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True Love Waits? A Sibling-Comparison Study of Age at First Sexual Intercourse and Romantic Relationships in Young Adulthood

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Abstract

This study tested whether the timing of first sexual intercourse in adolescence predicts romantic outcomes in adulthood, including union formation, number of romantic partners, and relationship dissatisfaction. Participants were 1,659 same-sex sibling pairs from the National Longitudinal Study of Adolescent Health, who were followed from adolescence (mean age = 16 years) to young adulthood (mean age = 29 years). The timing of participants' first sexual intercourse was classified as *early* (at age 14 or earlier), *on time* (between the ages of 15 and 19), or *late* (at age 19 or older). Compared with early and on-time age at first sex, late age at first sex was associated with decreased odds of marriage or nonmarital cohabitation and fewer romantic partners in adulthood. Among individuals who had married or cohabited with a partner, late timing of first sex was associated with significantly reduced levels of relationship dissatisfaction, even after controlling for genetic and environmental differences between families (using a sibling-comparison model), demographic outcomes in adulthood, and involvement in dating during adolescence. These results underscore the contribution of a life-span approach to our understanding of romantic relationships.

Keywords

adolescent development, behavior genetics, relationship quality, sex

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The attainment of sexual maturity is one of the defining developmental processes of adolescence. Much psychosocial research on the timing of sexual development has focused on the immediate consequences of early age at first sexual intercourse for adolescents' physical and mental health, such as risk for sexually transmitted infections, unintended pregnancy, depression, and delinquency. Adolescents' involvement in sexual relationships may also have long-term implications for psychosocial functioning beyond adolescence. A number of current "marriage promotion" policies are guided by the proposition that adolescents' romantic and sexual relationships provide formative experiences that influence the quality of marital relationships in adulthood (Karney, Beckett, Collins, & Shaw, 2007). However, the empirical research examining this proposition has been limited. In the research reported here, I used longitudinal sibling-comparison data to examine whether the timing of sexual initiation during adolescence predicts patterns of union formation and satisfaction with romantic relationships during young adulthood (i.e., the late 20s).

The few empirical studies examining the adult correlates of adolescent sexual activity have come from sociologists, who have shown that earlier sexual activity in adolescence is associated with strikingly higher rates of nonmarital cohabitation, more rapid transitions to cohabiting relationships following first sexual intercourse, earlier age at first marriage, higher rates of nonmarital pregnancy, and higher rates of marital dissolution (Raley, Crissey, & Muller, 2007; Teachman, 2003; Thornton, Axinn, & Xie, 2007). The sociological evidence has been interpreted in terms of the accumulation of social and educational capital: Earlier sexual initiation, particularly if it results in a pregnancy, may disrupt educational attainment, as well as the relative socioeconomic security and improved occupational conditions that typically accompany high levels of education (Frisco, 2008; Schvaneveldt, Miller, Berry, &

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Lee, 2001). Moreover, sexual activity at any point during adolescence may decrease individuals' religious commitment, whereas sexual abstention may bolster adolescents' religious conservatism. In turn, educational attainment, socioeconomic advantage, and high levels of religious commitment are associated with stable forms of unions in young adulthood and marital satisfaction (Bradbury, Fincham, & Beach, 2000; Conger, Rueter, & Elder, 1999; Mahoney, Pargament, Tarakeshwar, & Swank, 2001; Thornton, Axinn, & Teachman, 1995; Wilcox, Chaves, & Franz, 2004).

In addition to studies of adolescent sexual activity per se, there is an emerging literature on the long-term sequelae of adolescent dating relationships (Collins, 2003; Collins, Welsh, & Furman, 2009). From a social-learning perspective, dating relationships in adolescence are opportunities to practice communication and emotion-regulation skills (Shulman, 2003). Seiffge-Krenke (2003) posited that greater and earlier involvement in dating affords more opportunities for practice and thus produces better outcomes: "Sheer quantity of exposure and involvement provides the individual with learning experiences that ensure a positive romantic outcome" (p. 529). In contrast, Madsen and Collins (2011) found that having fewer dating partners in adolescence was associated with better-quality interactions with romantic partners during emerging adulthood. In addition, it is unclear whether the observed effects of dating generalize to sexual experience. Although most teenagers lose their virginity in the context of dating relationships, and adolescents who are in serious dating relationships are the most likely to be sexually active, there are also teens who date but abstain from sex, as well as teens who have sex outside of dating relationships (Harden & Mendle, 2011; Manning, Giordano, & Longmore, 2006; Manning, Longmore, & Giordano, 2005). One study showed that, controlling for involvement in dating relationships during adolescence, individuals who were sexually active in adolescence reported a greater number of romantic partners by emerging adulthood and were more likely to have married or cohabited (Meier & Allen, 2009).

Parsing the association between sexual activity in adolescence and romantic relationships in adulthood is further complicated by the possibility of nonrandom selection into different environmental experiences, particularly selection based on genetic factors (*gene-environment correlation*). Accordingly, in the study reported here, I used longitudinal data on the timing of sexual development and romantic relationships in young adulthood that were drawn from a longitudinal study of sibling pairs. This sibling-comparison approach controlled for both genetic- and environmental-background variables that are shared by siblings raised in the same family and that might otherwise confound observed associations with timing of first sex. Although genetic variation between nontwin siblings and aspects of the family environment that differ between siblings (e.g., parental treatment) remain uncontrolled in a sibling-comparison analysis, the approach still offers a rigorous alternative to the standard, one-subject-per-family correlational design (Dick, Johnson, Viken, & Rose, 2000; Lahey & D'Onofrio, 2010). In my analyses, I focused on three main questions:

- Is the timing of first sexual intercourse associated with patterns of union formation, number of romantic partners, and romantic-relationship quality in young adulthood?
- Do observed phenotypic associations between timing of first sexual intercourse and relationship outcomes persist when siblings, rather than unrelated individuals, are compared?
- Are observed associations accounted for by involvement in dating in adolescence or by demographic factors, such as educational attainment and religious participation, in young adulthood?

Method

Participants

Data were drawn from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative study of adolescent health and risk behaviors (Harris, Halpern, Smolen, & Haberstick, 2006). The Add Health study used a stratified, school-based sampling design: During the 1994–1995 school year, the rosters of participating schools were used to select a sample of adolescents (N = 20,744; 10,480 females, 10,264 males) to complete a comprehensive in-home interview (Wave I). The mean age of participants at Wave I was 16.12 years (SD = 1.67). Subsequently, there have been three follow-up home interviews: Wave II, between 1995 and 1996, when participants were 11 to 23 years old; Wave III, between 2001 and 2002, when participants were 18 to 26 years old; and Wave IV, between 2007 and 2009, when participants were 24 to 32 years old. The Add Health interviews assessed a broad array of health domains; interview questions were adapted from numerous sources and extensively pilot-tested before use. To maintain participants' privacy and confidentiality, sensitive topics were assessed by having participants listen through earphones to audio-recorded questions and enter their answers directly into a laptop.

The current study used data on 3,298 participants from 1,649 same-sex sibling pairs: 550 monozygotic twins, 466 dizygotic twins, 1,324 full siblings, 414 half siblings, 186 cousins raised in the same home, and 358 biologically unrelated siblings (e.g., adoptees, step-siblings). Twin pairs' zygosity was determined by matching 11 molecular genetic markers and by self-reports and responses to four questionnaire items concerning similarity of appearance (Harris et al., 2006). The demographic composition of the sibling-pair sample was comparable to that of the full Add Health sample (Jacobson & Rowe, 1999). Participants' race-ethnicity was classified as White (n = 1,707, 52.2%), African American (n = 766, 23.4%), Hispanic (n = 493, 15.1%), Asian American (n = 219, 6.7%), Native American (n = 57, 1.7%), or other (n = 56, 1.7%).

Analyses focused on relationship outcomes reported at Wave IV, when the participants were young adults (mean age = 29.1 years, *SD* = 1.75; 25th–75th percentile = 28–30 years). Of the 3,298 siblings, data for Wave IV outcomes were available for 2,679 participants (81.2%);[1] at Wave IV, 1,659 of these participants (50.3% of the total sibling sample, comprising 980 individuals from 490 complete sibling pairs and 679 individuals from incomplete sibling pairs) reported being in an intact marriage or cohabiting relationship and reported on their relationship dissatisfaction.

Measures

Timing of first sexual intercourse. At Waves I and II, participants reported whether they had ever had vaginal intercourse and, if so, in what month and year they had had sex for the first time. From these reports, age at first sexual intercourse (in years) was calculated. At Waves III and IV, participants were asked whether they had ever had vaginal intercourse and, if so, how old they had been (in years) when they first had sex. As in previous studies using this data set (e.g., Harden, Mendle, Hill, Turkheimer, & Emery, 2008), to minimize telescoping, analyses used the age at first sex from the earliest wave in which the participant reported having had sex. For example, if an adolescent reported having had sex for the first time at age 13 in Wave I and at age 14 in Wave II, the reported age from Wave I was used. If nonvirgin participants reported an age at first sex that was likely prepubertal and possibly nonconsensual (11 years of age or younger), their data were coded as missing; hence, the measure of age at first sexual intercourse ranged from 11 to 30 years (*M* = 16.85 years, *SD* = 2.82). Participants' age at first sexual intercourse was classified as *early* (before age 15; *n* = 766, 23.2%), *on time* (between 15 and 19 years of age; *n* = 1,988, 60.3%), or *late* (after age 19; *n* = 540, 16.4%). (By "on time," I mean only that losing one's virginity between the ages of 15 and 19 is normative for adolescents in the United States.) Nearly all participants (92.5%) had lost their virginity by Wave IV; timing of first sex for participants who were virgins at Wave IV was classified as late. Table 1 shows the percentages of male and female sibling pairs concordant and discordant for timing of first sex.

Union formation. At Wave IV, participants reported whether they had ever been married (yes: 50.6%, no: 49.4%) and whether they had ever cohabitated with a partner whom they had not subsequently married (yes: 49.3%, no: 50.4%). The sibling-pair correlations (expressed as phi coefficients) were .21 ($p < .05$) for having married and .18 ($p < .05$) for having cohabited.

Number of romantic partners. At Wave IV, participants reported how many people they (a) had married, (b) had cohabited with for more than a month, (c) had impregnated or been impregnated by, (d) were currently romantically involved with, and (e) had been romantically involved with for at least 6 months since 2001. All categories were mutually exclusive; for example, participants were asked to not count people they had married when counting the number of people they had lived with. Values for these five categories were summed to produce a total number of romantic partners (possible range = 0–100, *M* = 2.73, *SD* = 3.75). The sibling-pair correlation for number of romantic partners (log-transformed to reduce positive skew) was .22 ($p < .05$).

Relationship dissatisfaction. At Wave IV, participants who were in an intact marriage or cohabiting relationship completed seven items assessing their satisfaction with the relationship ("We enjoy doing even ordinary day-to-day things together"; "I am satisfied with the way we handle our problems and disagreements"; "I am satisfied with the way we handle family finances"; "My partner listens to me when I need someone to talk to"; "My partner expresses love and

Table 1. Sample Sizes and Mean Age at First Sexual Intercourse for Sibling Pairs Concordant and Discordant for Timing of First Sex

Timing and within-pair concordance of timing of first sex	Sample size			Mean age at first sexual intercourse (years)
	Total sample	Males	Females	
Early	766 (23.2%)	440 (26.9%)	326 (19.6%)	13.2 (0.96)
Concordant	309 (9.4%)	199 (12.2%)	110 (6.6%)	13.3 (0.90)
Discordant	457 (13.9%)	241 (14.7%)	216 (13.0%)	13.0 (1.01)
On time	1,988 (60.3%)	924 (56.5%)	1,064 (64.0%)	16.7 (1.28)
Concordant	1,363 (41.3%)	614 (37.5%)	749 (45.1%)	16.7 (1.26)
Discordant	625 (19.0%)	310 (18.9%)	315 (19.0%)	16.8 (1.32)
Late	540 (16.4%)	271 (16.6%)	269 (16.2%)	21.8 (1.99)
Concordant	208 (6.3%)	96 (5.9%)	112 (6.8%)	22.1 (2.14)
Discordant	332 (10.1%)	175 (10.7%)	157 (9.5%)	21.6 (1.88)

Note: Values in parentheses in the right-most column are standard deviations.

affection to me"; "I am satisfied with our sex life"; and "I trust my partner to be faithful to me"; Cronbach's α = .89). Responses were made using Likert scales from 0 (*strongly agree*) to 4 (*strongly disagree*). Scores for all seven items were summed to form a composite score ($M = 6.91$, $SD = 5.92$, possible range = 0–28), with higher scores indicating greater dissatisfaction with the relationship. Composite scores were strongly positively skewed, and the modal response for each item was 0, indicating no dissatisfaction. The sibling-pair correlation for relationship dissatisfaction (log-transformed to reduce positive skew) was .08 ($p < .05$).

Dating involvement and physical characteristics during adolescence. At Wave I, adolescents were asked whether they had had a "special romantic relationship" with anyone in the last 18 months; if their response was "yes," they were classified as being in a dating relationship. Adolescents who denied having a special romantic relationship but reported that they had told another person (who was not a family member) that they "liked" or "loved" him or her and had held hands with and kissed this person were also classified as being in a dating relationship. Involvement in dating was reported by 63.6% of adolescents. In addition, the interviewer at Wave I rated each adolescent on three measures of attractiveness: grooming (using a scale from 1, *very poorly groomed*, to 5, *very well groomed*), physical attractiveness, and attractiveness of personality (using scales from 1, *very unattractive*, to 5, *very attractive*). Scores for these items were summed ($M = 10.6$, $SD = 2.01$). Finally, adolescents reported their height (in feet and inches) and their weight (in pounds); these were used to calculate body mass index (BMI; $M = 22.4$ kg/m^2, $SD = 4.45$). On the basis of previous research with this data set (Halpern, King, Oslak, & Udry, 2005; Halpern, Waller, Spriggs, & Hallfors, 2006), I included attractiveness and BMI in my analyses as indices of an adolescent's opportunity for sexual activity.

Demographic factors in adulthood. At Wave IV, participants reported their annual household income, using a scale from 1 (*less than $5,000*) to 12 (*$150,000 or more; M* = 7.94, corresponding to approximately $40,000–$49,000; $SD = 2.66$). Participants also reported whether they had completed high school (graduated with a high school diploma, earned a high school equivalency degree, or earned another certificate of completion; yes: 94.1%, no: 5.9%) and whether they had completed college (attained a bachelor's degree or higher; yes: 23.6%, no: 76.4%). Finally, they rated their degree of religiousness by responding to five items assessing frequency of attendance at religious services and other religious activities, importance of religious faith, frequency of private prayer, and reliance on religious beliefs for help. Responses were made using 5-point scales, with higher scores indicating greater religiousness (Cronbach's α = .86). Scores for these items were summed to produce a composite religiousness score ($M = 11.41$, $SD = 6.14$).

Data analysis

Analyses were conducted using the PROC GENMOD procedure in the SAS software program. Data on categorical outcomes were analyzed using logistic regression, and effects are presented as odds ratios (*OR*s). Data on relationship dissatisfaction and number of romantic partners were analyzed using negative binomial models to account for positive skew. Standard errors for all models were corrected using generalized estimating equations to account for nonindependence of observations nested within sibling pairs.

Models were estimated in three steps. First, I estimated the phenotypic association between timing of first sex and relationship outcomes,[2] without using statistical controls or family-based information (but correcting for nonindependence of observations). This association is analogous to the "raw" association that would be observed in a sample of unrelated persons. Second, I constructed pair-level averages for early first sex and for late first sex by averaging the scores of siblings in each pair, which resulted in pairwise variables with values of 0 (e.g., neither sibling's timing of first sex was early), .5 (e.g., one sibling's timing of first sex was early), or 1 (e.g., both siblings' timing of first sex was early). I also constructed individual-level deviation scores by subtracting the pairwise average from each individual's score, which resulted in individual-level variables with values of –.5 (e.g., the individual's timing of first sex was not early, but that of his or her sibling was), 0 (e.g., the individual and his or her sibling were concordant for early timing of first sex), or .5 (e.g., the individual's timing of first sex was early, but that of his or her sibling was not).

The second, family-based set of analyses used these pairwise averages and individual-level deviation scores as predictors. The effect of the pairwise average is the *between-family effect*, indicating whether relationship-based experiences in adulthood differ between members of families in which at least one sibling's first sex was early or late and members of families in which all siblings' first sex was on time. Notably, this association is confounded by genetic and environmental-selection factors that vary between families. The effect of the individual-level deviation is the *within-family effect*, indicating whether siblings who differ in their timing of first sex have significantly different experiences in relationships in adulthood. Unlike the between-family effect, the within-family effect controls for genetic and environmental "third variables" that are shared by siblings raised in the same home, and thus constitutes a stronger test of the causal relationship between the timing of first sex and relationship outcomes in adulthood.

Third, I added a number of statistical controls to the models, including variables relevant to participants' opportunities for sexual activity in adolescence (attractiveness, BMI, and involvement in dating) and demographic variables in adulthood (religious participation, educational attainment, and household income). The key question to be addressed using

these models was whether the within-family effect of timing of first sex was attenuated or eliminated once these covariates were included in the model.

Results

Phenotypic analyses

Results from the phenotypic analysis are summarized in Table 2. As illustrated in Figure 1, for both males and females who experienced late first sex, the likelihood of ever having cohabited with a nonmarital partner was substantially reduced. In contrast, for both males and females who experienced early first sex, the likelihood of ever having cohabited with a nonmarital partner was significantly increased, and among females who experienced early first sex, the odds of ever having married were reduced. Both males and females who experienced early first sex reported an increased number of romantic partners, whereas males and females who experienced late first sex reported a reduced number. Finally, among both males and females currently in a marriage or cohabiting relationship, late timing of first sex was associated with reduced levels of relationship dissatisfaction, with a small but significant effect size (Cohen's $d \approx 0.3$).

Sibling comparisons plus statistical covariates

Associations between timing of first sexual intercourse and sexual opportunity during adolescence. As shown in Figure 2, individuals who initiated sex after adolescence were about half as likely to report being involved in a dating relationship at Wave I as were individuals whose first sexual intercourse was early or on time. However, this lack of romantic and sexual involvement does *not* appear to have been due to unattractiveness. On average, males who lost their virginity late were rated by interviewers to be as attractive as males who lost their virginity on time and more attractive than early initiators. Females who lost their virginity late were rated to be more attractive, on average, than those who lost their virginity either early or on time. Finally, males who reported early first sex had the highest average BMI, whereas females whose first sex was on time reported the lowest average BMI.

Associations between timing of first sexual intercourse and demographic factors in adulthood. Consistent with previous findings, our results revealed a broad array of demographic differences among the early, on-time, and late groups. As shown in Figure 3, African American adolescents, Native American adolescents, and adolescents of "other" races and ethnicities were the most likely to report early timing of first sex (31%, 33%, and 36%, respectively), whereas White adolescents were the least likely to report early timing of first sex (19%). Asian Americans were the most likely to report late timing of first sex (30%), and African American and Native American adolescents were the least likely to report late timing of first sex (9% and 4%, respectively).

Figure 4 presents the remaining associations between timing of first sex and demographic variables; I have separated these associations by race-ethnicity to demonstrate that they are not artifacts of racial-ethnic differences. As expected, later

Table 2. Phenotypic Associations Between Age at First Sex and Relationship Outcomes in Early Adulthood

	Group			Effect size	
Relationship outcome	Early first sex	On-time first sex	Late first sex	Early vs. on-time first sex	Late vs. on-time first sex
Ever married (%)					
Males	47.1	47.2	43.2	*OR* = 1.00	*OR* = 0.83
Females	47.0	57.0	51.2	*OR* = 0.70*	*OR* = 0.79
Ever cohabited with partner (%)					
Males	62.9	52.0	26.7	*OR* = 1.51*	*OR* = 0.37*
Females	65.0	53.4	22.4	*OR* = 1.59*	*OR* = 0.26*
Mean number of romantic partners					
Males	4.05 (7.75)	3.13 (4.45)	1.65 (1.51)	*d* = 0.17*	*d* = –0.38*
Females	3.12 (1.92)	2.59 (2.30)	1.56 (1.18)	*d* = 0.23*	*d* = –0.48*
Relationship dissatisfaction					
Males	13.4 (5.21)	13.3 (5.54)	11.9 (4.80)	*d* = 0.02	*d* = –0.26*
Females	14.3 (6.82)	13.8 (6.38)	11.9 (5.19)	*d* = 0.07	*d* = –0.31*

Note: Standard deviations are shown in parentheses. Data for males and females were analyzed separately. Scores for relationship dissatisfaction ranged from 0 to 28, with higher scores indicating greater dissatisfaction. *OR* = odds ratio.
*$p \leq .05$.

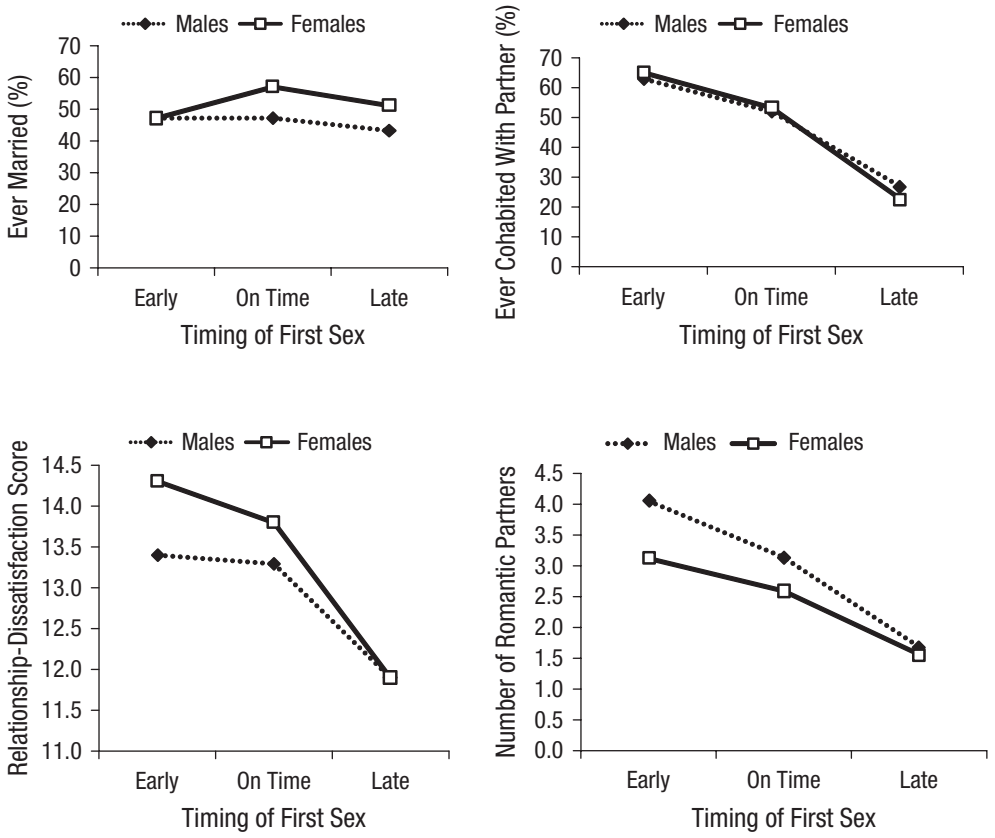

Fig. 1. Union formation, number of romantic partners, and relationship dissatisfaction in young adulthood by timing of first sex. Scores for relationship dissatisfaction ranged from 0 to 28, with higher scores indicating greater dissatisfaction.

first sex was associated with higher educational attainment, particularly among White and Asian American individuals. Later first sex was also associated with higher household income and greater religiousness in adulthood.

Because the pattern of associations with timing of first sex was highly consistent across males and females in the phenotypic analyses, subsequent sibling comparisons combined males and females into a single set of analyses but included

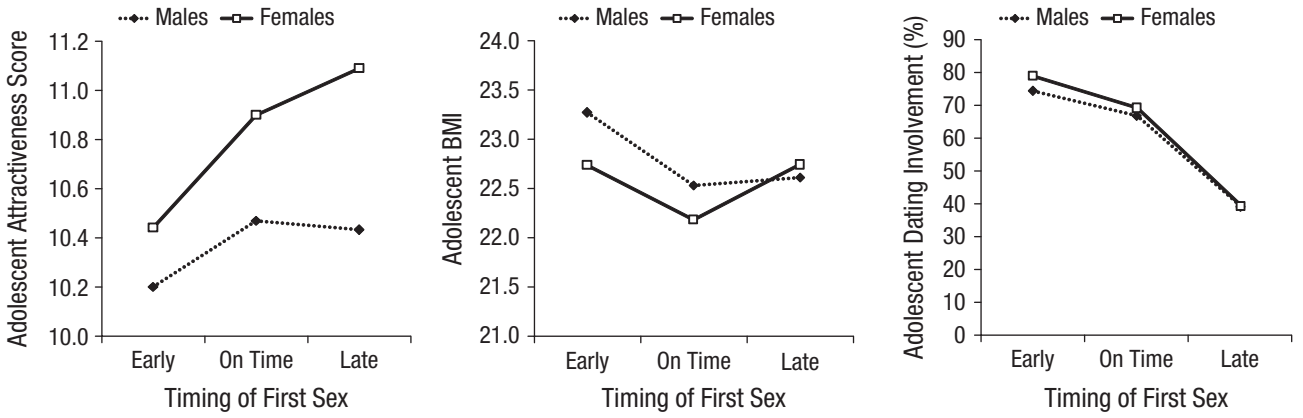

Fig. 2. Attractiveness, body mass index (BMI; kilograms/meter^2), and involvement in dating relationships during adolescence as a function of timing of first sex. Scores for attractiveness ranged from 3 to 15, with higher scores indicating greater attractiveness.

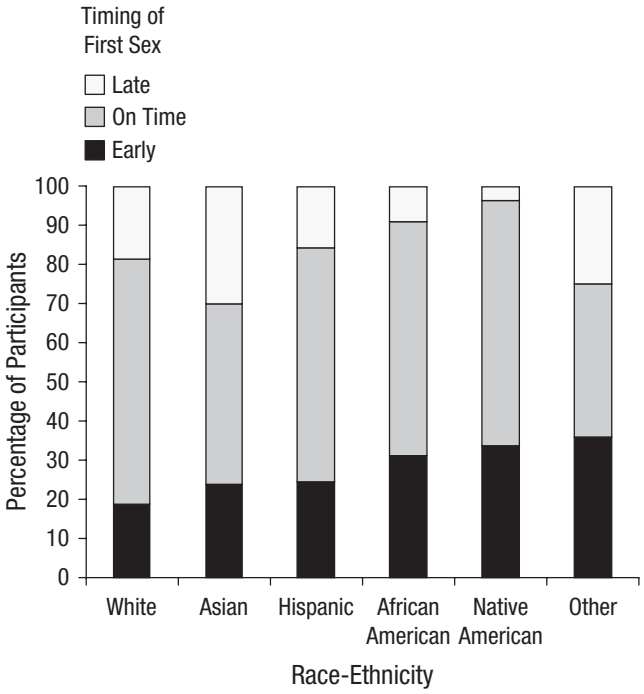

Fig. 3. Timing of first sexual intercourse as a function of race-ethnicity.

gender as a statistical covariate. Follow-up analyses indicated that interaction parameters with gender were consistently nonsignificant (full results are available upon request), so they are not presented here.

Marriage. Results from sibling-comparison models of marriage are summarized in Table 3. Neither the between-family effect nor the within-family effect for early timing of first sex was significantly associated with likelihood of marriage; however, both the within-family and between-family effects for late timing of first sex were associated with decreased odds of marriage. That is, if only one sibling in a pair had lost his or her virginity late, that individual's odds of having married were 0.62 times those of his or her sibling. Including statistical covariates in the models did not change the estimated within-family effect of late timing of first sex.

Nonmarital cohabitation. Results from sibling-comparison models of cohabitation are summarized in Table 4. The between-family effects of both early and late classifications for timing of first sex were significant. The odds of nonmarital cohabitation for individuals from families in which at least one sibling's first sex had been early were 1.37 times greater than those for individuals from families in which neither sibling's first sex had been early. Even more strikingly, the odds of nonmarital cohabitation for individuals from families in which at least one sibling's first sex had been late were 3 times *lower* (*OR* = 0.31) than those for individuals from families in which neither sibling's first sex had been late. However, the within-family effect for early timing of first sex was not significant, indicating that the difference between early and on-time initiators was due to genetic or environmental confounds that differed between families. In contrast, the within-family effect for late timing of first sex was significant: The odds of nonmarital cohabitation for individuals who had lost their virginity late were almost half (*OR* = 0.63) those of their siblings who had not. Again, including adult demographic outcomes in the model did not change the estimated within-family effect of late timing of first sex.

Number of romantic partners. Results from sibling-comparison models for number of romantic partners are summarized in Table 5. Compared with individuals from sibling pairs concordant for on-time first sex, individuals from sibling pairs concordant for early timing of first sex had 1.3 times more romantic partners, whereas individuals from sibling pairs concordant for late timing of first sex had about half (0.57 times) the number of romantic partners. There was a significant within-family effect for late timing of first sex, such that for sibling pairs in which one sibling's first sex had been late and the other's had been early or on time, the later-initiating individual reported nearly half (0.61 times) the number of romantic partners as his or her sibling.

Relationship dissatisfaction. Results for sibling-comparison models of relationship dissatisfaction are summarized in Table 6. Because the models used negative binomial regression, parameters are presented as exponentiated regression coefficients. Neither the between-family effects nor the within-family effects of early timing of first sex were significant, which indicates that individuals who lose their virginity relatively early (before age 15) and those who lose their virginity during high school (between the ages of 15 and 19) do not differ in their relationship satisfaction in young adulthood. Rather, the significant effect was specific to late timing of first sex. Compared with their siblings who lost their virginity during their teens, individuals who delayed sexual intercourse until after adolescence reported 0.81 times as much relationship dissatisfaction in their late 20s.

Discussion

This article presents analyses of longitudinal data from more than 1,500 sibling pairs followed from midadolescence through the end of young adulthood. Two results are notable. First, the timing of adolescents' first sexual intercourse predicted the quality and stability of their romantic relationships in young adulthood. Although researchers have typically focused on the putative consequences of early initiation of sexual activity, individuals in the current study who lost their virginity relatively early (before age 15) were largely indistinguishable from individuals who lost their virginity later in adolescence (between the ages of 15 and 19). Moreover, the phenotypic association between early timing of first sex and nonmarital cohabitation did not persist when siblings were

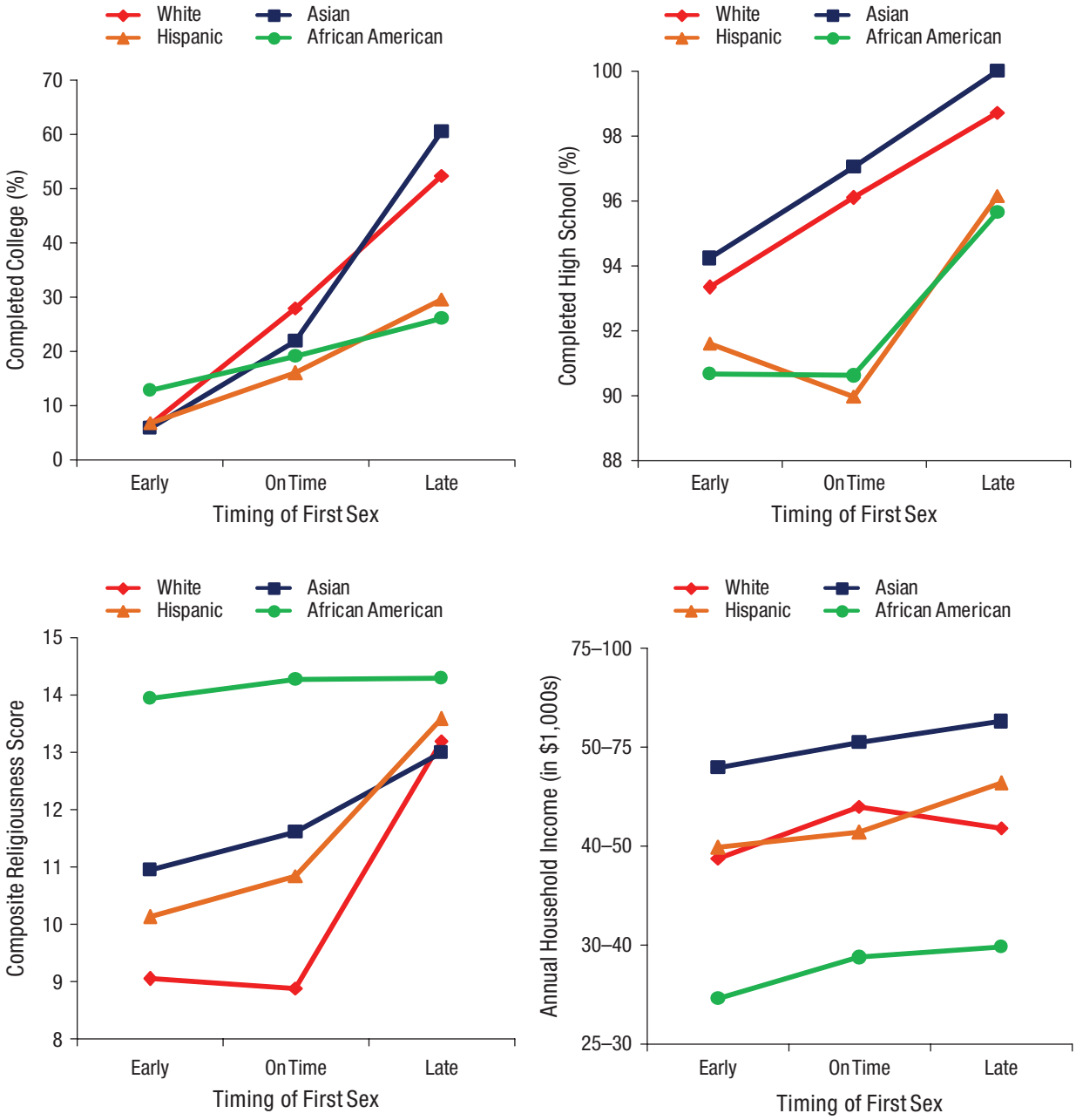

Fig. 4. Demographic outcomes in adulthood as a function of timing of first sexual intercourse and race-ethnicity. Composite religiousness scores ranged from 0 to 25, with higher scores indicating greater religiousness.

compared, which indicates that this association was due to between-family confounds. In contrast, later timing of first intercourse (after age 19) was associated with lower odds of entering into any type of romantic union in young adulthood and with fewer romantic partners. In addition, among participants who were married or in cohabiting unions, those whose first sexual intercourse had been late reported significantly less dissatisfaction with their relationship than did individuals who had lost their virginity during their teenage years. Thus, although the timing of adolescents' sexual experiences predicted aspects of their relationships in adulthood, this effect appears to have been driven not by early timing of first sex as a "risk" factor, but rather by late timing of first sex as a "protective" factor.

Second, the associations between late timing of first sex and relationship outcomes in adulthood were robust to both methodological and statistical controls. Notably, even when siblings who were discordant for timing of first sex were compared, delayed loss of virginity (i.e., after adolescence) was significantly associated with decreased relationship dissatisfaction. Moreover, this association could not be accounted for by differences in educational attainment, income, or religiousness

Table 3. Odds Ratios From Sibling-Comparison Models of the Association Between Timing of First Sex and Marriage

Predictor	Sibling-comparison model	Sibling-comparison model with demographic covariates
Age	1.27 [1.20, 1.32]*	1.24 [1.18, 1.32]*
Female (compared with male)	1.58 [1.33, 1.87]*	1.49 [1.24, 1.81]*
Minority race-ethnicity (compared with White)		
Asian American	0.85 [0.60, 1.20]	0.61 [0.41, 0.92]*
African American	0.31 [0.25, 0.39]*	0.26 [0.20, 0.34]*
Hispanic	0.80 [0.63, 1.01]	0.68 [0.52, 0.89]*
Native American	0.94 [0.53, 1.69]	1.01 [0.52, 1.96]
Other race	0.91 [0.32, 2.42]	1.31 [0.31, 5.47]
Attractiveness in adolescence	—	1.03 [0.98, 1.07]
BMI in adolescence	—	1.01 [0.99, 1.03]
Dating involvement in adolescence	—	1.15 [0.94, 1.41]
Completed high school	—	0.77 [0.51, 1.15]
Completed college	—	0.63 [0.51, 0.78]*
Household income	—	1.20 [1.15, 1.24]*
Religiousness	—	1.07 [1.06, 1.09]*
Between- vs. within-family effects for timing of first sexual intercourse		
Between-family effect, early first sex	1.09 [0.80, 1.47]	1.13 [0.81, 1.59]
Within-family effect, early first sex	1.09 [0.80, 1.49]	1.02 [0.72, 1.45]
Between-family effect, late first sex	0.72 [0.54, 0.98]*	0.60 [0.43, 0.84]*
Within-family effect, late first sex	0.61 [0.44, 0.84]*	0.62 [0.43, 0.89]*

Note: Values in brackets are 95% confidence intervals. Attractiveness, body mass index (BMI), and dating involvement were measured at Wave I. Completion of high school and college, household income, and religiousness were measured at Wave IV. Between-family effects reflect differences between sibling pairs in which at least one sibling's timing of first sex was early or late and sibling pairs in which both siblings' first sex had been on time. Within-family effects reflect differences between siblings from sibling pairs discordant for early or late first sex.
*$p \leq .05$.

in adulthood or by differences in dating involvement, BMI, or attractiveness in adolescence. Together, the sibling-comparison design and use of demographic controls provided a strong test of the association between sexual experiences (or lack thereof) in adolescence and romantic relationships in adulthood.

Nevertheless, there are methodological limitations to using the Add Health sample that are worth noting. Specifically, at the most recent survey assessment, participants were about 30 years old on average, and only half had married or cohabited with a romantic partner. Consequently, it remains unclear whether the observed associations would persist into middle adulthood. Timing of first sex may be a relevant predictor of levels of relationship dissatisfaction relatively early in life but not necessarily of longer-term trajectories of relationship quality or of romantic relationships initiated after early adulthood. Future research is necessary to examine how sexual experiences in adolescence are related to the quality of romantic relationships across adulthood. In addition, the current analyses used data for siblings of various degrees of genetic relatedness, and thus remained confounded by the genetic differences between nontwin siblings. An even stronger test would be to examine the association between timing of first sex and relationship outcomes in young adulthood within only monozygotic twin pairs; however, Add Health did not include a sufficient number of monozygotic twins for this analysis to have adequate power.

Moreover, the precise mechanisms by which late timing of first sex is associated with low relationship dissatisfaction remain unknown. At least two types of explanations, not mutually exclusive, are viable. First, late timing of first sex may be a marker for an intrapersonal characteristic, such as a secure attachment style (Belsky, Houts, & Fearon, 2010; Senchak & Leonard, 1992) or strong self-regulatory ability (Moffitt et al., 2011), that has environmentally mediated effects on both sexual delay and relationship quality. Individuals may also differ in their "pickiness" regarding romantic and sexual partners, such that some individuals are reluctant to enter into or maintain intimate relationships unless those relationships are highly satisfying. Alternatively, earlier and later timing of first sex may result in different interpersonal experiences in adolescence that influence relationships in adulthood. For example, an individual who forgoes sex and dating entirely during adolescence may avoid early experiences of relational aggression or victimization, which would otherwise have deleterious effects on relationship functioning in adulthood. In addition, individuals who first navigate intimate relationships in young adulthood, after they have accrued cognitive and emotional

Table 4. Odds Ratios From Sibling-Comparison Models of the Association Between Timing of First Sex and Nonmarital Cohabitation

Predictor	Sibling-comparison model	Sibling-comparison model with covariates
Age	1.00 [0.96, 1.05]	1.01 [0.95, 1.06]
Female (compared with male)	0.98 [0.83, 1.16]	1.01 [0.85, 1.22]
Minority race-ethnicity (compared with White)		
Asian American	0.62 [0.40, 0.95]*	0.80 [0.52, 1.22]
African American	1.49 [1.22, 1.83]*	1.67 [1.33, 2.11]*
Hispanic	1.16 [0.92, 1.48]	1.29 [1.00, 1.67]
Native American	1.24 [0.71, 2.18]	1.44 [0.78, 2.65]
Other race	0.63 [0.24, 1.65]	0.64 [0.18, 2.32]
Attractiveness in adolescence	—	0.97 [0.93, 1.01]
BMI in adolescence	—	0.99 [0.97, 1.01]
Dating involvement in adolescence	—	1.36 [1.11, 1.67]*
Completed high school	—	0.71 [0.48, 1.05]
Completed college	—	0.66 [0.53, 0.91]*
Household income	—	0.91 [0.88, 0.94]*
Religiousness	—	0.95 [0.94, 0.97]*
Between- vs. within-family effects for timing of first sexual intercourse		
Between-family effect, early first sex	1.66 [1.24, 2.21]*	1.37 [1.01, 1.86]*
Within-family effect, early first sex	1.29 [0.94, 1.77]	1.25 [0.89, 1.76]
Between-family effect, late first sex	0.22 [0.16, 0.31]*	0.31 [0.21, 0.43]*
Within-family effect, late first sex	0.55 [0.40, 0.75]*	0.63 [0.43, 0.93]*

Note: Values in brackets are 95% confidence intervals. Attractiveness, body mass index (BMI), and dating involvement were measured at Wave I. Completion of high school and college, household income, and religiousness were measured at Wave IV. Between-family effects reflect differences between sibling pairs in which at least one sibling's timing of first sex was early or late and sibling pairs in which both siblings' first sex had been on time. Within-family effects reflect differences between siblings from sibling pairs discordant for early or late first sex.
*$p \leq .05$.

Table 5. Odds Ratios From Sibling-Comparison Models of the Association Between Timing of First Sex and Number of Romantic Partners

Predictor	Sibling-comparison model	Sibling-comparison model with covariates
Age	1.02 [1.00, 1.04]*	1.02 [1.00, 1.05]
Female (compared with male)	0.82 [0.75, 0.90]*	1.24 [1.11, 1.38]*
Minority race-ethnicity (compared with White)		
Asian American	0.81 [0.67, 0.96]*	0.86 [0.71, 1.04]
African American	1.29 [1.15, 1.45]*	1.35 [1.19, 1.54]*
Hispanic	1.04 [0.93, 1.17]	1.04 [0.92, 1.18]
Native American	1.00 [0.81, 1.23]	0.99 [0.80, 1.22]
Other race	0.93 [0.67, 1.30]	0.76 [0.52, 1.11]
Attractiveness in adolescence	—	1.01 [0.98, 1.04]
BMI in adolescence	—	1.00 [0.99, 1.01]
Dating involvement in adolescence	—	1.14 [1.01, 1.29]
Completed high school	—	1.02 [0.88, 1.19]
Completed college	—	0.87 [0.79, 0.96]
Household Income	—	0.98 [0.96, 1.00]
Religiousness	—	0.99 [0.98, 1.00]
Between- vs. within-family effects for timing of first sexual intercourse		
Between-family effect, early first sex	1.30 [1.05, 1.61]*	1.29 [1.01, 1.65]*
Within-family effect, early first sex	1.11 [0.99, 1.25]	1.13 [0.99, 1.28]
Between-family effect, late first sex	0.57 [0.49, 0.66]*	0.68 [0.49, 0.95]*
Within-family effect, late first sex	0.61 [0.44, 0.83]*	0.68 [0.49, 0.95]*

Note: Values in brackets are 95% confidence intervals. Attractiveness, body mass index (BMI), and dating involvement were measured at Wave I. Completion of high school and college, household income, and religiousness were measured at Wave IV. Between-family effects reflect differences between sibling pairs in which at least one sibling's timing of first sex was early or late and sibling pairs in which both siblings' first sex had been on time. Within-family effects reflect differences between siblings from sibling pairs discordant for early or late first sex.
*$p \leq .05$.

Table 6. Exponentiated Regression Coefficients From Sibling-Comparison Models of the Association Between Timing of First Sex and Relationship Dissatisfaction

Predictor	Sibling-comparison model	Sibling-comparison model with demographics
Age	1.03 [1.00, 1.06]*	1.03 [1.00, 1.07]*
Female (compared with male)	1.05 [0.96, 1.16]	1.09 [0.98, 1.20]
Minority race-ethnicity (compared with White)		
Asian American	0.82 [0.67, 1.00]*	0.85 [0.69, 1.04]
African American	1.16 [1.03, 1.31]*	1.15 [1.01, 1.31]*
Hispanic	1.10 [0.96, 1.26]	1.04 [0.91, 1.20]
Native American	1.41 [1.08, 1.84]*	1.29 [0.99, 1.68]
Other race	0.95 [0.64, 1.42]	0.81 [0.46, 1.43]
Relationship type (marriage vs. nonmarital cohabitation)	0.96 [0.87, 1.06]	0.98 [0.89, 1.08]
Attractiveness in adolescence	—	0.99 [0.96, 1.01]
BMI in adolescence	—	1.01 [1.00, 1.02]*
Dating involvement in adolescence	—	1.01 [0.91, 1.13]
Completed high school	—	0.91 [0.75, 1.11]
Completed college	—	0.78 [0.69, 0.88]*
Household income	—	0.98 [0.96, 1.01]
Religiousness	—	0.99 [0.98, 1.00]*
Between vs. within-family effects of timing of first sexual intercourse		
Between-family effect, early first sex	1.03 [0.88, 1.21]	0.94 [0.80, 1.11]
Within-family effect, early first sex	1.13 [0.95, 1.35]	1.10 [0.92, 1.31]
Between-family effect, late first sex	0.79 [0.66, 0.95]*	0.87 [0.73, 1.05]
Within-family effect, late first sex	0.75 [0.61, 0.93]*	0.81 [0.65, 1.00]*

Note: Values in brackets are 95% confidence intervals. Attractiveness, body mass index (BMI), and dating involvement were measured at Wave I. Completion of high school and college, household income, and religiousness were measured at Wave IV. Between-family effects reflect differences between sibling pairs in which at least one sibling's timing of first sex was early or late and sibling pairs in which both siblings' first sex had been on time. Within-family effects reflect differences between siblings from sibling pairs discordant for early or late first sex.
*$p \leq .05$.

maturity, may learn more effective relationship skills than individuals who first learn scripts for intimate relationships while they are still teenagers. These possibilities remain speculative hypotheses to be explored in future research.

Although indicators of financial and social capital are commonly integrated into models of relationship quality, sexual experiences during adolescence are rarely considered. Yet in the current study, late timing of first sex was nearly as predictive of relationship dissatisfaction as having a college degree, and it was more predictive of relationship dissatisfaction than a $10,000 change in annual income. Overall, these results underscore the utility of adopting a life-span approach to the study of romantic relationships, given that sexual or romantic experiences in an earlier part of the life span—particularly adolescence—may help explain the quality and stability of people's relationships in adulthood.

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Notes

1. Of the original Wave I participants who were eligible for follow-up (i.e., who were not deceased, out of the country, or on active military duty), 80.3% were interviewed at Wave IV. Attrition was due to investigators' inability to locate or contact participants

(7.79%), participants' inability to complete the interview due to mental or physical incapacity or language barrier (2.57%), participants' refusal to participate (9.09%), or another, unspecified reason (0.28%). Participants reported their age at first sexual intercourse at all assessment waves; thus, in many cases, individuals' timing of first sex could be properly classified as early, on time, or late even if they failed to participate in all waves. For example, if an adolescent reported at Wave I that he had sex at age 14, his timing of first sex could be classified as early even if he was not interviewed at subsequent waves. Consequently, few individuals were missing data for timing of first sex (n = 4; 0.12% of the sample). Brownstein et al. (2011) used data on health-risk behaviors, substance use, and antisocial behavior from Wave I to estimate bias due to nonresponse. Bias was calculated as the difference in prevalence of each behavior between responders and nonresponders, weighted by the nonresponse rate. In almost all cases, bias did not exceed 1%. That is, Wave IV respondents and nonrespondents were not markedly different in terms of their health and risk behaviors in adolescence. However, nonresponse was significantly associated with gender, race-ethnicity, and socioeconomic status, all of which were controlled for in the analyses reported here. To check whether the results of these analyses were biased by nonresponse at Wave IV, I created five multiply imputed data sets in SAS, which replaced missing values for relationship outcomes in adulthood with a range of plausible values that captured the uncertainty surrounding the "true" values. Each of the imputed data sets was analyzed as described in the Method section, and the parameter estimates from each data set were combined using PROC MIANALYZE. Notably, the key effect identified in this article (i.e., the within-family effect of late timing of first sex) was essentially unchanged. Compared with the parameter values reported in Tables 3 through 6, the parameter values estimated using multiple imputation differed by 1.5% to 3.2%, depending on the outcome, and remained significant in all cases ($p <$ .05). Complete parameter estimates for all models based on multiply imputed data sets are available upon request.

2. Analyses of union formation (i.e., entry into a marriage or cohabiting relationship) as a function of timing of first sex used data from all participants. Analyses of relationship dissatisfaction as a function of timing of first sex used data only from participants who were in an intact marriage or cohabiting relationship.

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