Running Head: SEXUAL PARTNERING – AGES 16 TO 26

Biological Sex, Mature Appearance, Alcohol Use and Dating as Correlates of

Sexual Partner Accumulation from Ages 16 to 26
Abstract

Purpose. To determine growth in sexual partnering from age 16 to 26, and to test whether biological and social factors launched these growth patterns.

Methods. A prospective design was used. Participants were 176 young people followed from birth to age 26 (47% female). Sexual partnering was measured as the accumulated number of different sexual intercourse partners at ages 16, 19, 23, and 26. Physical appearance of maturity, alcohol use and dating were measured at ages 13 to 16 via observations, interviews and questionnaires.

Results. Mature appearance at age 13, using alcohol more than monthly at age 16, and a history of a steady romantic partner before age 16 were each associated with a greater number of sexual intercourse partners by age 16. However, a more mature appearance, more frequent alcohol use and greater dating involvement did not foreshadow a steeper accumulation of sexual partners between ages 16 and 26. Only biological sex had such a “growth” influence, with males accruing sexual partners more rapidly from the ages of 16 to 26 when compared to females.

Conclusions. Although adolescents had accumulated a higher number of sexual partners by age 16 when they looked older, drank alcohol more frequently and were more involved with dating in early to middle adolescence, only being male, as compared to female, was associated with accumulating sexual partners more rapidly between age 16 and 26. In addition, there was little indication that the accumulation of different sexual partners had begun to slow by age 26 for the average participant.
Keywords: sexual behavior; dating; longitudinal studies; substance use; pubertal maturation; adolescent development; emerging adulthood; peer relationships
There were two aims of the current longitudinal study. The first aim was to determine the average pattern of sexual partnering during an 11-year period spanning the later teenage years through emerging adulthood (ages 16 to 26). Sexual partnering was measured as the accumulated number of sexual partners and was assessed at ages 16, 19, 23, and 26. We focused on the ages of 16 to 26 because late adolescence and emerging adulthood are times of life when sexual partner changes are likely to peak for most people. Our second aim was to investigate biological sex, physical maturation, alcohol use, and dating behavior as individual difference factors that launch age-related growth trajectories of sexual partnering. A “launch” effect has been defined as a factor that is in place before or at the start of a developmental progression and is associated with growth over time. Our selection of both biological and social factors as influential in sexual behavior was founded in theories and empirical evidence that draw attention to the importance of both biological and experiential correlates of sexual behavior patterns.

It has been found that higher sexual risk behaviors are earlier onset of sexual behavior, a higher number of different sexual partners, and inconsistent condom use, and these behaviors covary during adolescence. The age of first sexual intercourse has been positively associated with the number of sexual partners reported by adolescents. More specifically, in two studies, the number of sexual partners accumulated by age 15 or age 14-17 was associated with having first sex by age 15 or age 16, respectively. Nevertheless, in developmental studies of adolescent sexual behaviors, the focus has been most often on investigating the correlates of sexual intercourse debut (particularly early
debut defined as before age 15 or 16 and/or defined relative to the sample\textsuperscript{15-17}) rather than on the accumulation of different sexual partners.\textsuperscript{8,9}

There have only been a small number of longitudinal studies with data on the antecedents and correlates of “sexual partnering.”\textsuperscript{18-21} To our knowledge, repeated assessments of the number of different sexual intercourse partners over time have been analyzed in only one of these longitudinal studies of adolescents. In this study, Tubman et al.\textsuperscript{20} followed over 1000 young people from the age of 16 to age 18. In their middle to upper income sample of U.S. adolescents living in suburban New York, 3\% of all males and 2\% of all females had four or more sexual partners by age 16, and 10\% of males and 6\% of females had four or more sexual partners by age 18. Groups with different patterns of sexual partnering also were identified and compared. The group with multiple sexual intercourse partners (12\% of adolescents) had elevated levels of a number of behavioral, social and emotional problems. This study provides important information about the variety of patterns of sexual intercourse and partner switching during adolescence, and the risk associated with accumulating a higher number of sexual partners during adolescence. However, the study was limited to two years of follow-up, did not examine growth patterns of sexual partnering over time, and grouped adolescents for comparison rather than modeling early correlates of sexual partnering trajectories. This means that there is little available information on patterns of sexual partnering over more than a two-year period of time, and there has been no investigation of the correlates of sexual partnering growth trajectories. The accumulation of different sexual partners is an important behavior, because of its links with other sexual risk-taking behavior\textsuperscript{19-22}, and potential to increase exposure to physical health (sexually transmitted infections),\textsuperscript{23}
social, emotional and economic problems (e.g., unplanned pregnancy, evidence of problems with relationship formation).^{24}

Data on sexual partnering was first collected at age 16 and follow-ups were repeated until participants were age 26. We had two aims in the current longitudinal study. The first aim was to identify the average pattern of sexual partnering from age 16 to 26 using growth curve modeling. The second aim was to test expected associations of sexual partnering trajectories with two biological and two experiential factors. We focused on four factors including biological sex, physical maturation level in the early teens, alcohol use at age 16, and romantic partner formation. Although other correlates of adolescent sexual behavior have been identified, these four factors were the focus in the following hypothesis, because their consistent associations with adolescent sexual intercourse debut even after accounting for many other potential covariates.^{9}

The first hypothesis concerned biological sex differences. Boys were expected to have accumulated more sexual partners by age 16, compared to girls (a gender difference in age 16 intercepts) and to accumulate partners more rapidly than girls from ages 16 to 26 (a gender difference in slopes of growth trajectories). Males have been found to accrue a higher number of sexual intercourse partners during adolescence when compared to females, but there have been few studies and the evidence is not consistent.^{13,25}

The second hypothesis focused on the appearance of physical maturity as a correlate of sexual partnering trajectories. Adolescents who appear more physically mature than others can prompt responses from the social environment that include opportunities for romantic and sexual behavior.^{10,26} Yet, we could find no previous study of associations between maturity of appearance (or pubertal maturation) and number of
sexual partners in adolescence. This is surprising given the theories that emphasis pubertal development and related aspects of physical maturation for understanding sexual behavior\textsuperscript{27,28} and the multiple studies that have found significant associations between pubertal timing and onset of sexual intercourse.\textsuperscript{8,9,13,14,19} In this study, it was expected that individuals who looked more physically mature at age 13 than others would have accumulated more sexual partners at age 16 than others. Yet, because there has been no previous study, it was unclear whether growth in sexual partnering would escalate more rapidly for those who look relatively more mature at age 13 compared to others.

Although still understudied, there was more evidence supporting the third hypothesis that adolescent alcohol use would be associated with the accumulation of sexual intercourse partners. Significant associations between alcohol use and sexual partnering were reported in two longitudinal studies that used path models,\textsuperscript{18,21} in one study of adolescents age 16 to 18,\textsuperscript{20} and in one study of girls.\textsuperscript{29} We expected that adolescents who used alcohol more frequently at age 16 would report a greater number of different sexual partners at age 16 than those who used less alcohol. We also expected that greater alcohol use would be associated with more rapid accumulation of sexual partners between the ages of 16 and 26.

The final hypothesis was focused on the formation of couple relationships and sexual partnering. One of the strongest correlates of sexual intercourse behavior during adolescence is dating involvement.\textsuperscript{6-9} In a previous study, a link between dating and sexual behavior had been found, with an earlier onset of the first steady romantic relationship associated with a greater number of sexual partners at age 19.\textsuperscript{21} In addition, recent theory suggests a link between earlier couple formation and greater accumulation
of sexual partners over time.\textsuperscript{30} Hence, compared to other adolescents, we expected that adolescents who had their first steady couple relationship before age 16 would 1) report more sexual partners by age 16 and 2) accumulate partners more rapidly over time.

Method

Participants

Participants were 176 (47\% female, 66\% of the original sample of 267) firstborn children of mothers living in poverty and receiving prenatal care in the Minneapolis Health Department.\textsuperscript{31} Most participants had Caucasian/white mothers (85\%). Other participants had Black mothers (14\%) or mothers from other ethnic minority groups (2\%). At the time of the birth of the participants, 41\% of mothers had not graduated from high school, 37\% had a high school diploma, and the remainder had attended university. Most mothers were single (61\%), whereas 27\% were married; others were divorced, widowed or separated. Mothers ranged in age from 15 to 34 (age $M = 20.5$, $SD = 3.6$).

Data on the children were collected from birth, with the first data on sexual behavior collected when the children were age 16. The participants included in the current study were those who reported their history of sexual partners at age 16. Some individuals were missing data at ages 19 ($n = 2$), 23 ($n = 21$), and/or 26 ($n = 12$). These missing repeated measures data were imputed using procedures available within SPSS. These procedures are used to estimate missing data based upon other data for the individual subject and data from other participants for that variable at that point in time.

By age 2, 212 families (80\%) remained in the longitudinal study, with residential mobility being the primary reason for attrition prior to age 2. About 79\% of the participants have been retained since the age of 2. To assess whether the sample of 176
adolescents was representative of the original 267 participants, we compared
demographic data between the study participants and those who were excluded because
of early attrition or non-participation at age 16. There were no differences in age of
mother, $M (SD) = 20.6 (3.5)$ vs. $20.4 (3.8)$; mother educational level, $M (SD) = 11.9 (1.7)$
vs. $11.4 (1.9)$; socioeconomic status, $M (SD) = 50.5 (10.0)$ vs. $49.1 (10.1)$; percentage
with single mothers, $64.4\%$ vs. $58.9\%$; and percentage female, $43\%$ vs. $46\%$. One
difference between those maintained in the longitudinal sample and those lost to follow-
up was found; a larger percentage of retained participants had white mothers when
compared to those lost to follow-up, $84.7\%$ and $69.2\%$, respectively, $\chi^2 = 8.7$, $p < .01$.

Measures

Sexual partnering. Participants reported their cumulative lifetime number of sexual
partners at ages 16, 19, 23, and 26. Response options at age 16 were 0 (none), 1 (one), 2
(2 to 5), 3 (6 to 10), and 4 (more than 10). Response options at ages 19, 23 and 26 were 0
(none), 1 (one), 2 (2 to 5), 3 (6 to 10), and 4 (11 to 20), and 5 (more than 20). There were
few participants at the top end of these scales; $6\%$ of participants reported more than 10
sexual partners at age 16 and $4\%$ reported more than 20 sexual partners at age 26. All
values were recoded to the lower end of the range for analyses, so values ranged from 0
to 11 at age 16, and from 0 to 21 at ages 19, 23 and 26. This recoding was done to
provide growth trajectories that better represented actual numbers of sexual partners at
age 16 and accrued over time, rather than reported growth trajectories based upon the
original response scales. However, results of all analyses were similar when means values
of each category or responses on the original scale were used in analyses.
Appearance of physical maturity, age 13. Seven senior undergraduate and graduate students were trained to observe and assess adolescents’ appearance of physical maturity. Assessments were done after observing videotaped parent-adolescent interaction tasks conducted when participants were age 13. Most adolescents were observed standing and sitting. Voice and physical characteristics, including adult features, breast development and body proportions, were considered in rating adolescents from 1 (very immature appearance) to 6 (very mature appearance). Extensive descriptions of each response level and practice were used to anchor ratings. The independent coders (3 male and 4 female undergraduate students) rated the adolescents on physical maturity. Mature appearance scores were calculated by averaging the ratings of all coders. The intraclass correlation of ratings among coders ($n=7$) was .64.

Although the intraclass correlation was adequate, there was some difference between male and female raters, which is reflected in this modest intraclass correlation. Males rated participants as less mature than females did, $t(175) = -2.9, p < .01$. However, when scores from male raters were averaged separately from those from female raters, the correlation between ratings was $r = .87$. In addition, we had more confidence in this measure because, as would be expected, the mature appearance rating was significantly negatively correlated with age of first menstruation, $r = -.40, p < .001, n = 70$. Also as would be expected, girls appeared more mature on average than boys, girls $M = 3.5$ ($SD = 0.9$), boys $M = 2.7$ ($SD = 0.9$), $t(175) = 5.6, p < .01$.

To compare sexual partnering growth trajectories between groups of adolescents who appeared older, younger or average at age 13 compared to others, we formed three groups based on quartile ranges. Adolescents in the first group were in the highest
quartile (physical maturity scores > 3.70, \( n = 47 \)) and appeared older than other participants. Adolescents in the second group were in the lowest quartile (physical maturity scores < 2.30, \( n = 46 \)) and were younger in appearance than others. Adolescents in the other two middle quartiles were in the third group, labeled "average" (\( n = 83 \)). Boys had scores ranging from 1.1 to 5.3, with 20% in the older appearance group and 30% in the younger appearance group. Girls had scores that ranged from 1.4 to 5.7, with 31% in the older appearance group and 21% in the younger appearance group.

**Frequency of alcohol use, age 16.** As part of the Adolescent Health Survey (described in Blum et al.\(^{32}\)), adolescents reported frequency of alcohol use by answering the following question: “How often do you use the following (without a doctor telling you to)?” using the response topics of 0 (never), 1 (less than monthly), 2 (monthly) 3 (more than monthly) 4 (weekly), 5 (daily). Frequency of alcohol use was the sum of two items that assessed consumption of beer/wine in one question, and consumption of hard liquor in the second question, making the possible range 0 to 10.

Two groups were formed to compare the sexual partnering growth trajectory of adolescents who used more alcohol to the trajectory of other adolescents with lower levels of alcohol use at age 16. The first group included those adolescents who were in the top quartile of alcohol use (a score of 4 or more indicating monthly or more frequent alcohol use, \( n = 46 \)). The second group included all other adolescents with lower levels of alcohol use at age 16 (\( n = 130 \)).

**Romantic relationship history.** Participants completed audiotaped interviews about dating and romantic relationships when they were age 16. Part of the interview included the collection of a history of dating, boyfriends/girlfriends, steady romantic relationships,
and length of past and current romantic relationships. From this interview, we constructed a dichotomous variable to indicate whether each participant had a history of a steady romantic relationship prior to age 16 or not. The majority of participants reported a first steady romantic partner before age 16, \( n = 125, 71\% \).

**Procedure**

At age 13, the primary assessment was a parent-adolescent interaction videotaped task that required attendance at the research laboratory. At ages 16, 19, 23, and 26, participants spent a day at the laboratory completing interviews and questionnaires or, in minority of cases, research assistants visited their homes. Participants and their family members were provided with monetary compensation for their time.

**Data Analysis**

The primary analyses were conducted with Hierarchical Linear Modeling (HLM).\(^{33}\) This multilevel modeling procedure accounts for the nonindependence of the repeated measures, such as the measures of sexual partnering collected in the current study. In these models, time (age) was coded 0 for age 16, 3 for age 19, 7 for age 23, and 10 for age 26, and time and sexual partnering were modeled as a level 1 variables nested within participant, a level 2 variable. We also tested for curvilinear patterns over time (e.g., a steeper incline earlier than later or vice versa) by entering time\(^2\) as a covariate. When time\(^2\) was regressed on the repeated measure of number of sexual partners, the association was not significantly larger than 0, \( p = .45 \). This indicated that there was not a more rapid accumulation of partners either earlier or later between the ages of 16 and 26. Hence, time\(^2\) was not entered as a covariate in the main models reported below.
The results of four mixed models are reported. One model was used to test each of the four study hypotheses. The first model compared patterns of sexual partnering between males and females. After accounting for differences between males and females, the final three models compared patterns of sexual partnering between participants who 1) looked younger, average or older than others at age 13, 2) used more or less alcohol at age 16, and 3) had or had not formed a steady couple relationship at age 16, respectively.

Results

Patterns of Sexual Partnering over Time for Males and Females

Model estimates showed that males and females reported an average of about 1.79 and 1.06 sexual partners at age 16, respectively, and this was not a significant sex difference, $p = .11$ (see Figure 1 for an illustration of observed patterns over time). On average, males had more rapid accumulation of sexual partners than females, with males accumulating about 1.04 and females accumulating .70 new partners per year from age 16 to 26, $p < .05$. Hence, the average male added just over one new sexual partner every year from age 16 to 26, whereas the average female accumulated between about 2 or 3 new sexual partners every three years, on average.¹

Mature Appearance and Biological Sex as Correlates of Sexual Partnering Over Time

Next, we estimated a growth model with mature appearance at age 13 and biological sex as fixed effects. Mature appearance was coded to compare participants who looked the most and the least mature to those who were average. Figure 2 shows

¹ White and nonwhite participants also were compared, but when gender was accounted for there were no significant differences in intercepts or slopes between these two groups, age 16 intercept $p = .12$, slope from age 16 to 26 $p = .37$. Because of this, white versus nonwhite groups were not examined further. Given the evidence that the difference in sexual behavior may be between Black and nonblack², a larger sample size is needed than was available here so that the combination of gender and race/ethnicity can be considered.
observed male and female patterns of sexual partnering for adolescents who were most mature in appearance at age 13, least mature, and about average compared to their peers in this study. Table 1 provides the results of HLM that estimated sexual partnering patterns as associated with two fixed effects – biological sex and maturity of appearance at age 13. After accounting for biological sex, participants who had the most mature physical appearance had accumulated more sexual partners at age 16 than those who were average, \( p < .05 \), and males who had the most mature appearance at age 13 had more sexual partners at age 16 than other groups (see Figure 2). However, there were no significant differences in growth rates of sexual partnering over time when mature appearance levels at age 13 were compared.

*Alcohol Use and Biological Sex as Correlates of Sexual Partnering Over Time*

Our next model included alcohol use at age 16 and biological sex as fixed effects. Table 1 provides the results of HLM that estimated sexual partnering patterns as associated with two fixed effects – biological sex and alcohol use reported at age 16. Figure 3 illustrates observed sexual partnering over time within four groups of adolescents. These groups are based on biological sex and compare those who used alcohol at least monthly at age 16 to those who used alcohol less often. Figure 3 also shows the estimated intercepts and slopes of sexual partner growth trajectories for these four groups. After considering biological sex, participants who used alcohol most frequently reported a significantly higher number of sexual partners at age 16 than others, \( p < .01 \), and males who used alcohol monthly or more often clearly stood out as having had a greater number of different sexual partners at age 16. This group difference was maintained up to age 26. Nevertheless, this was only a difference in the number of sexual
intercourse partners at each age; alcohol use was not significantly associated with a steeper or flattened accumulation of partners from ages 16 to 26 (i.e., there was no alcohol use group difference in growth curve slopes), $p = .54$.

*Romantic History and Biological Sex as Correlates of Sexual Partnering Over Time*

Our final growth curve model included romantic partner history at age 16 and biological sex as fixed effects. Table 1 provides the HLM results and Figure 4 shows observed male and female patterns of sexual partnering over time within four groups of adolescents. These groups are based on biological sex and compare those who had their first romantic partner before age 16 to other participants. After considering biological sex, participants who reported romantic partners prior to age 16 had a significantly higher number of sexual partners at age 16 than others, $p < .01$, but, just as was found in analyses of all other individual difference factors, there was no association of romantic partner history with the growth rates of sexual partnering from ages 16 to 26, $p = .30$.

**Discussion**

The findings of the current study show that maturity of appearance at age 13, using alcohol more than monthly at age 16, and having a first steady couple relationship before age 16 are all factors that are associated with a greater number of different sexual intercourse partners reported at age 16. Additionally, it was the group of males who looked older at age 13 and who consumed alcohol the most frequently at age 16 that clearly stood out from other groups of participants by having accumulated a higher number of sexual partners by age 16 and in every three year increment up to age 26.

However, in this study these biological and social forces did not foreshadow a steeper accumulation of different sexual intercourse partners between the ages of 16 and
26. This means that young people who appear more mature in early adolescence and engage in drinking and steady dating have accrued a greater number of different sexual intercourse partners by age 16 than other adolescents, but they do not engage in any more rapid or repeated partner switching throughout the remaining teen years and during emerging adulthood than other young people. It is important to note a methodological strength here that is different from many past studies in this area. Multiple assessment methods were used to determine maturity of appearance, alcohol use and romantic involvement. Maturity of appearance was based on an observational assessment, whereas alcohol use was based on adolescent self-report and romantic involvement was based on individual interviews with each participant about their dating experiences. This use of different methods would reduce the concern that all associations found here were overly and similarly influenced by shared method variance.

These findings of associations between sexual partnering, appearance, alcohol use and dating must be considered along with whether an individual is male or female. In this study, biological sex did not have an association with the number of different sexual intercourse partners reported at age 16, although there was a slight trend toward males having a more diverse history of sexual partners than females. Rather, biological sex had a “launch” influence; males more rapidly accrued new sexual partners from the ages of 16 to 26 when compared to females.

Having sexual intercourse relatively early in adolescence is often considered a risk behavior because it is associated with increased rates of sexually transmitted infections and unintended pregnancy. In recent years, researchers have realized that studying behaviors that may be more closely aligned with risk, such as partner switching
and inconsistent contraceptive use, is as important as studying correlates of the age of first sexual intercourse. The current study findings add to this direction in research and suggest three important considerations about sexual partnering and risk across adolescence and emerging adulthood.

First, earlier first sexual intercourse and a greater history of partner switching at age 16 does not seem to be indicative of escalating partner switching into the later teen years and the 20s. When we categorized adolescents by particular biological or social factors known to be associated with earlier onset of sexual intercourse behavior during adolescence, no subgroup had a significantly different rate of accrual of different sexual intercourse partners than any other subgroup, with the exception of males when compared to females. Yet, subgroups of young people did have higher or lower numbers of sexual partners at each age, and this difference stayed fairly consistent across the ages of 16 to 26. This means that young people who engage in risk behavior during the middle teen years do not necessarily engage in even riskier behavior in the later teens and 20s. Future research could focus on the correlates of a reduction in the accrual of sexual partners below the levels found here – what accounts for a reduction of the accrual of about 1 partner per year for males and a rate of about 2 partners every three years for females? Is a reduced growth rate associated with romantic involvement and commitment and are there other factors, which are important to consider? In the current study, we found no evidence of a slowing of this growth rate by the age of 26 (i.e., we found no evidence of an inverted-U shaped growth trajectory), so it is unclear from these data when during the life course this rate of growth in the accumulation of different sexual intercourse partners may slow in the average male and female.
Although adolescent sexual risk behavior does not seem to get “riskier” with increasing age, in this relatively high risk group of participants partner switching did not dissipate by age 26, on average, either. This is a second consideration for understanding patterns of sexual risk behavior over the adolescent and emerging adult years. These findings indicate that interventions targeted at teens to reduce sexual risk behavior also may be just as appropriate and necessary in the later teen years and into emerging adulthood. Future studies might expand on this by examining patterns of contraceptive use over a similar age period in order to help guide the content of interventions and the groups that could benefit the most from continued access to advice and clinical services. Most important to consider is the evidence that young people may stop the consistent use of condoms when they are in steady relationships or discontinue other types of contraception (e.g., the contraceptive pill) when they end steady relationships. Relationship dissolution and formation seem to be frequent social experiences of young people at least until the age of 26, and this means that inconsistent contraceptive use and switching methods may continue to be common throughout the early 20s.

A third consideration is inspired by a limitation of this study. Sexual partnering was the focus in this study, rather than considering other sexual behaviors that may come with risks for physical, social or psychological health. Such behaviors that have been identified in other bodies of research include earlier age of sexual intercourse debut and inconsistent condom use. This research has shown that these behaviors do covary, so understanding the patterns of multiple sexual risk behaviors over time and their antecedents and correlates is an important direction for future research.
References


Table 1

Results of Multilevel Modeling of the Number of Sexual Intercourse Partners from Ages 16 to 26 (N = 176)

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Table 1 continues on the next page.
Table 1, continued

Results of Multilevel Modeling of the Number of Sexual Intercourse Partners from Ages 16 to 26 \((N = 176)\)

\*\(p < .05\). \**\(p < .01\).

*Note.* As an example, physical appearance at age 13 was dummy coded to compare those with the most mature appearance to those who were observed to be average, and to compare those with the least mature (young) appearance to those who were average. This shows that the average intercept of the growth trajectory was 1.69 and the average slope was 1.06 for males with an average mature appearance. To get values for females with an average appearance add the \(B\) for Intercept to the \(B\) for Intercept-Sex \((1.69 + -1.01)\) and the \(B\) for Slope to the \(B\) for Slope-Sex \((1.06 + -.34)\). Similar strategies are used to get values for
Figure 1. Average intercepts, slopes and patterns of sexual intercourse partnering from ages 16 to 26 for all participants and for males and females.
Figure 2. Average patterns of sexual intercourse partnering from ages 16 to 26 for males and females who were most mature in appearance, average and least mature in appearance at age 13.
Figure 3. Average intercepts, slopes and patterns of sexual intercourse partnering from ages 16 to 26 for all males and females who used alcohol more than monthly versus less than monthly.
Figure 4. Average intercepts, slopes and patterns of sexual intercourse partnering from ages 16 to 26 for males and females who had their first steady romantic partners before age 16 versus at age 16 or later