables for the OLS and school fixed-effects regressions included measures of demographic characteristics, socioeconomic status, household structure, parent's values, whether a family member or friend recently attempted suicide, family dynamics, physical health, mental health, employment, romantic relationships, religiosity, preference for attending college, innate intelligence, substance use, and school characteristics. The first-differences model included a subset of these controls that could vary over time, related to preference for attending college, parent's values, family dynamics, physical and mental health, whether a family member or friend recently attempted suicide, employment, religiosity, substance use, romantic relationships, and whether the student attended a public or private school. The author used two different IV estimation techniques, instrumenting for sexual initiation using seven variables: whether an adolescent's school provides daycare for parenting students; whether sex education and family planning or associated referrals are provided by the school; whether the adolescent considers themselves a born-again Christian and believes the bible is the word of God; schoolmates' perceptions of sex (two variables); parents' attitudes about sex; and whether a parent has spoken with the adolescent about sex.*			
College aspiration scale	Male Ages 13–15	Ever had sex vs. never had sex	Based on the OLS models, on average, individuals who ever had sex had values on the college aspirations scale that were 0.13 to 0.14 points lower (on a one-to-five scale) than individuals who never had sex. Only one of the two OLS estimates was statistically significant. In all other models, the differences were not statistically significant.
College aspiration scale	Male Ages 16–18	Ever had sex vs. never had sex	Based on the OLS models, on average, individuals who ever had sex had values on the college aspirations scale that were 0.07 to 0.10 points lower (on a one-to-five scale) than individuals who never had sex. Only one of the two OLS estimates was statistically significant. In all other models, the differences were not statistically significant.
College aspiration scale	Female Ages 13–15	Ever had sex vs. never had sex	Based on the OLS, school fixed effects, and individual fixed-effects models, on average, individuals who ever had sex had values on the college aspirations scale that were 0.11 to 0.23 points lower (on a one-to-five scale) than individuals who never had sex. Based on IV models, individuals who had ever had sex had college aspirations 0.10 to 0.27 points higher, on average, than those who never had sex. Only one of the two IV estimates was statistically significant.
College aspiration scale	Female Ages 16–18	Ever had sex vs. never had sex	Based on the OLS models, on average, individuals who ever had sex had values on the college aspirations scale that were 0.07 to 0.13 points lower (on a one-to-five scale) than individuals who never had sex. Only one of the two OLS estimates was statistically significant. In all other models, the differences were not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Sabia and Rees (2009): *The authors apply a number of analytic approaches to Add Health data, including ordinary least squares (OLS) with controls for demographic characteristics, family background, and measures of academic achievement; OLS with the aforementioned controls and school fixed effects; OLS with the aforementioned controls and family fixed effects (using a sample of sisters); and two-stage least squares using age at menarche or a number of policy variables related to family planning services as instruments. The two-stage least squares regressions were also estimated with and without a control for fertility (childrearing at age 18 or younger) for ever sexually active females.*			
High-school graduation	Female Age 18–28 Ever sexually active	Age at sexual initiation	In the OLS regression without fixed effects, a one-year increase in age at sexual initiation was associated with a statistically significant 2.9 percentage point increase in the probability of high school completion. Similar findings held when the authors controlled for school fixed effects or used instrumental variables. The relationship weakened and became statistically insignificant when regressions included family fixed effects or the authors controlled for childbearing at age 18 or younger.
College attendance	Female Age 18–28 Ever sexually active	Age at sexual initiation	In the OLS regression without fixed effects, a one year increase in age at sexual initiation was associated with a statistically significant 3.6 percentage point increase in the probability of college attendance. Similar findings held when the authors controlled for school or family fixed effects. But the relationship weakened and became statistically insignificant when instrumental variables were used.
High-school graduation	Female Age 18–28	Abstained from sex until age 18 or later vs. did not abstain until age 18	In the OLS regression without fixed effects, abstaining from sex until at least age 18 was associated with a statistically significant 9.8 percentage point increase in the probability of high school completion. Similar findings held when the authors controlled for school fixed effects. The association became stronger (a difference of 28.5 percentage points) and remained statistically significant when the authors used instrumental variables. But the relationship weakened and became statistically insignificant when family fixed effects were used.
College attendance	Female Age 18–28	Abstained from sex until age 18 or later vs. did not abstain until age 18	In the OLS regression without fixed effects, abstaining from sex until at least age 18 was associated with a statistically significant 17 percentage point increase in the probability of going to college. Similar findings held when the authors controlled for school fixed effects; the coefficient was also similar in magnitude, but statistically insignificant, when the authors controlled for family fixed effects. The relationship became weaker and statistically insignificant when instrumental variables were used.

Outcome	Sample characteristics	Contrast	Findings
Sabia and Rees (2011): *The authors use the Add Health to estimate a series of regressions. Ordinary least squares regressions controlled for observable characteristics, such as parental education, religion, and household income, and age at first intercourse. Instrumental variables regression used three different instruments for age at first intercourse: age of menarche (for females only), a physical development index, and the physical development index plus the mean opposite gender index.*			
Received a high school diploma	Female Age 18–28 Ever had sex	Age at first intercourse	In a regression with observable controls, females are 2.3 to 2.4 percentage points more likely to receive a high school diploma for each year they delay first intercourse. This difference is statistically significant. Using the age of menarche as an instrumental variable, this coefficient increases to 2.5 percentage points; using the physical development index as an instrumental variable, with or without the mean male index as an additional instrument, the coefficient increases to 3.7 percentage points. All of these differences are statistically significant. In a number of robustness checks on the physical development instrumental variables approach, the coefficient ranges from 2.2 percentage points to 3.9 percentage points and is significant in four of seven analyses.
Received a high school diploma	Male Age 18–28 Ever had sex	Age at first intercourse	In a regression with observable controls, males are 2.7 percentage points more likely to receive a high school diploma for each year they delay first intercourse. This difference is statistically significant. Using the instrumental variables (the physical development index with and without the mean male index), these differences in the probability of diploma receipt were not statistically significant. In a number of robustness checks on the physical development instrumental variables approach, the coefficient ranges from -1.5 percentage points to 0.3 percentage points and was not significant in any of the seven analyses.
Currently attending college or had completed at least one year	Female Age 18–28 Ever had sex	Age at first intercourse	In a regression with observable controls, females are 3.2 percentage points more likely to have enrolled in college for each year they delay first intercourse. This difference is statistically significant. Using the three instrumental variables (age of menarche and the physical development index with or without the mean male index), the differences are not statistically significant.
Currently attending college or had completed at least one year	Male Age 18–28 Ever had sex	Age at first intercourse	In a regression with observable controls, males are 2.6 to 2.7 percentage points more likely to have enrolled in college for each year they delay first intercourse. This difference is statistically significant. Using the instrumental variables (the physical development index with and without the mean male index), the differences are not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Schvaneveldt et al. (2001): *The authors used three waves of longitudinal data from the National Survey of Children (interviews conducted in 1976 at ages 7–11, 1981 at ages 12–17, and 1987 at ages 18–22) to compare educational outcomes between youth who had and had not initiated sexual intercourse at the time of the interview. They performed simple comparisons of means on cross-sections of the data. When outcomes were measured in two consecutive waves, the authors used analysis of covariance (ANCOVA) to analyze outcomes, controlling for the lagged value of the outcome and gender.*			
Parents' rating of child's academic ranking scale (1981)	Age 12–17 Never had sex before 1976 interview	Initiated sex vs. did not initiate sex	In a simple means comparison, parents' ratings of their children's academic ranking was lower for sexually active youth than abstinent youth (3.2 compared with 3.6 on a one-to-five scale). This difference was statistically significant. ANCOVA estimates were not provided.
Self-reported rating of academic ranking scale (1981)	Age 12–17 Never had sex before 1976 interview	Initiated sex vs. did not initiate sex	In a simple means comparison, academic ranking among sexually active youth was lower than that among abstinent youth (3.2 compared with 3.5 on a one-to-five-scale) and the difference was statistically significant. In the ANCOVA, initiating sex between 1976 and 1981 was associated with a statistically significant decline in self-reported academic ranking of 0.24 points.
Self-reported rating of academic ranking scale (1987)	Age 18–22 Never had sex before 1981 interview	Initiated sex vs. did not initiate sex	In a simple means comparison, academic ranking among sexually active youth was lower than that among abstinent youth (3.5 compared with 3.9 on a one-to-five scale) and the difference was statistically significant. In the ANCOVA, initiating sex between 1981 and 1987 was associated with a statistically significant decline in self-reported academic ranking of 0.42 points.
English performance scale (1981)	Age 12–17	Initiated sex vs. did not initiate sex	English performance among sexually active youth was lower than that for abstinent youth and the difference was statistically significant. ANCOVA estimates were not provided.
Interest in school scale (1981)	Age 12–17	Initiated sex vs. did not initiate sex	Sexually active youth reported a lower interest in school than abstinent youth and this difference was statistically significant. ANCOVA estimates were not provided.
Educational goals scale (1981)	Age 12–17	Initiated sex vs. did not initiate sex	Sexually active youth aspired to complete less education than abstinent youth (3.3 compared with 3.6 on a one-to-five scale) and this difference was statistically significant. ANCOVA estimates were not provided.
Educational goals scale (1987)	Age 18–22	Initiated sex vs. did not initiate sex	Sexually active youth aspired to complete less education than abstinent youth (3.8 compared with 4.0 on a one-to-five scale) and this difference was statistically significant. In the ANCOVA, initiating sex between 1981 and 1987 was associated with a statistically significant decline in educational goals of 0.35 points.

Outcome	Sample characteristics	Contrast	Findings
Highest grade completed (1987)	Age 18–22	Initiated sex vs. did not initiate sex	There was no statistically significant difference in means. ANCOVA estimates were not provided.
Spriggs and Halpern (2008a): *The authors used Add Health to estimate a series of Poisson regressions. The first regression included no controls and the second controlled for demographic characteristics, family background, risk behaviors, neighborhood characteristics, and measures of academic achievement and the likelihood of going to college. The final regression also controlled for early childbearing.*			
Initiated postsecondary education	Male Age 18–26	Initiated sexual activity between ages 10 and 15 vs. initiated sexual activity at age 19 or later	In a regression without controls, males who initiated sexual activity between ages 10 to 15 were 35 percent less likely to initiate postsecondary education than those who delayed until age 19 or later. The difference was statistically significant. When controls were added to the regression, this difference decreased to 16 to 20 percent and was no longer significant.
Initiated postsecondary education	Male Age 18–26	Initiated sexual activity between ages 16 and 18 vs. initiated sexual activity at age 19 or later	In a regression without controls, males who initiated sexual activity between ages 16 to 18 were 16 percent less likely to initiate postsecondary education than those who delayed until age 19 or later. The difference was statistically significant. When controls were added to the regression, this difference decreased to 3 to 6 percent and was statistically insignificant.
Initiated postsecondary education	Female Age 18–26	Initiated sexual activity between ages 10 and 15 vs. initiated sexual activity at age 19 or later	In a regression without controls, females who initiated sexual activity between ages 10 to 15 were 39 percent less likely to initiate postsecondary education than those who delayed until age 19 or later. The difference was statistically significant. The difference decreased to 16 to 22 percent when controls were added to the regression but remained significant.
Initiated postsecondary education	Female Age 18–26	Initiated sexual activity between ages 16 and 18 vs. initiated at age 19 or later	In a regression without controls, females who initiated sexual activity between ages 16 to 18 were 23 percent less likely to initiate postsecondary education than those who delayed until age 19 or later. The difference was statistically significant. The difference decreased to 9 to 13 percent when controls were added to the regression but remained significant.
Steward et al. (2009): *Using data from the National Educational Longitudinal Study, the authors analyzed the relationship between age of sexual initiation and educational attainment. The dataset was based on a nationally representative sample of 8th grade students in 1988 who were interviewed every two years through 1994 and again in 2000, when the outcomes for this study were assessed. The authors used a sample of women to estimate logistic regressions controlling for sociodemographic characteristics and middle school academic achievement. Additional models also controlled for academic expectations, behavioral issues (such as tobacco use and school tardiness), and marriage and childbirth.*			

Outcome	Sample characteristics	Contrast	Findings
Graduated high school	Female Around age 26	Initiated sexual activity at age 12, 13, or 14 vs. initiated sexual activity at age 15 or older	Females who initiated sexual activity before age 15 were 0.3 to 0.4 times as likely to have graduated from high school as those who initiated sexual activity at age 15 or older. The differences were statistically significant.
Enrolled in any postsecondary school	Female Around age 26	Initiated sexual activity at age 12, 13, or 14 vs. initiated sexual activity at age 15 or older	In models that controlled for sociodemographic characteristics and academic background, females who initiated sexual activity before age 15 were 0.5 to 0.6 times as likely to have enrolled in postsecondary school as those who initiated sexual activity at age 15 or older. After controlling for academic aspirations, behavioral issues, and marriage and childbirth, the differences narrowed and were no longer statistically significant.
Received a bachelor's degree	Female Around age 26	Initiated sexual activity at age 12, 13, or 14 vs. initiated sexual activity at age 15 or older	Females who initiated sexual activity before age 15 were 0.4 to 0.5 times as likely to have received a bachelor's degree as those who initiated sexual activity at age 15 or older. The differences were statistically significant.
Torchiana (2013): *Using Add Health data, the author examined the relationship between sexual initiation by Add Health Wave I (when respondents were in grades 7–12) and educational attainment. The paper presented eight ordinal regression models by gender: Model 1 controlled for demographic and socioeconomic characteristics and academic ability; Model 2 added a control for peer acceptance to Model 1; Model 3 added controls for undertaking a virginity pledge or receiving treatment for sexually transmitted infections to Model 2; Model 4 added controls for delinquency, smoking, and binge drinking to Model 3; Model 5 added controls for attachment to parents, parents' academic expectations, desire to go to college, and self-esteem to Model 4; Model 6 added an interaction between whether one ever had sex and the measure of peer acceptance; Model 7 added a control for age at first sexual intercourse to Model 5; and Model 8 added a control for age at first sexual intercourse to Model 6.*			
Educational attainment (categorical)	Age 24–34 Female	Had sex by Add Health Wave I vs. had not had sex by Add Health Wave I	Across Models 1–6 and 8, females who had sex before Add Health Wave I had lower educational attainment than those who had not had sex. The differences were statistically significant. The difference estimated in Model 7 was not statistically significant.
Educational attainment (categorical)	Age 24–34 Male	Had sex by Add Health Wave I vs. had not had sex by Add Health Wave I	Across Models 1–6, males who had sex before Add Health Wave I had lower educational attainment than those who had not had sex. The differences were statistically significant. The differences estimated in Models 7 and 8 were not statistically significant.
Educational attainment (categorical)	Age 24–34 Female	Age at first sexual intercourse	An increase in age at first sexual intercourse was associated with a statistically significant increase in educational attainment for females in both Models 7 and 8. Models 1–6 did not test this contrast.
Educational attainment (categorical)	Age 24–34 Male	Age at first sexual intercourse	An increase in age at first sexual intercourse was associated with a statistically significant increase in educational attainment for males in both Models 7 and 8. Models 1–6 did not test this contrast.

E. Findings within the delinquency and criminal activity domain

The SSAvER team reviewed eight studies that examined outcomes related to delinquency and criminal activity (Table A.5). Four studies examined composite scales or indices of delinquent behaviors, such as property damage and shoplifting (Armour and Haynie 2007; Butera et al. 2014; Harden et al. 2008; Harper 2017). Three studies examined school disciplinary outcomes, such as unexcused absences or suspensions (McCarthy and Grodsky 2011; Rector and Johnson 2005; Sabia 2007b). One study examined criminal convictions (Donahue 2012). Several of these studies used careful methods to identify causal effects, including propensity score methods (Butera et al. 2014; McCarthy and Grodsky 2011), bivariate family models or within twin-pair models estimated using sibling data (Donahue 2012; Harden et al. 2008), and instrumental variables analysis (Sabia 2007b).

Table A.5. Studies examining outcomes related to delinquency and criminal activity

Outcome	Sample characteristics	Contrast	Findings
Armour and Haynie (2007): *Using a sample of adolescents that responded to the first three waves of Add Health, the authors examined the relationship between age at first sex and delinquent behavior in early adulthood (an index combining information on property damage, theft, and selling drugs). Individuals were classified, based on their age at sexual initiation compared with others in their school, as "early" (more than one standard deviation below the mean, 12 percent of respondents), "on-time" (within one standard deviation of the mean, 52 percent of respondents), or "late" (more than one standard deviation above the mean, 36 percent of respondents) initiators, as well as based on whether they initiated sexual activity between Add Health Waves I and II (when individuals were in grades 7 to 12). The authors estimated negative binomial regressions, controlling for measures of demographic characteristics, socioeconomic status, family structure, delinquency at Wave I, depression, school performance, parental support, substance use, relative pubertal timing, dating behavior, and attitudes toward sex.*			
Delinquency scale at Wave II	Grade 8–12 Initiated sexual activity between Add Health Waves I and II	Early vs. on-time sexual initiation	Individuals who initiated sexual activity early compared with their peers had delinquency scales that were an average of 0.19 points higher at Wave II (on an 18-point scale) compared with those initiated sexual activity around the same time as their peers. The difference was statistically significant.
Delinquency scale at Wave II	Grade 8–12 Initiated sexual activity between Add Health Waves I and II	Early vs. on-time sexual initiation	Individuals who initiated sexual activity late compared with their peers had delinquency scales that were an average of 0.71 points lower at Wave II (on an 18-point scale) compared with those initiated sexual activity around the same time as their peers. The difference was statistically significant.
Delinquency scale at Wave III	Most age 18–26	Early vs. on-time sexual initiation	Individuals who initiated sexual activity early compared with their peers had delinquency scales that were an average of 0.19 points higher at Wave III (on an 18-point scale) compared with those initiated sexual activity around the same time as their peers. The difference was statistically significant.
Delinquency scale at Wave III	Most age 18–26	Late vs. on-time sexual initiation	Individuals who initiated sexual activity late compared with their peers had delinquency scales that were an average of 0.23 points lower at Wave III (on an 18-point scale) compared with those initiated sexual activity around the same time as their peers. The difference was statistically significant.
Delinquency scale at Wave II	Grade 8–12	Initiated sexual activity between Add Health Waves I and II vs. did not initiate sexual activity before Add Health Wave I	Individuals who initiated sexual activity between Add Health Waves I and II had delinquency indices that were an average of 0.39 points higher at Wave II (on an 18-point scale) compared with those who had not initiated sexual activity by Wave II. The difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Butera et al. (2014): *Using the first wave of Add Health data, the authors analyzed the relationship between sexual initiation at age 14 or younger and delinquent behavior (lying to parents; behaving loud, rowdy, or unruly in a public place; stealing from a store; stealing items worth less than $50; damaging property; and participating in a group fight). Delinquent behavior was classified into four groups based on latent class analysis (non delinquents, verbal antagonists, shoplifters, and general delinquents). The authors used generalized boosted modeling to first predict a propensity score for early sexual intercourse. They then used two logistic regressions to estimate the relationship between sexual initiation and membership in each delinquent behavior class. Both regressions control for demographic characteristics, family background, and early delinquent behaviors (alcohol use and smoking). One regression also weighted the data based on the inverse of the propensity score as a means to control for the propensity to engage in early intercourse.*			
Verbal antagonists class (reference class: non delinquents)	Female Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences.
Verbal antagonists class (reference class: non delinquents)	Male Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences.
Shoplifters (reference class: non delinquents)	Female Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	Before adjusting for propensity scores, females who initiated sexual activity at age 14 or younger were 2.11 times more likely to be in the shoplifters class than females who initiated sexual activity later. This difference was statistically significant. After weighting by the propensity score, the difference decreased and was no longer statistically significant.
Shoplifters (reference class: non delinquents)	Male Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences.
General delinquents class (vs. non delinquents class)	Female Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences. (Estimates could not be obtained when the analysis did not weight based on the propensity score.)
General delinquents class (reference class: non delinquents)	Male Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences.

Outcome	Sample characteristics	Contrast	Findings
Non delinquents class (reference class: general delinquents)	Female Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences. (Estimates could not be obtained when the analysis did not weight based on the propensity score.)
Non delinquents class (reference class: general delinquents)	Male Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences.
Verbal antagonists class (reference class: general delinquents)	Female Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences. (Estimates could not be obtained when the analysis did not weight based on the propensity score.)
Verbal antagonists class (reference class: general delinquents)	Male Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	Before adjusting for the propensity score, males who initiated sexual activity at age 14 or younger were 0.43 times as likely as males who initiated sexual activity later to be in the verbal antagonists class. This difference was statistically significant. After weighting by the propensity score, the difference decreased and was no longer statistically significant.
Shoplifters (reference class: general delinquents)	Female Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences. (Estimates could not be obtained when the analysis did not weight based on the propensity score.)
Shoplifters (reference class: general delinquents)	Male Grades 11 or 12	Initiated sexual intercourse at age 14 or younger vs. initiated sexual intercourse after age 14	There were no statistically significant differences.

Outcome	Sample characteristics	Contrast	Findings
Donahue (2012): *Using longitudinal data from the Children of the National Longitudinal Survey of Youth, the author explored the relationship between sexual initiation before age 16 and a number of outcomes. The author fit several regression models, using logit models for binary outcomes, multinomial regression for categorical outcomes, and ordinary least squares for other outcomes. All models included a family-level random effect. Models 1 and 2 included all individuals, with Model 1 including no covariates and Model 2 adjusting for the characteristics of individuals' mothers, including mothers' demographic and socioeconomic characteristics and mothers' adolescent behavior. Models 3, 4, and 5 included only individuals with a sibling in the data set. Model 3 included controls for mother's characteristics, Model 4 included controls for mother's characteristics and siblings' ages at sexual initiation, and Model 5 included controls for mother's characteristics, siblings' ages at sexual initiation, and a propensity score measuring the likelihood of sexual initiation before age 16. The author estimated the propensity score using measures of an individual's demographic characteristics, substance use before age 14, dating behavior before age 14, problem behavior, peer pressure, impulsivity, sensation seeking, home environment, and cognitive ability. The author then used bivariate family models to estimate the proportion of the relationship between sexual initiation and each outcome of interest within the sample of siblings that is attributable to siblings' common genes, shared environment, and other influences.*			
Criminal conviction in the past 12 months	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 3.07 times as likely to have had a criminal conviction in the past year as individuals who initialed sexual activity at age 16 or later. In a model that adjusted for mother-level covariates, these individuals were 2.84 times as likely to have had a criminal conviction. The differences were statistically significant.
Criminal conviction in the past 12 months	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 2.70, 1.63, and 1.11 times as likely (respectively) to have had a criminal conviction as individuals who initiated sexual activity at age 16 or later. The differences for Models 3 and 4 were statistically significant. The bivariate family model demonstrated that most of the association was attributable to common genetic factors.
Harden et al. (2008): *Using longitudinal data from a sample of 534 same-sex twin pairs that participated in Add Health, the authors analyzed the relationship between age at first sex and delinquent behavior in early adulthood (an index combining information on property damage, theft, and selling drugs). Variation in age at first sexual intercourse was decomposed into three components: genetic (using the shared genes between twins), shared environment (using the shared environment of twins), and other factors. The authors used this decomposition to estimate three structural models of interest for this review. Model 1 allowed for fully flexible relationships between the different components of age at first sex, delinquent behavior in adolescence, and delinquent behavior in early adulthood. Models 2 and 3 put restrictions on the relationship between the genetic and shared environmental components of age at first sex and delinquency in early adulthood.*			
Delinquency index	Age 18–28 Same-sex twins	Age at first sex	Across twin pairs, individuals with later age at first sex exhibited a lower index of delinquent behavior. This result was statistically significant. However, within twin pairs, individuals with ages at first sex later than their same-sex twin exhibited higher delinquency scores than the same-sex twin. This result was also statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Harper (2017): *The author analyzed the relationship between whether someone ever had sex (measured at Wave I of the Add Health) and delinquency one year later (measured at Wave II of the Add Health). The author used a negative binomial regression and controls for delinquent behavior at Wave I; demographic characteristics; socioeconomic status; relationships with parents, peers, and romantic partners; self-control; religiosity; college aspirations; having taken a virginity pledge; and depression.*			
Delinquency scale (based on the prevalence and frequency of 15 different activities)	Age 11 to 21 In middle or high school	Ever had sex vs. never had sex	There was no statistically significant difference.
McCarthy and Grodsky (2011): *The authors used data from Add Health and the associated Adolescent Health Academic Achievement Study to estimate two regressions that capture the relationship between sexual abstinence and nine education outcomes (assessed in Wave II). The first regression controlled for age, race, parental education, public assistance, academic ability, self-control, physical maturity, ever having gotten someone pregnant or become pregnant, history of sexually transmitted infections, and delinquency. The second regression also controlled for an index capturing romantic behavior and included a correction for selection into sexual intercourse. The selection correction was introduced using the Heckman (1976) two-stage correction procedure. The authors first calculated the hazard of sexual initiation for each individual and then included that hazard as a control in the second stage regression. The authors used the following instruments for sexual intercourse in the first stage to compute the hazard: physical attractiveness, weight, attitudes towards sex, popularity, friendliness, parental attachment, parents' attitudes toward sex, virginity until marriage pledge, religiosity, self-control, and delinquency. The authors estimated regressions for ordinal, dichotomous, and count outcomes using ordinary least squares, logistic, and negative binomial regressions, respectively.*			
Problems in school scale	Female Grades 8–12	Ever had sex vs. never had sex	Sexually active females reported having school problems more often (0.09 points on a zero-to-four scale) than abstinent females before controlling for selection and romantic behavior. This difference was statistically significant. After controlling for selection and romantic behavior, the difference decreased and was no longer statistically significant.
Problems in school scale	Male Grades 8–12	Ever had sex vs. never had sex	Sexually active males reported having school problems more often (0.11 points on a zero-to-four scale) than abstinent males before controlling for selection and romantic behavior. This difference was statistically significant. After controlling for selection and romantic behavior, the difference decreased and was no longer statistically significant.
Ever skipped school	Female Grades 8–12	Ever had sex vs. never had sex	Before controlling for selection and romantic behavior, sexually active females were 2.41 times as likely as abstinent females to have ever skipped school. This relationship was statistically significant. The multiplier declined to 1.80 after controlling for selection and romantic behavior but remained statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Ever skipped school	Male Grades 8–12	Ever had sex vs. never had sex	Before controlling for selection and romantic behavior, sexually active males were 2.18 times as likely as abstinent males to have ever skipped school. This relationship was statistically significant. The multiplier declined to 1.84 after controlling for selection and romantic behavior but remained statistically significant.
Number of school days skipped school	Female Grades 8–12 Skipped at least one day of school	Ever had sex vs. never had sex	Sexually active females skipped 1.47 to 1.55 more days of school than abstinent females. The differences were statistically significant.
Number of school days skipped school	Male Grades 8–12 Skipped at least one day of school	Ever had sex vs. never had sex	Sexually active males skipped a statistically significant 1.75 more days of school than abstinent males before controlling for selection and romantic behavior and a statistically significant 1.52 more days after controlling for selection and romantic behavior.
Received an out-of-school suspension or expulsion	Female Grades 8–12	Ever had sex vs. never had sex	Sexually active females were 1.71 times as likely as abstinent females to be suspended or expelled from school before controlling for selection and romantic behavior. This relationship was statistically significant but decreased and became insignificant after controlling for selection and romantic behavior.
Received an out-of-school suspension or expulsion	Male Grades 8–12	Ever had sex vs. never had sex	Sexually active males were 2.69 times as likely as abstinent males to be suspended or expelled from school before controlling for selection and romantic behavior. This difference was statistically significant. After controlling for selection and romantic behavior, the multiplier declined to 2.35 but remained statistically significant.
Rector and Johnson (2005): *Using Add Health data, the authors examined the relationship between abstaining from sex until age 18 and measures of educational attainment and school behavior. The authors used logistic regressions with controls for demographic and socioeconomic characteristics, family structure, self-esteem, and religiosity. An additional regression model also controlled for whether contraception was used at sexual initiation for those who initiated before age 18.*			
Ever expelled	Age 19–25	Abstained from sex until age 18 or later vs. had sex before age 18	Youth who abstained from sex until at least age 18 were 0.40 times as likely as youth who had sex before age 18 to have ever been expelled. The difference was statistically significant. (Results from the model controlling for contraception use were not reported for this outcome.)

Outcome	Sample characteristics	Contrast	Findings
Sabia (2007b): *Using longitudinal data from Add Health and several analytic techniques, the author examined the relationship between sexual intercourse and school attachment. The approaches included ordinary least squares (OLS; two sets of estimates), school-fixed effects, first-differences regression, and instrumental variables (IV). The first-differences approach used changes in sexual behavior between Add Health Waves I and II to predict changes in the outcome between those waves. All other estimates use data from Wave I. Control variables for the OLS and school fixed-effects regressions included measures of demographic characteristics, socioeconomic status, household structure, parent's values, whether a family member or friend recently attempted suicide, family dynamics, physical health, mental health, employment, romantic relationships, religiosity, preference for attending college, innate intelligence, substance use, and school characteristics. The first-differences model included a subset of these controls that could vary over time, related to preference for attending college, parent's values, family dynamics, physical and mental health, whether a family member or friend recently attempted suicide, employment, religiosity, substance use, romantic relationships, and whether the student attended a public or private school. The author used two different IV estimation techniques, instrumenting for sexual initiation using seven variables: whether an adolescent's school provides daycare for parenting students; whether sex education and family planning or associated referrals are provided by the school; whether the adolescent considers themselves a born-again Christian and believes the bible is the word of God; schoolmates' perceptions of sex (two variables); parents' attitudes about sex; and whether a parent has spoken with the adolescent about sex.*			
Any unexcused absences	Male Ages 13–15	Ever had sex vs. never had sex	Based on the OLS and school fixed effects models, sexual initiation was associated with an 11 to 13 percentage point increase in the probability of an individual having any unexcused school absence. The differences were statistically significant. In the first-differences model, the relationship weakened and became statistically insignificant. Based on the IV models, sexual initiation was associated with a 25 to 44 percentage point increase in the probability of an individual having any unexcused school absence. The differences were statistically significant.
Any unexcused absences	Male Ages 16–18	Ever had sex vs. never had sex	Based on the OLS and school fixed effects models, sexual initiation was associated with an 8 to 11 percentage point increase in the probability of an individual having any unexcused school absence. The differences were statistically significant. In the first-differences model, the relationship weakened and became statistically insignificant. Based on the IV models, sexual initiation was associated with a 31 to 48 percentage point increase in the probability of an individual having any unexcused school absence. Only one of the two IV estimates was statistically significant.
Any unexcused absences	Female Ages 13–15	Ever had sex vs. never had sex	Based on the OLS and school fixed effects models, sexual initiation was associated with a 10 to 12 percentage point increase in the probability of an individual having any unexcused school absence. The differences were statistically significant. In the first-differences model, the relationship weakened and became statistically insignificant. Based on the IV models, sexual initiation was associated with an 11 to 40 percentage point increase in the probability of an individual having any unexcused school absence. Only one of the two IV estimates was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Any unexcused absences	Female Ages 16–18	Ever had sex vs. never had sex	Based on OLS models, sexual initiation was associated with an 8 percentage point increase in the probability of an individual having any unexcused school absence. The differences were statistically significant. In all other models, the differences were not statistically significant.
Received an out-of-school suspension	Male Ages 13–15	Ever had sex vs. never had sex	Based on the OLS, school fixed effects and individual fixed effects models, sexual initiation was associated with a 4 to 17 percentage point increase in the probability of an individual having received a suspension. The differences were statistically significant. In one of the IV models, sexual initiation was associated with a statistically significant 14 percentage point increase in the probability of an individual having received a suspension. The difference was less than one percentage point and not statistically significant in the other IV model.
Received an out-of-school suspension	Male Ages 16–18	Ever had sex vs. never had sex	Based on the OLS and school fixed effects models, sexual initiation was associated with a statistically significant 9 to 10 percentage point increase in the probability of an individual having received a suspension. In the first-differences model, the relationship weakened and became statistically insignificant. In one of the IV models, sexual initiation was associated with a statistically significant 26 percentage point increase in the probability of an individual having received a suspension. The difference was less than one percentage point and not statistically significant in the other IV model.
Received an out-of-school suspension	Female Ages 13–15	Ever had sex vs. never had sex	In one of the OLS models, sexual initiation was associated with a statistically significant 2 percentage point increase in the probability of an individual having received a suspension. In one of the IV models, sexual initiation was associated with a statistically significant 11 percentage point increase in the probability of an individual having received a suspension. In all other models, differences were not statistically significant.
Received an out-of-school suspension	Female Ages 16–18	Ever had sex vs. never had sex	Based on one of the OLS models and the school fixed effects and individual fixed effects models, sexual initiation was associated with a statistically significant 4 to 7 percentage point increase in the probability of an individual having received a suspension. The difference in the other OLS model was not statistically significant. In one of the IV models, sexual initiation was associated with a statistically significant 12 percentage point increase in the probability of an individual having received a suspension. The difference was less than one percentage point and not statistically significant in the other IV model.

F. Findings within the mental health and emotional well-being domain

The SSAvER team reviewed 14 studies that examined outcomes related to mental health or emotional well-being (Table A.6). Measures related to depression were the most commonly examined outcomes. Of the 14 studies in this domain, 10 included measures of depression (Donahue 2012; Epstein et al. 2018; Jamieson and Wade 2011; Kugler et al. 2017; Meier 2007; Ream 2006; Sabia 2006; Sabia and Rees 2008; Spriggs and Halpern 2008b; Wesche et al. 2017). Four studies examined measures of self-esteem or body image (Houlihan et al. 2008; Meier 2007; Sabia and Rees 2008; Vasilenko et al. 2011). Two studies in this domain examined more general measures of overall mental health or emotional distress (Bogart et al. 2007; Finger et al. 2004).

Studies used a variety of methods. Two of the studies used propensity score methods to help identify the causal effects of the timing of first sexual activity (Kugler et al. 2017; Meier 2007); one study used sibling data (Donahue 2012, with the strongest estimates produced using bivariate family models); and one study used instrumental variables analysis (Sabia and Rees 2008). Many of the other studies used regression analysis to correct for some observable differences between individuals who initiated sexual activity at different ages but those studies did not use propensity score methods, sibling data, or instrumental variables analysis to help identify causal effects.

Table A.6. Studies examining outcomes related to mental health and emotional well-being

Outcome	Sample characteristics	Contrast	Findings
Bogart et al. (2007): *Using data collected for the RAND Adolescent/Young Adult Panel from students in California and Oregon, the authors examined the relationship between sexual initiation at age 19 or older and mental health at age 29. The study presented five models: the bivariate model was a simple regression of sexual initiation on mental health; Models 2, 3, and 4 added in sets of control variables separately—unconventionality (self-reported substance use, deviance, and rebelliousness at age 13), family bonding/characteristics, and educational prospects, respectively; and Model 5 combined all control variables into the full model. All models except Model 1 also included controls for race and gender.*			
Mental health scale	Female Age 29	Initiated sex at age 19 or older vs. initiated sex younger than 19	Across all models, females who initiated sex at age 19 or older scored between 0.04 and 0.15 points higher on a 0 to 5 mental health scale. This difference was only statistically significant in the simple bivariate model, which also reported the greatest difference.
Mental health scale	Male Age 29	Initiated sex at age 19 or older vs. initiated sex younger than 19	There was no statistically significant difference in Model 1. Models 2–5 were not estimated.
Donahue (2012): *Using longitudinal data from the Children of the National Longitudinal Survey of Youth, the author explored the relationship between sexual initiation before age 16 and a number of outcomes. The author fit several regression models, using logit models for binary outcomes, multinomial regression for categorical outcomes, and ordinary least squares for other outcomes. All models included a family-level random effect. Models 1 and 2 included all individuals, with Model 1 including no covariates and Model 2 adjusting for the characteristics of individuals' mothers, including mothers' demographic and socioeconomic characteristics and mothers' adolescent behavior. Models 3, 4, and 5 included only individuals with a sibling in the data set. Model 3 included controls for mother's characteristics, Model 4 included controls for mother's characteristics and siblings' ages at sexual initiation, and Model 5 included controls for mother's characteristics, siblings' ages at sexual initiation, and a propensity score measuring the likelihood of sexual initiation before age 16. The author estimated the propensity score using measures of an individual's demographic characteristics, substance use before age 14, dating behavior before age 14, problem behavior, peer pressure, impulsivity, sensation seeking, home environment, and cognitive ability. The author then used bivariate family models to estimate the proportion of the relationship between sexual initiation and each outcome of interest within the sample of siblings that is attributable to siblings' common genes, shared environment, and other influences.*			
Depression z-score	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, the depression score for individuals that initiated sexual activity before age 16 was, on average, 0.24 standard deviations higher than that for individuals who initialed sexual activity at age 16 or later. In a model that adjusted for mother-level covariates, the difference was 0.19 standard deviations. Both differences were statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Depression z-score	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 had average depression scores 0.17, 0.16, and 0.11 standard deviations higher (respectively) than individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that most of the association was attributable to common genetic factors.
Epstein et al. (2018): *Using data from the Seattle Social Development Project in Seattle, Washington, the authors used logistic regressions to examine the relationship between age of sexual initiation and six adult health outcomes. The paper reports on two models: the unmediated model controls for measures of demographic characteristics, socioeconomic status, pubertal age, sexual abuse in childhood, alcohol or tobacco use at ages 10 to 12, and teacher reports of child behavior and weight at ages 10 through 12; the mediated model also includes controls for early adolescent pregnancy (before age 18), lifetime sexually transmitted infection acquisition at age 21, and number of sexual partners (an indicator for 10 or more lifetime partners at age 24). The authors also reported testing for nonlinearity using a measure of age at sexual initiation squared but rejected this addition to the model because of no consistent pattern of statistical significance. Note that part of the sample was exposed to a preventative intervention in elementary school, which is accounted for by controlling for intervention status in the regression models.*			
Met Diagnostic and Statistical Manual of Mental Disorders IV criteria for depression at age 30, 33, or 39	Age 30–39	Age at sexual initiation	There were no significant results in either the unmediated and mediated models.
Finger et al. (2004): *The authors used data from the National Longitudinal Study of Youth (1979–2000) to examine the relationship between sexual initiation by age 18 and 10 outcomes that captured economic, health, and social well-being in middle adulthood. The authors performed simple comparisons of means and estimated logistic regressions for dichotomous outcomes and ordinary least squares regressions for continuous outcomes, with controls for adolescent demographic and socioeconomic characteristics, religiosity, and employment status (variables were retained in a model only if they changed a coefficient by more than 10 percent).*			
Had an emotional illness	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, 7 percent of males who had not had sex by age 18 had an emotional illness compared with 9 percent of males who had sex by that age. In a regression with controls, there was no statistically significant difference between the groups.
Had an emotional illness	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Had an emotional illness	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among males who lived in a single-parent urban household at age 14, those who had not had sex by age 18 were 0.24 times as likely as those who had sex by that age of having an emotional illness. This difference was statistically significant.
Had an emotional illness	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, 13 percent of females who had not had sex by age 18 had an emotional illness compared with 23 percent of females who had sex by that age. In a regression with controls, there was no statistically significant difference between the groups.
Had an emotional illness	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who were not pregnant by age 18 years and 3 months, those who had not had sex by age 18 were 0.49 times as likely as those who had sex by that age of having an emotional illness. This difference was statistically significant.
Had an emotional illness	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who lived in a single-parent urban household at age 14, those who had not had sex by age 18 were 0.38 times as likely as those who had sex by that age of having an emotional illness. This difference was statistically significant.
Happiness scale (based on three questions)	Male Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, males who had and had not had sex by age 18 scored about the same on the happiness scale. In a regression with controls, there was no statistically significant difference between the groups.
Happiness scale (based on three questions on a short-form survey)	Male Age 36–43 Unmarried before age 18 Not a father by age 19	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Happiness scale (based on three questions on a short-form survey)	Male Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Happiness scale (based on three questions on a short-form survey)	Female Age 36–43 Unmarried before age 18	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a simple mean comparison, females who had and had not had sex by age 18 scored about the same on the happiness scale. In a regression with controls, females who had not had sex by age 18 scored significantly higher on the happiness scale than females who had sex by that age.
Happiness scale (based on three questions on a short-form survey)	Female Age 36–43 Unmarried before age 18 Not pregnant by age 18 years and 3 months	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	In a regression with controls, among females who were not pregnant by age 18 years and 3 months, those who had not had sex by age 18 scored significantly higher on the happiness scale than females who had sex by that age.
Happiness scale (based on three questions on a short-form survey)	Female Age 36–43 Unmarried before age 18 Single-parent urban household at age 14	Initiated sexual intercourse at age 18 or older vs. initiated before age 18	There was no statistically significant difference.
Houlihan et al. (2008): *The authors analyzed three waves of data, across five years, from the Family and Community Health Study (FACHS) to examine the relationships between sexual initiation, self-esteem, perceptions on youth who are sexually active, and risky sexual behavior. The FACHS is a longitudinal study of 889 African American families in nonurban communities in Iowa and Georgia. Youth were surveyed at ages 10–12 (Wave I) and 20 and 56 months later (Waves II and III). The authors estimated structural equation models, in which Wave III sexual risk behavior was modeled as a function of sexual initiation between Waves I and II, Wave III self-concept, and Wave III willingness to have sex without a condom. The model also indirectly controlled for earlier measures of self-concept and attitudes towards individuals that engage in sexual behavior (through the modeling of other variables in the structural model). The authors also considered controlling for family socioeconomic status but did not include measures in the final model because of a lack of significance.*			
Self-esteem scale in Wave II (ratings of whether a respondent felt they were popular, smart, cool, good-looking, boring)	Age 15–17 (approximate)	Initiated sex between Waves I and II vs. did not initiate sex before Wave II	Youth who initiated sex between Waves I and II reported higher self-esteem than youth who did not initiate sex before Wave II (a statistically significant 0.18 points on a one-to-four-scale). The difference was driven by increases in self-esteem among males.
Jamieson and Wade (2011): *Using data from Add Health, the authors estimated the relationship between age of first sexual intercourse and depression symptoms with four regression models. Model 1 was a simple regression of age of first intercourse on depressive symptomatology. Model 2 added depressive symptoms at Wave 1 as a control. Model 3 was Model 1 with controls added for demographic characteristics, measures of puberty progression at the first Add Health wave, self-esteem, social support, family background, and religious service attendance. Model 4 included all controls for Models 2 and 3.*			

Outcome	Sample characteristics	Contrast	Findings
Depressive symptoms (Based on responses to an eight-item version of the Center for Epidemiological Studies Depression Scale)	Age 18–28	Initiated sexual activity between 11 and 16 vs. initiated sexual activity after age 16	Across all models, individuals who initiated sexual activity from ages 11 to 16 had an average depressive symptoms score between 0.04 and 0.13 points lower (on a 24-point scale) than those who initiated sexual activity after age 16. The difference was largest in Model 1 and smallest in Model 4. The difference was only statistically significant in Models 1 and 2.
Kugler et al. (2017): *Using data from Add Health, the authors estimated the relationship between age at sexual initiation and several outcomes, also testing for gender differences in these associations. The authors first estimated the propensity score using generalized boosted modeling and 59 variables measured when respondents were age 11 to 13 and had not yet initiated sexual activity, including measures related to a respondent's demographic characteristics, family structure and processes, peers, school, mental health, religion, problem behavior, and neighborhood. They then estimated logistic regressions using data weighted based on the propensity score.*			
Had depressive symptoms in the past week (Based on responses to a nine-item version of the Center for Epidemiological Studies Depression Scale)	Age 19–21	Initiated sexual activity at age 14 or younger vs. initiated sexual activity at age 15 or older	There was no statistically significant difference.
Had depressive symptoms in the past week (Based on responses to a nine-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 19–21	Initiated sexual activity at age 14 or younger vs. initiated sexual activity at age 15 or older	There was no statistically significant difference.
Had depressive symptoms in the past week (Based on responses to a nine-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 19–21	Initiated sexual activity at age 14 or younger vs. initiated sexual activity at age 15 or older	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Meier (2007): *Using longitudinal data from Wave I and Wave II of Add Health, the author examined the relationship between initiating sexual activity between survey waves and depression and self-esteem using a propensity-score matching approach. The author conducted propensity score matching using 36 variables measured at Wave I to predict the likelihood of sexual initiation between Waves I and II. The measures used to estimate the propensity score captured sociodemographic characteristics, scholastic achievement, cognitive ability, weight, physical development, physical attractiveness, religiosity, social relationship characteristics, romantic involvement and dating, attitudes toward sexual initiation, depression, and self-esteem. Individuals who initiated sexual activity between survey waves were compared with all individuals who did not do so but had a predicted propensity score within 1 percentage point. The author also created a score for each individual who initiated sexual activity by comparing the individual's age at initiation with the distribution of ages at initiation for those of the same gender, racial/ethnic group, and low-income status. Individuals initiating sexual activity 0.50 standard deviations earlier than the mean for their group were classified as initiating "early," while individuals initiating sexual activity 0.50 standard deviations later than the mean for their group were classified as initiating "late." Others were classified as initiating "on time."*			
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	Sexual initiation was associated with a significant 0.504 point increase in the depression scale.
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 Female	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	Sexual initiation was associated with a significant 0.781 point increase in the depression scale for females. The relationship was largely driven by females who (1) had sex early relative to their peers or (2) broke up with a romantic partner between Waves I and II (and especially females who were in a less emotionally committed relationship and broke up).
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 Male	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 Initiated sexual activity at an early age compared with peers	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	Sexual initiation was associated with a significant 1.567 point increase in the depression scale for individuals who had sex early relative to their peers. The relationship was largely driven by (1) females, and (2) individuals who broke up with a romantic partner between Waves I and II.
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 Initiated sexual activity on-time compared with peers	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 Initiated sexual activity at a late age compared with peers	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 Broke up with romantic partner between Waves I and II	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	Sexual initiation was associated with a significant 0.955 point increase in the depression scale for individuals who broke up with a romantic partner. The relationship was largely driven by (1) females, (2) individuals in less emotionally committed relationships, (3) individuals in more socially embedded relationships, and (4) individuals who had sex early relative to their peers.
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 No relationship between Waves I and II	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Depression scale (19-item version of the Center for Epidemiological Studies Depression Scale, 57 points)	Age 11–18 Still dating main partner between Waves I and II	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 Female	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 Male	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.

Outcome	Sample characteristics	Contrast	Findings
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 Initiated sexual activity at an early age compared with peers	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	Sexual initiation was associated with a significant 0.599 point decrease in the self-esteem scale for individuals who had sex early relative to their peers. The relationship was largely driven by females, and especially females who did not have a romantic relationship between Waves I and II.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 Initiated sexual activity on-time compared with peers	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 Initiated sexual activity at a late age compared with peers	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 Broke up with romantic partner between Waves I and II	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 No relationship between Waves I and II	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.
Self-esteem (6 items from Rosenberg scale, 24 points)	Age 11–18 Still dating main partner between Waves I and II	Initiated sexual activity between Add Health Waves I and II vs. did not have sex before Wave II	There was no statistically significant difference.

Ream (2006): *Using longitudinal data from Wave I and Wave II of Add Health, the author examined the relationship between sexual intercourse and several measures of depression and connection to one's environment. In analyses by gender predicting outcomes at Wave I, the author used linear regression analysis with controls for demographic and socioeconomic characteristics, relative pubertal maturation timing, cognitive ability, romantic relationships, sexually transmitted infection acquisition, experience of rape, and pregnancy of either self or a partner. In analyses by gender predicting outcomes at Wave II, the author also included a control for a measure of the outcome at Wave I. In addition, the author estimated differences in changes between outcomes at Wave I and Wave II for individuals with different patterns of sexual initiation, pooling males and females. Finally, for the Wave II depression outcome only, the author estimated a model controlling for Wave I depression; the cross-wave average indexes of parent problem-focused interactions, school belonging, and religious participation; and all previously described control variables.*

Outcome	Sample characteristics	Contrast	Findings
Depression index (Wave II; range 0–3)	Age 12–18	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity by Wave II	In models without controls for parent problem-focused interactions, school belonging, and religious participation, the average Wave II depression index for those who initiated sexual activity between Waves I and II was 0.06 to 0.12 points higher than that for individuals who did not initiate sexual activity by Wave II. The differences were statistically significant. In models that control for these other outcomes, differences were not statistically significant.
Sabia (2006): *Using Add Health data, the author estimated the relationship between initiation of sexual intercourse and three measures of depressive symptoms. The paper presents two analyses: an ordinary least squares (OLS) regression model of cross-sectional estimates and a difference-in-difference model that used longitudinal data and included individual-level fixed effects. Both models control for being in a romantic relationship, attempted suicide of family or friends, college aspirations, self-perception of being overweight, physical health, belief that their parents do not care about them, religiosity, GPA, and alcohol consumption. The cross-sectional regression model also included controls for family environment, cognitive ability, demographics, family characteristics, socioeconomic status, mothers' depression, and location; the difference-in-difference model also included controls for perceived loneliness.*			
Felt depressed "a lot" or more often in past week	Age 13–14 Female	Ever had sex vs. never had sex	In the OLS model, females ages 13 to 14 who engaged in sexual activity were 9.2 percentage points more likely to be depressed. This difference was statistically significant. In the OLS model restricted to the difference-in-difference sample, this difference decreased to 6.9 percentage points and remained statistically significant. In the difference-in-difference model, the difference decreased in size was not statistically significant.
Felt depressed "a lot" or more often in past week	Age 15–16 Female	Ever had sex vs. never had sex	In the OLS model, females ages 15 to 16 who engaged in sexual activity were 4.6 percentage points more likely to be depressed. This difference was statistically significant. In the OLS model restricted to the difference-in-difference sample, this difference was 4.7 percentage points and remained statistically significant. In the difference-in-difference model, the difference decreased in size and was not statistically significant.
Felt depressed "a lot" or more often in past week	Age 17–18 Female	Ever had sex vs. never had sex	There were no statistically significant differences.
Felt life not worth living sometimes or more often in past week	Age 13–14 Female	Ever had sex vs. never had sex	In the OLS model, females ages 13 to 14 who engaged in sexual activity were 8.1 percentage points more likely to have felt that life was not worth living. This difference was statistically significant. In the OLS model restricted to the difference-in-difference sample, this difference decreased to 7.2 percentage points and remained statistically significant. In the difference-in-difference model, the difference decreased in size and was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Felt life not worth living sometimes or more often in past week	Age 15–16 Female	Ever had sex vs. never had sex	In the OLS model, females ages 15 to 16 who engaged in sexual activity were 5.0 percentage points more likely to have felt that life was not worth living. This difference was statistically significant. In the OLS model restricted to the difference-in-difference sample, this difference decreased to 4.8 percentage points and remained statistically significant. In the difference-in-difference model, the difference decreased in size and was not statistically significant.
Felt life not worth living sometimes or more often in past week	Age 17–18 Female	Ever had sex vs. never had sex	There were no statistically significant differences.
Considered suicide in past year	Age 13–14 Female	Ever had sex vs. never had sex	In the OLS models, there were no statistically significant differences. In the difference-in-difference model, females ages 13 to 14 who engaged in sexual activity were 11.1 percentage points less likely to have seriously thought about committing suicide. This difference was also statistically significant.
Considered suicide in past year	Age 15–16 Female	Ever had sex vs. never had sex	In the OLS model, females ages 15 to 16 who engaged in sexual activity were 4.9 percentage points more likely to have seriously thought about committing suicide. This difference was statistically significant. In the OLS model restricted to the difference-in-difference sample, this difference increased to 5.1 percentage points and remained statistically significant. In the difference-in-difference model, the difference became negative and was not statistically significant.
Considered suicide in past year	Age 17–18 Female	Ever had sex vs. never had sex	In the OLS models, there were no statistically significant differences. In the difference-in-difference model, females ages 17 to 18 who engaged in sexual activity were 7.7 percentage points less likely to have seriously thought about committing suicide. This difference was statistically significant.
Felt depressed “a lot” or more often in past week	Age 13–14 Male	Ever had sex vs. never had sex	There were no statistically significant differences.
Felt depressed “a lot” or more often in past week	Age 15–16 Male	Ever had sex vs. never had sex	There were no statistically significant differences.
Felt depressed “a lot” or more often in past week	Age 17–18 Male	Ever had sex vs. never had sex	There were no statistically significant differences.

Outcome	Sample characteristics	Contrast	Findings
Felt life not worth living sometimes or more often in past week	Age 13–14 Male	Ever had sex vs. never had sex	There were no statistically significant differences.
Felt life not worth living sometimes or more often in past week	Age 15–16 Male	Ever had sex vs. never had sex	In the OLS model, males ages 15 to 16 who engaged in sexual activity were 4.7 percentage points more likely to have felt that life was not worth living. This difference was statistically significant. In the OLS model restricted to the difference-in-difference sample, this difference decreased to 4.5 percentage points and remained statistically significant. In the difference-in-difference model, the difference decreased in size and was not statistically significant.
Felt life not worth living sometimes or more often in past week	Age 17–18 Male	Ever had sex vs. never had sex	There were no statistically significant differences.
Considered suicide in past year	Age 13–14 Male	Ever had sex vs. never had sex	There were no statistically significant differences.
Considered suicide in past year	Age 15–16 Male	Ever had sex vs. never had sex	There were no statistically significant differences.
Considered suicide in past year	Age 17–18 Male	Ever had sex vs. never had sex	There were no statistically significant differences.
Sabia and Rees (2008): *Using Add Health, the authors examined the effect of ever having sex on three measures of mental health: self-esteem, depression, and major depression. The paper reports an ordinary least squares (OLS) model, an individual fixed-effects model, and an instrumental variables (IV) model. The individual fixed-effects approach used data from Add Health Waves I and II. All other estimates use data from Wave I. OLS regressions controlled for demographic characteristics, socioeconomic characteristics, household composition, physical health, physical development, cognitive ability, religion, and school characteristics; fixed-effects regressions were estimated both without controls and with controls for time-varying characteristics (age, physical development, physical health, and school characteristics). IV estimates were based on three instruments: (1) the per-capital number of county-level family planning clinics, (2) the presence of a contraceptive-inclusive HIV education program as measured by the presence of a state HIV education mandate coupled with school-level provision of family planning services, and (3) a school policy that requires pregnant students to attend a separate school. The authors also used several sensitivity analyses to assess the robustness of the estimates. These produced broadly similar results, except as noted below.*			
Self-esteem scale (Based on 6 items from the Rosenberg scale, 30 points)	Female Age 14–18	Ever had sex vs never had sex	In OLS models, females who ever had sex scored 0.765 to 0.778 points lower on the self-esteem scale compared with females who had not had sex. This difference was statistically significant. In the fixed-effects models, the coefficient decreased and was not statistically significant. In the IV models, the difference ranged from -1.84 to -2.95 points, though no difference was statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Self-esteem scale (Based on 6 items from the Rosenberg scale, 30 points)	Male Age 14–18	Ever had sex vs never had sex	In OLS models, males who ever had sex scored 0.280 to 0.296 points lower on the self-esteem scale compared with males who had not had sex. This difference was statistically significant. In the fixed-effects models, the coefficient decreased and was not statistically significant. In the IV models, the difference ranged from 1.43 to 3.29 points, though no difference was statistically significant.
Depression scale (Based on 18 items from the Center for Epidemiologic Studies Depression scale, 54 points)	Female Age 14–18	Ever had sex vs never had sex	In OLS models, females who ever had sex scored 3.61 to 3.62 points higher on the depression scale compared with females who had not had sex. This difference was statistically significant. In the fixed-effects model, the coefficient decreased to 0.979 to 1.01 points but remained statistically significant. In the IV models, the difference ranged from 6.14 to 7.67 and was significant in 2 of the 5 models.
Depression scale (Based on 18 items from the Center for Epidemiologic Studies Depression scale, 54 points)	Male Age 14–18	Ever had sex vs never had sex	In OLS models, males who had sex scored 1.36 to 1.41 points higher on the depression scale compared with males who had not had sex. This difference was statistically significant. In the fixed-effects models, the coefficient decreased and was not statistically significant. In the IV models, the differences ranged from -4.19 to -6.59 points, though no difference was statistically significant.
Major depression (Based on score for 18 items from the Center for Epidemiologic Studies Depression scale)	Female Age 14–18	Ever had sex vs never had sex	In OLS models, females who ever had sex were 9.6 to 9.7 percentage points more likely to have major depression compared with females who had not had sex. This difference was statistically significant. In the fixed-effects models, the coefficient decreased and was not statistically significant. In the IV models, the difference ranged from 20.2 to 28.3 percentage points and was statistically significant in four of the five models.
Major depression (Based on score for 18 items from the Center for Epidemiologic Studies Depression scale)	Male Age 14–18	Ever had sex vs never had sex	In OLS models, males who ever had sex were 3.0 to 3.3 percentage points more likely to have major depression compared with males who had not had sex. This difference was statistically significant. In the fixed-effects models, the coefficient decreased and was not statistically significant. In the IV models, the difference ranged from -14.2 to -20.3 percentage points, though no difference was statistically significant.

Spriggs and Halpern (2008b): *The authors used data from Waves I, II, and III of Add Health to estimate a series of logistic regressions. The authors examined the relationship between age at sexual initiation and depression during adolescence (Wave II, when respondents were ages 14 to 18) or emerging adulthood (Wave III, when respondents were Age 18-22), also controlling for sociodemographic variables and a measure of Wave I depressive symptoms (when respondents were 13–17). Models without controls were also estimated for emerging adulthood depression.*

Outcome	Sample characteristics	Contrast	Findings
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 13 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	Females who were 13 years old at Wave I who initiated sexual activity between Waves I and II were 3.32 times as likely to report depressive symptoms during Wave II as those who did not initiate sexual activity. The difference was statistically significant.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 14 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	Females who were 14 years old at Wave I who initiated sexual activity between Waves I and II were 2.41 times as likely to report depressive symptoms during Wave II as those who did not initiate sexual activity. The difference was statistically significant.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 15 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	Females who were 15 years old at Wave I who initiated sexual activity between Waves I and II were 1.75 times as likely to report depressive symptoms during Wave II as those who did not initiate sexual activity. The difference was statistically significant.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 16 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	There was no statistically significant difference.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 17 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	There was no statistically significant difference.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 13 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	There were no significant differences.

Outcome	Sample characteristics	Contrast	Findings
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 14 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	There were no significant differences.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 15 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	There were no significant differences.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 16 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	There were no significant differences.
Depressive symptoms during adolescence (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 17 at Wave I	Initiated sexual activity between Waves I and II vs. did not initiate sexual activity before Wave II	There were no significant differences.
Emerging adult depressive symptoms (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 18–22	Initiated sexual activity before age 16 vs. initiated sexual activity at age 19 or later	In a logistic regression without controls, females who initiated sexual activity before age 16 were 1.82 times as likely to report emerging adult depressive symptoms as those who delayed sexual activity until age 19 or later. The difference was statistically significant. In the model with controls, this difference decreased and was no longer significant.
Emerging adult depressive symptoms (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Female Age 18–22	Initiated sexual activity between ages 16 and 18 vs. initiated sexual activity at age 19 or later	There were no statistically significant differences.

Outcome	Sample characteristics	Contrast	Findings
Emerging adult depressive symptoms (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 18–22	Initiated sexual activity before age 16 vs. initiated sexual activity at age 19 or later	There were no statistically significant differences.
Emerging adult depressive symptoms (Based on responses to a 8-item version of the Center for Epidemiological Studies Depression Scale)	Male Age 18–22	Initiated sexual activity between ages 16 and 18 vs. initiated sexual activity at age 19 or later	There were no statistically significant differences.
Vasilenko et al. (2011): *The authors used four waves of longitudinal data on 100 college students who initiated sexual activity between the falls of their first and fourth years of college to examine the relationship between (vaginal or anal) sexual initiation and body image. They used a hierarchical linear model, including fixed-effects for gender and race/ethnicity and individual-level random-effects and time trends.*			
Body image scale (higher score indicates more satisfaction with body)	Male College student	After vs. before sexual initiation	After sexual initiation, male college students exhibited a 1.80 point increase in the 35-point body image scale. The statistical significance of this effect was not directly assessed; but the change in the body image scale following sexual initiation for male students was significantly greater than the change in the scale for female students (a decrease of 0.57 points).
Body image scale (higher score indicates more satisfaction with body)	Female College student	After vs. before sexual initiation	There was no statistically significant difference.
Wesche et al. (2017): *The authors explored the relationship between sexual initiation and mental health using data from the Promoting School-university-community Partnerships to Enhance Resilience (PROSPER) intervention study. For this study, students in 28 rural communities in Pennsylvania and Iowa were surveyed twice per year in grade 6 and once per year thereafter, until the year following high school graduation. People in both the PROSPER intervention and comparison groups were included in this study. The authors estimated random effects models to capture within-person variation between sexual initiation and mental health. They ran several regressions, which differed based on the modeling of sexual initiation. Model 1 included an indicator for having ever had sex; Model 2 included two indicators for (1) having ever had sex, given sexual initiation occurred in grade 9 and (2) having ever had sex, given sexual initiation occurred between grades 10 and 12; and Model 3 included the indicators from Model 2 along with two variables measuring the time since sexual initiation (with one measure for grade 9 initiators and one measure for grade 10–12 initiators). All models were estimated separately for males and females and controlled for alcohol use, living in a two-parent family, attachment to parents, free/reduced price lunch eligibility, delinquency, high school grades, race/ethnicity, PROSPER wave, and whether a student's school participated in PROSPER intervention program. The authors used numerous sensitivity analyses (not discussed below) to support their conclusions.*			

Outcome	Sample characteristics	Contrast	Findings
Anxiety/depression scale (Based on responses to seven items from the Achenback Youth Self Report)	Female Age 19 Initiated sex in grade 9 or later	After initiating sex vs. before initiating sex or never had sex	There was no statistically significant difference.
Anxiety/depression scale (Based on responses to seven items from the Achenback Youth Self Report)	Male Age 19 Initiated sex in grade 9 or later	After initiating sex vs. before initiating sex or never had sex	There was no statistically significant difference.
Anxiety/depression scale (Based on responses to seven items from the Achenback Youth Self Report)	Female Age 19 Initiated sex in grade 9 or later	After initiating sex, given initiated in grade 9 vs. before initiating sex or never had sex	Females who initiated sex in grade 9 experienced a statistically significant 4.7 percent increase in the anxiety/depression scale. When allowing for the relationship to change over time using Model 3, females who initiated sex in grade 9 experienced an immediate, statistically significant 8.7 percent increase in the anxiety/depression scale. The difference decayed over time; each year after sexual initiation the scale decreased by a significant 1.9 percent.
Anxiety/depression scale (Based on responses to seven items from the Achenback Youth Self Report)	Female Age 19 Initiated sex in grade 9 or later	After initiating sex, given initiated between grades 10 and 12 vs. before initiating sex or never had sex	There was no statistically significant difference in Model 2. When allowing for the relationship to change over time using Model 3, females who initiated sex in grades 10–12 experienced no immediate significant change in the anxiety/depression scale. Each year thereafter, sexual initiators experienced a significant 1.8 percent decrease in the scale.
Anxiety/depression scale (Based on responses to seven items from the Achenback Youth Self Report)	Male Age 19 Initiated sex in grade 9 or later	After initiating sex, given initiated in grade 9 vs. before initiating sex or never had sex	There was no statistically significant difference.
Anxiety/depression scale (Based on responses to seven items from the Achenback Youth Self Report)	Male Age 19 Initiated sex in grade 9 or later Rural PA or IA	After initiating sex, given initiated between grades 10 and 12 vs. before initiating sex or never had sex	There was no statistically significant difference in Model 2. When allowing for the relationship to change over time using Model 3, males who initiated sex in grades 10–12 experienced no immediate, statistically significant change in the anxiety/depression scale. Each year thereafter, sexual initiators experienced a significant 1.1 percent decrease in the scale.

G. Findings within the risky sexual behavior domain

The SSAvER team reviewed four studies that examined outcomes related to sexual risk taking (Table A.7). Houlihan et al. (2008) examined three outcomes: (1) a composite index of sexual risk behaviors, such as having sex with someone who might have HIV; (2) a four-point scale measuring adolescents' attitudes toward their peers who are sexually active; and (3) a three-point scale measuring willingness to have sex without a condom. Huibregtse et al. (2011) examined sexual behavior under the influence of alcohol or drugs. Samek et al. (2014) examined a composite index of sexual activity under the influence of drugs or alcohol and the number of casual sex partners. Sandfort et al. (2008) examined five separate measures of sexual risk behavior, including sexual activity under the influence of alcohol or drugs, and having sex with a partner who is HIV positive or uses injection drugs. Both Huibregtse et al. (2011) and Samek et al. (2014) used sibling data to study these relationships, with the most causally robust estimates reflected by Huibregtse et al.'s discordant twin model and Samek et al.'s multivariate biometric decomposition.

Table A.7. Studies examining outcomes related to risky sexual behavior

Outcome	Sample characteristics	Contrast	Findings
Houlihan et al. (2008): *The authors analyzed three waves of data, across five years, from the Family and Community Health Study (FACHS) to examine the relationships between sexual initiation, self-esteem, perceptions on youth who are sexually active, and risky sexual behavior. The FACHS is a longitudinal study of 889 African American families in nonurban communities in Iowa and Georgia. Youth were surveyed at ages 10–12 (Wave I) and 20 and 56 months later (Waves II and III). The authors estimated structural equation models, in which Wave III sexual risk behavior was modeled as a function of sexual initiation between Waves I and II, Wave III self-concept, and Wave III willingness to have sex without a condom. The model also indirectly controlled for earlier measures of self-concept and attitudes towards individuals that engage in sexual behavior (through the modeling of other variables in the structural model). The authors also considered controlling for family socioeconomic status but did not include measures in the final model because of a lack of significance.*			
Favorability of youth who are sexually active in Wave II (ratings of whether peers who are sexually active were popular, smart, cool, good-looking, boring)	Age 15–17 (approximate)	Initiated sex between Waves I and II vs. did not initiate sex before Wave II	Youth who initiated sex between Waves I and II had a more favorable image of adolescents who were sexually active than youth who did not initiate sex before Wave II (a statistically significant difference of 0.26 points on a one-to-four-scale).
Risky sexual behavior in Wave III (composite index based on the number of sexual partners, recent sexual activity, condom use during sex, consuming drugs or alcohol before sex, sexually transmitted infection acquisition, having sex with someone who might have HIV, being pregnant/getting someone pregnant, and having an abortion/having a partner have an abortion)	Age 15–17 (approximate)	Initiated sex between Waves I and II vs. did not initiate sex before Wave II	Youth who initiated sex between Waves I and II were more likely to engage in risky sexual behavior in Wave III compared with youth who did not initiate sex before Wave II. The difference was statistically significant.
Willingness to have sex without a condom scale in Wave III	Age 15–17 (approximate)	Initiated sex between Waves I and II vs. did not initiate sex before Wave II	Youth who initiated sex between Waves I and II were more likely to report that they were willing to have sex without a condom in Wave 3 than those who did not initiate sex before Wave II (a statistically significant difference of 0.29 points on a one-to-three scale).

Outcome	Sample characteristics	Contrast	Findings
Huibregtse et al. (2011): *The authors used two cohorts of same-sex adolescent twins from the Minnesota Twin Family Study (born 1977–1984, assessed at age 24 or 29) to estimate the relationship between adolescent sexual initiation (oral, anal, or vaginal initiation at or before age 16) and early pregnancy, sexual partnering, and adult risky sexual behavior using regression analyses. The first regression controlled for gender, years sexually active (for measures of number of lifetime partners only), age of assessment, and cohort. The authors estimated two additional analyses if the first regression demonstrated a significant relationship. The second regression compared twins who did and did not experience adolescent sexual initiation in a discordant-twin model. As part of this analysis, the authors also estimated differences across twins from different families. The final regression added a sexual initiation propensity score as a control in the twin-level analysis (the propensity score model included controls for parent-child relationships, externalizing and internalizing pathology, peer factors, psychosexual development, and stressful life events).*			
Sexual behavior under the influence of drugs or alcohol past year (z-score)	Male twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, sexual behavior under the influence of drugs or alcohol for male twins who initiated sex at age 16 or younger was 0.55 standard deviations higher than that for male twins who initiated after age 16. This difference was statistically significant. This difference was lower (0.38 standard deviations) and statistically significant in the between-pair regression for identical twins with and without controlling for a sexual initiation propensity score. There were no statistically significant differences between fraternal twins. In the discordant-twin model, there are no statistically significant differences for identical male twins. Sexual behavior under the influence of drugs or alcohol for fraternal male twins who initiated sexual activity at or before age 16 was 0.76 standard deviations higher than that for fraternal twins who initiated sex after age 16 in models both with and without a propensity-score control. These differences were statistically significant.
Sexual behavior under the influence of drugs or alcohol past year (z-score)	Female twins Ages 24 and 29 Ever had sex	Initiated sexual activity at age 16 or younger vs. initiated sexual activity after age 16	In the first regression, sexual behavior under the influence of drugs or alcohol for female twins who initiated sex at age 16 or younger was 0.25 standard deviations higher than that for female twins who initiated after age 16. This difference was statistically significant. This difference was the same and remained statistically significant in the between-pair regressions for identical twins that did not control for a sexual initiation propensity score. There were no statistically significant differences in the regressions adjusting for propensity score or between fraternal twin pairs. There were no statistically significant differences in the discordant-twin regressions.
Samek et al. (2014): *The authors used a sample of same-sex adolescent twins from the Minnesota Twin Family Study (twins born 1977–1984, assessed at age 24). They created a scale variable for age of sexual initiation (including vaginal or oral sex) with five groupings: age 13 or younger (scale = 5), age 14–15 (scale = 4), age 16–18 (scale = 3), age 19–22 (scale = 2), and age 23 or older (scale = 1). They begin by estimating simple correlations between the variables of interest (including the relationship between age of sexual initiation and risky sexual behavior). Their main analysis then uses a multivariate biometric decomposition of the variance in risky sexual behavior that accounts for genetic and environmental factors.*			

Outcome	Sample characteristics	Contrast	Findings
Risky sex at age 24 (composite index of sex under the influence of drugs/alcohol and number of casual sex partners)	Female twins Age 24	Age of sexual initiation scale	There were no statistically significant relationships, both in the simple correlations and in the multivariate decompositions.
Risky sex at age 24 (composite index of sex under the influence of drugs/alcohol and number of casual sex partners)	Male twins Age 24	Age of sexual initiation scale	Simple correlations show a statistically significant correlation between the age at sexual initiation scale and risky sexual behavior at age 24. The multivariate decomposition is consistent with this finding but suggests that behavioral inhibition more generally, instead of early sexual initiation specifically, influences risky sex at age 24.
Sandfort et al. (2008): *Using a sample from the National Sexual Health Survey (1995–1996), the authors classified respondent's age at sexual initiation as "early" (25 percent), "normative" (50 percent), or "late" (25 percent) based on the distribution of age at first intercourse for those with the same gender, race/ethnicity, and educational background. The authors used ordinary least squares and logistic regression to estimate relationships between age at sexual initiation and sexual initiation before marriage and various outcomes, controlling for demographics (race/ethnicity, education, place of residence in youth, age, and migration status) and sexual history (nonconsensual sex, whether first orgasm was from masturbation, and sexual activity before first intercourse).*			
Any risky partners (those that are HIV positive or use injection drugs) in the past year	Male adults	Early vs. normative sexual initiation	The difference was not statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past five years	Male adults	Early vs. normative sexual initiation	Male early initiators were 1.33 times as likely to have had a risky sexual partner as male normative initiators. The difference was statistically significant.
Sex under the influence of alcohol or drugs in the past year	Male adults	Early vs. normative sexual initiation	Male early initiators were 1.77 times as likely to have had sex under the influence of alcohol or drugs as male normative initiators. The difference was statistically significant.
Risk denial	Male adults	Early vs. normative sexual initiation	Male early initiators scored 0.20 points higher, on average, on the risk denial index than male normative initiators. The difference was statistically significant.
Negative condom attitudes	Male adults	Early vs. normative sexual initiation	The difference was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Any risky partners (those that are HIV positive or use injection drugs) in the past year	Female adults	Early vs. normative sexual initiation	Female early initiators were 1.41 times as likely to have had a risky sexual partner as female normative initiators. The difference was statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past five years	Female adults	Early vs. normative sexual initiation	Female early initiators were 1.43 times as likely to have had a risky sexual partner as female normative initiators. The difference was statistically significant.
Sex under the influence of alcohol or drugs in the past year	Female adults	Early vs. normative sexual initiation	Female early initiators were 1.69 times as likely to have had sex under the influence of alcohol or drugs as female normative initiators. The difference was statistically significant.
Risk denial	Female adults	Early vs. normative sexual initiation	The difference was not statistically significant.
Negative condom attitudes	Female adults	Early vs. normative sexual initiation	Female early initiators scored 0.06 points higher, on average, on the negative condom attitudes index than female normative initiators. The difference was statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past year	Male adults	Late vs. normative sexual initiation	Male late initiators were 0.72 times as likely to have had a risky sexual partner as male normative initiators. The difference was statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past five years	Male adults	Late vs. normative sexual initiation	Male late initiators were 0.74 times as likely to have had a risky sexual partner as male normative initiators. The difference was statistically significant.
Sex under the influence of alcohol or drugs in the past year	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Risk denial	Male adults	Late vs. normative sexual initiation	Male late initiators scored 0.17 points lower, on average, on the risk denial index than male normative initiators. The difference was statistically significant.
Negative condom attitudes	Male adults	Late vs. normative sexual initiation	The difference was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Any risky partners (those that are HIV positive or use injection drugs) in the past year	Female adults	Late vs. normative sexual initiation	Female late initiators were 0.71 times as likely to have had a risky sexual partner as female normative initiators. The difference was statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past five years	Female adults	Late vs. normative sexual initiation	Female late initiators were 0.62 times as likely to have had a risky sexual partner as female normative initiators. The difference was statistically significant.
Sex under the influence of alcohol or drugs in the past year	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Risk denial	Female adults	Late vs. normative sexual initiation	Female late initiators scored 0.17 points lower, on average, on the risk denial index than female normative initiators. The difference was statistically significant.
Negative condom attitudes	Female adults	Late vs. normative sexual initiation	The difference was not statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past year	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past five years	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Men who waited until marriage to first have intercourse were 0.37 times as likely to have had any risky sexual partners as men who did not wait. The difference was statistically significant.
Sex under the influence of alcohol or drugs in the past year	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Risk denial	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Negative condom attitudes	Male adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Any risky partners (those that are HIV positive or use injection drugs) in the past year	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Women who waited until marriage to first have intercourse were 0.56 times as likely to have had any risky sexual partners as women who did not wait. The difference was statistically significant.
Any risky partners (those that are HIV positive or use injection drugs) in the past five years	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Women who waited until marriage to first have intercourse were 0.45 times as likely to have had any risky sexual partners as women who did not wait. The difference was statistically significant.
Sex under the influence of alcohol or drugs in the past year	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	Women who waited until marriage to first have intercourse were 0.20 times as likely to have had sex under the influence of alcohol or drugs in the past year as women who did not wait. The difference was statistically significant.
Risk denial	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.
Negative condom attitudes	Female adults Currently married to first spouse	Initiated sexual activity after vs. before marriage	The difference was not statistically significant.

H. Findings within the substance use domain

The SSAvER team reviewed five studies that examined outcomes related to substance use (Table A.8). Cha et al. (2016) examined the relationship between age at sexual initiation and cannabis use. Both Donahue (2012) and Holway et al. (2017) examined outcomes related to alcohol use. Cornelius et al. (2007) and Epstein et al. (2018) examined clinical measures of substance use disorders. Only one study (Donahue 2012) used more rigorous methods (the bivariate family model which leverages data on siblings) to measure causal effects.

Table A.8. Studies examining outcomes related to substance use

Outcome	Sample characteristics	Contrast	Findings
Cha et al. (2016): *The authors used cross-sectional data from more than 5,000 respondents to the National Comorbidity Survey—Replication, a nationally representative survey of U.S. adults, to describe the relationship between age at sexual initiation and cannabis use. They estimated four types of models using logistic regression. Model 1 included no control variables beyond measures of age at sexual initiation; Model 2 added controls for demographic characteristics, socioeconomic characteristics, and sexual risk behavior; Model 3 added controls for childhood religiosity, abuse, family dynamics, and receipt of government assistance to Model 2; and Model 4 added controls for nicotine and alcohol use to Model 3. The authors' main results exclude individuals who initiated sexual activity before age 12 but sensitivity analysis was conducted to demonstrate that results are robust to this choice.*			
Ever used cannabis	U.S. adult	Age at sexual initiation	Across all four models, a one-year increase in age at sexual initiation was associated with a statistically significant 10 to 21 percent decrease in the odds of cannabis use. The difference was largest in Model 1 and smallest in Model 4.
Ever used cannabis	U.S. adult	Initiated sexual activity at age 12–17 vs. initiated sexual activity at age 18	Based on Model 1, individuals who initiated sexual activity between ages 12 and 17 were 1.45 times as likely as those who initiated sexual activity at age 18 to have ever used cannabis. The difference was statistically significant. When control variables were added to the regression, the difference decreased and became statistically insignificant.
Ever used cannabis	U.S. adult	Initiated sexual activity after age 18 vs. initiated sexual activity at age 18	Across all four models, individuals who initiated sexual activity after age 18 were 0.41 to 0.57 times as likely as those who initiated sexual activity at age 18 to have ever used cannabis. The differences were statistically significant across all models. Model 1 produced the largest difference and Model 4 produced the smallest.
Used cannabis in past year	U.S. adult	Age at sexual initiation	Across Models 1–3, a one-year increase in age at sexual initiation was associated with a 12 to 24 percent decrease in the odds of cannabis use. The differences were statistically significant across these models. In Model 4, the difference decreased and was not significant.
Used cannabis in past year	U.S. adult	Initiated sexual activity at age 12–17 vs. initiated sexual activity at age 18	Across Models 1–3, individuals who initiated sexual activity between ages 12 and 17 were 1.42 to 2.10 times as likely as those who initiated sexual activity at age 18 to have used cannabis in the past year. The differences were statistically significant across these models. In Model 4, the difference decreased and was not significant.

Outcome	Sample characteristics	Contrast	Findings
Used cannabis in past year	U.S. adult	Initiated sexual activity after age 18 vs. initiated sexual activity at age 18	Based on Model 1, individuals who initiated sexual activity after age 18 were 0.41 times as likely as those who initiated sexual activity at age 18 to have used cannabis in the past year. The difference was statistically significant. When control variables were added to the regression, the difference decreased and became statistically insignificant.
Ever used cannabis	U.S. adult Male White	Age at sexual initiation	A one-year increase in age at sexual initiation was associated with a statistically significant 7 to 17 percent decrease in the odds of cannabis use. The difference was largest in Model 1 and smallest in Model 4.
Ever used cannabis	U.S. adult Male Black	Age at sexual initiation	There were no statistically significant differences.
Ever used cannabis	U.S. adult Male Hispanic	Age at sexual initiation	A one-year increase in age at sexual initiation was associated with a statistically significant 18 to 21 percent decrease in the odds of cannabis use.
Ever used cannabis	U.S. adult Male Non-white, non-black, non-Hispanic	Age at sexual initiation	Based on Models 1–3, a one-year increase in age at sexual initiation was associated with a statistically significant 18 to 57 percent decrease in the odds of cannabis use. Model 4 was not estimated because of sample size.
Ever used cannabis	U.S. adult Female White	Age at sexual initiation	A one-year increase in age at sexual initiation was associated with a statistically significant 13 to 27 percent decrease in the odds of cannabis use. This difference was largest in Model 1 and smallest in Model 4.
Ever used cannabis	U.S. adult Female Black	Age at sexual initiation	Based on Model 3, a one-year increase in age at sexual initiation was associated with a statistically significant 19 percent decrease in the odds of cannabis use. In Models 1, 2, and 4, the difference was slightly smaller (15 to 18 percent) and not statistically significant.
Ever used cannabis	U.S. adult Female Hispanic	Age at sexual initiation	Based on Models 1–3, a one-year increase in age at sexual initiation was associated with a statistically significant 21 to 23 percent decrease in the odds of cannabis use. In Model 4, the difference decreased and was not significant.

Outcome	Sample characteristics	Contrast	Findings
Ever used cannabis	U.S. adult Female Non-white, non-black, non-Hispanic	Age at sexual initiation	Based on Model 1, a one-year increase in age at sexual initiation was associated with a statistically significant 29 percent decrease in the odds of cannabis use. When control variables were added to the regression, the difference decreased and became statistically insignificant.
Cornelius et al. (2007): *Based on a longitudinal study of adolescents (136 male subjects recruited at ages 10–12, with follow-up evaluations at ages 14, 16, 19, 22, and 25), the authors used Cox proportional hazard models to examine whether earlier age at first intercourse predicted the development of substance use disorders. The models also controlled for measures of disinhibition, peer deviant behavior, and prevalence of drugs in one's neighborhood.*			
Substance use disorder	Male	Age at first intercourse	A one standard deviation (2.4-year) delay in first sexual intercourse was associated with an 18 percent decrease in the risk of developing a substance use disorder. The difference was statistically significant.
Cannabis use disorder	Male	Age at first intercourse	Delay in first sexual intercourse was associated with a decrease in the risk of developing a cannabis use disorder. The difference was statistically significant, but its magnitude was not stated in the article.
Alcohol use disorder	Male	Age at first intercourse	Delay in first sexual intercourse was associated with a decrease in the risk of developing an alcohol use disorder. The difference was statistically significant, but its magnitude was not stated in the article.
Donahue (2012): *Using longitudinal data from the Children of the National Longitudinal Survey of Youth, the author explored the relationship between sexual initiation before age 16 and a number of outcomes. The author fit several regression models, using logit models for binary outcomes, multinomial regression for categorical outcomes, and ordinary least squares for other outcomes. All models included a family-level random effect. Models 1 and 2 included all individuals, with Model 1 including no covariates and Model 2 adjusting for the characteristics of individuals' mothers, including mothers' demographic and socioeconomic characteristics and mothers' adolescent behavior. Models 3, 4, and 5 included only individuals with a sibling in the data set. Model 3 included controls for mother's characteristics, Model 4 included controls for mother's characteristics and siblings' ages at sexual initiation, and Model 5 included controls for mother's characteristics, siblings' ages at sexual initiation, and a propensity score measuring the likelihood of sexual initiation before age 16. The author estimated the propensity score using measures of an individual's demographic characteristics, substance use before age 14, dating behavior before age 14, problem behavior, peer pressure, impulsivity, sensation seeking, home environment, and cognitive ability. The author then used bivariate family models to estimate the proportion of the relationship between sexual initiation and each outcome of interest within the sample of siblings that is attributable to siblings' common genes, shared environment, and other influences.*			
Ever drank alcohol but did not drink in past year (vs. never drank)	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 3.36 times as likely to have ever consumed alcohol but not to have consumed alcohol in the past year as individuals who initialed sexual activity at age 16 or later. In a model that adjusted for mother-level covariates, these individuals were 2.30 times as likely to have had this pattern of drinking behavior. The differences were statistically significant.

Outcome	Sample characteristics	Contrast	Findings
Drank alcohol less than once per month in past year (vs. never drank)	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 3.68 times as likely to have drank alcohol less than once per month in the past year as individuals who initialed sexual activity at age 16 or later. In a model that adjusted for mother-level covariates, these individuals were 3.10 times as likely to have had this pattern of drinking behavior. The differences were statistically significant.
Drank alcohol once a month or more, but less than once per week, during the past year (vs. never drank)	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 4.67 times as likely to have drank alcohol once a month or more, but less than once per week, during the past year as individuals who initialed sexual activity at age 16 or later. In a model that adjusted for mother-level covariates, these individuals were 5.00 times as likely to have had this pattern of drinking behavior. The differences were statistically significant.
Drank alcohol once a week or more during the past year (vs. never drank)	Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In a model without controls or family-based information, individuals that initiated sexual activity before age 16 were 5.90 times as likely to have drank alcohol once a week or more during the past year as individuals who initialed sexual activity at age 16 or later. In a model that adjusted for mother-level covariates, these individuals were 7.02 times as likely to have had this pattern of drinking behavior. The differences were statistically significant.
Ever drank alcohol but did not drink in past year (vs. never drank)	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 2.34, 2.11, and 1.65 times as likely (respectively) to have ever consumed alcohol but not to have consumed alcohol in the past 12 months as individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that about half the association was attributable to common genetic factors.
Drank alcohol less than once per month in past year (vs. never drank)	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 3.20, 3.01, and 2.35 times as likely (respectively) to have consumed alcohol less than once per month in the past 12 months as individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that about half the association was attributable to common genetic factors.

Outcome	Sample characteristics	Contrast	Findings
Drank alcohol once a month or more, but less than once per week, during the past year (vs. never drank)	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 5.31, 4.57, and 3.20 times as likely (respectively) to have consumed alcohol once per month or more, but less than once per week, in the past 12 months as individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that about half the association was attributable to common genetic factors.
Drank alcohol once a week or more during the past year (vs. never drank)	Siblings Age 18–21	Initiated sexual activity before age 16 vs. initiated sexual activity at age 16 or later	In Models 3, 4, and 5, individuals that initiated sexual activity before age 16 were 7.45, 5.36, and 3.35 times as likely (respectively) to have consumed alcohol once per week or more in the past 12 months as individuals who initiated sexual activity at age 16 or later. The differences were statistically significant. The bivariate family model demonstrated that about half the association was attributable to common genetic factors.
Epstein et al. (2018): *Using data from the Seattle Social Development Project in Seattle, Washington, the authors used logistic regressions to examine the relationship between age of sexual initiation and six adult health outcomes. The paper reports on two models: the unmediated model controls for measures of demographic characteristics, socioeconomic status, pubertal age, sexual abuse in childhood, alcohol or tobacco use at ages 10 to 12, and teacher reports of child behavior and weight at ages 10 through 12; the mediated model also includes controls for early adolescent pregnancy (before age 18), lifetime sexually transmitted infection acquisition at age 21, and number of sexual partners (an indicator for 10 or more lifetime partners at age 24). The authors also reported testing for nonlinearity using a measure of age at sexual initiation squared but rejected this addition to the model because of no consistent pattern of statistical significance. Note that part of the sample was exposed to a preventative intervention in elementary school, which is accounted for by controlling for intervention status in the regression models.*			
Met Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV criteria for alcohol disorder at age 30, 33, or 39	Age 30–39	Age at sexual initiation	There were no significant results in either the unmediated and mediated models.
Met DSM-IV criteria for nicotine disorder at age 30, 33, or 39	Age 30–39	Age at sexual initiation	In the unmediated model, a one-year delay in age of sexual initiation was associated with a 12 percent decrease in the odds of having a nicotine disorder. This difference was statistically significant. In the mediated model, this different was similarly sized (10 percent) but not significant.
Met DSM-IV criteria for marijuana disorder at age 30, 33, or 39	Age 30–39	Age at sexual initiation	In the unmediated model, a one-year delay in age of sexual initiation was associated with a 23 percent decrease in the odds of having a marijuana disorder. This difference was statistically significant. In the mediated model, this difference decreased to 17 percent but remained significant.

Outcome	Sample characteristics	Contrast	Findings
Holway et al. (2017): *Using Add Health data, the authors estimated the relationship between age at first sexual intercourse and a measure of frequent binge drinking. The paper presents three logistic regression models, with all including controls for demographic characteristics, pubertal timing, education, employment, family characteristics, experience of forced sexual relations, and binge drinking before sexual initiation. Model 1 included no additional controls; Model 2 controlled for the rate of partner accumulation (the ratio of number of sexual partners to years since first intercourse); and Model 3 included an interaction between age at first intercourse and rate of partner accumulation.*			
Reported drinking four or more drinks in a row at least twice per month	Age 24–32 Female	Age at first sexual intercourse	Across all models, for each additional year delay in sexual initiation, a female was 11 to 12 percent less likely to have binge drunk frequently in the past year. This difference was significant across all three models. In Model 3, the interaction between age of sexual initiation and rate of sex partner accumulation was not significant.
Reported drinking five or more drinks in a row at least twice per month	Age 24–32 Male	Age at first sexual intercourse	Across all models, for each additional year delay in sexual initiation, a male was 14 to 16 percent less likely to have binge drunk frequently in the past year. This difference was significant across all three models. In Model 3, the interaction between age of sexual initiation and rate of sex partner accumulation was not significant.

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