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Associations Between Changing Developmental Contexts and Risky Sexual Behavior in the Two Years Following High School

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Abstract

The present study tested associations between common developmental contexts (relationship involvement, independent living, college attendance, work) and risky sexual behavior (casual sex, inconsistent condom use, high-risk sex) across the two years following high school. Data were drawn from the Raising Healthy Children project, and included 801 participants aged 18–21 years. Longitudinal analyses, which controlled for early sexual debut, high school substance use, and high school grades, showed that living with a parent was protective against all three sexual risk behavior outcomes (ORs about 0.70). Being in a romantic relationship was associated with a lower probability of casual sex, but a higher probability of inconsistent condom use. Attending college was associated with a lower probability of high-risk sex (OR = 0.67). Working was not related to the sexual risk behaviors examined. Levels of sexual risk behavior showed little change across the two years following high school. Findings from this study suggest that developmental context may affect young adults' engagement in risky sexual behavior. Programs aimed at promoting sexual health and reducing risk behaviors for STIs among young adults should consider targeting those in romantic relationships, those not living with parents, and those not attending college. Further, to develop effective prevention programs for these targeted youth, it is critical that we understand the mechanisms leading to risky sex in these groups.

Keywords

early adulthood; risky sex; developmental context; condom use

INTRODUCTION

The late teens and early twenties comprise a period of heightened risk behavior (Arnett, 2000, 2005), including sexual risk behavior that increases the likelihood of contracting sexually transmitted infections (STIs) (Bearinger & Resnick, 2003; Centers for Disease Control and Prevention, 2003a; Dariotis et al., 2008). In fact, STI prevalence is highest in this age group (Centers for Disease Control and Prevention, 2003a). For example, national estimates from data collected in 2008 suggest that the prevalence of Chlamydia is as high as 5%–20% among women and 2%–12% among men aged 16–24, depending on region (Centers for Disease Control and Prevention, 2009). Data from 2003–2004 suggest that the prevalence of high risk and lower risk types of human papillomavirus is about 28% and 30%, respectively, among women aged 20–24 (Dunne et al., 2007). The transition out of high school marks a period of role exploration and change for many young people. Rapid

changes in developmental context, including exit from the parental home, formation of romantic relationships, and entrance into college and/or work, are common during this period, and may influence sexual behaviors that carry risk for STIs. Understanding how developmental contexts are related to sexual risk behavior among young adults may help in designing and targeting prevention programs aimed at promoting healthy and reducing risky sexual behaviors during this period of heightened risk. Using longitudinal data, this study tested the associations of living situation, romantic relationship status, college attendance, and work with risky sexual behavior across the two years following high school.

Developmental Contexts and Sexual Risk Behavior

Prior longitudinal research has suggested a general pattern of sexual risk behavior that increases from mid-adolescence to late adolescence and the early 20s and decreases again in the mid-20s among men (Darios et al., 2008). Although we were unable to find longitudinal studies on patterns of sexual risk behavior among women during this age range, cross-sectional data on sexual behavior and STI incidence suggest that this pattern holds for women as well (Centers for Disease Control and Prevention, 2003a, 2003b). The peak in risky sexual behavior in the late teens and early 20s coincides with the normative process of role expansion and experimentation that occurs in young adulthood (Arnett, 2000, 2005). Role expansion and experimentation entail participation in multiple new developmental contexts, often including committed romantic relationships, independent living, post-secondary education, and full- or part-time work. Few published studies have investigated how normative changes in developmental context are related to sexual risk behavior in the transition out of high school.

Past research has identified parental monitoring as a key predictor of sexual risk behavior in adolescence (Longmore, Manning, & Giordano, 2001; Miller, Benson, & Galbraith, 2001). Thus, it is plausible that leaving the parental home—and the watchful eyes of parents—also may be associated with increased sexual risk behavior in early adulthood. We were able to find few studies that tested this hypothesis, however, and existing findings were mixed and largely based on college student samples. One study found cross-sectional, negative associations between parental monitoring and young adult sexual risk behavior in a sample of undergraduates and their parents, but the association differed according to whether the child or the parent reported on monitoring (Padilla-Walker, Nelson, Madsen, & Barry, 2008). Another study found that a measure of perceived parental monitoring and caring predicted lower numbers of sexual partners and less unsafe sex in the first few months of college (Wetherill, Neal, & Fromme, in press), but it was unclear whether monitoring or perceived caring or their combination was driving the association. Dalton and Galambos (2009) reported a positive, zero-order correlation between living away from parents and oral and penetrative sex among first year college students, but did not test this association in multivariate models as the focus of their study was elsewhere. In a study including both college and noncollege youth, living with a parent in the fall following high school was associated with a lower probability of engaging in casual sex compared to not living with a parent [Odds Ratio (OR) = 0.70], but this relationship was not significant when early sexual debut and substance use and grades during high school were controlled (Bailey, Fleming, Henson, Catalano, & Haggerty, 2008).

Existing studies have suggested that participation in committed romantic relationships may be protective in terms of some sexual risk behaviors, but pose a risk in terms of others. Specifically, committed romantic relationships have been associated with lower rates of casual sex and partner concurrency (Bailey et al., 2008; Cooper, Shapiro, & Powers, 1998). Rates of inconsistent condom use, however, frequently have been higher among those in relationships than among those not in relationships. Given that romantic relationships during this developmental stage are characterized by turnover (Corbin & Fromme, 2002),

inconsistent condom use, even in the context of a “committed” relationship, may be risky. Much prior research in this area has been cross-sectional and has not examined the within-person association between relationship status and sexual risk behavior across time.

Although many studies of risky sex and contraceptive use have included academic attainment as a predictor of these behaviors and others have examined patterns of sexual risk behavior among college students, we are aware of only one prior study that examined contextual effects of current college attendance versus nonattendance on sexual risk behavior. Based on the literature linking college attendance to increased risk behavior in the form of heavy episodic, or binge, drinking (White & Jackson, 2004/2005; White, Labouvie, & Papadaratsakis, 2005; White et al., 2006), one might expect college students to report higher levels of sexual risk behavior than nonstudents. A prior, cross-sectional study using the present sample, however, found that college attendance (either two- or four-year college) was associated with a lower probability of reporting both casual and unprotected sex in the fall following high school (Bailey et al., 2008). Further, college students also have been found to report less marijuana use than nonstudents (White et al., 2005; White et al., 2006). Thus, it is possible that college attendance may be associated with less sexual risk behavior, perhaps because going to college reflects a commitment to education and corresponding norms that encourage prosocial behavior (Catalano & Hawkins, 1996; Hawkins & Weis, 1985).

Another functional task during this developmental period is participation in work. We were unable to find published studies testing associations between participation in full- or part-time work and sexual risk behavior in either young adulthood or in adolescence. Prior studies have demonstrated links between participation in part-time work and increased levels of other risk behavior (e.g., substance use and antisocial behavior) among high school students (Bachman, Safron, Sy, & Schulenberg, 2003; Breslin & Adlaf, 2005; Valois, Dunham, Jackson, & Waller, 1999). It is possible that part-time work may continue to be associated with risk behavior, including sexual risk behavior, after young people leave high school. Conversely, the move to full-time employment in young adulthood is thought to reduce the probability of substance use and other risk behaviors, because it reflects the move toward adult roles (e.g., worker, provider) (Bachman, Wasdsworth, O’Malley, Johnston, & Schulenberg, 1997) and may reflect a commitment to prosocial norms favoring constructive engagement and financial independence among adults (Catalano & Hawkins, 1996; Hawkins & Weis, 1985).

A Competing Explanation

Although some prominent theories of young adult development have highlighted the roles of rapidly changing developmental contexts and the assumption of adult roles in influencing young adult behavior (Arnett, 2000, 2005; Bachman et al., 1997), others have suggested continuity of behavior across developmental periods (Catalano & Hawkins, 1996; Hawkins & Weis, 1985; Masten et al., 2005). Thus, it also is possible that patterns of sexual risk behavior in the two years following high school are simply the continuation of patterns begun during earlier adolescence. Further, adolescent risk behavior, especially substance use, has been associated with a lower probability of college attendance (King, Meehan, Trim, & Chassin, 2006). These adolescent risk behaviors also may be associated with the probability of leaving the parental home, being in a romantic relationship, and participating in full- or part-time work. The continuity hypothesis (Schulenberg, Maggs, & O’Malley, 2003) provides an important counterargument to the idea that changing developmental contexts may play a role in increased sexual risk behavior during early adulthood.

The Present Study

The present study tested associations of young adult developmental contexts, including living with a parent, being in a romantic relationship, attending college, and working full- or part-time, with risky sexual behavior across the first two years following high school in a contemporary sample. It made use of data collected at six month intervals in order to capture the rapid changes in context that occur during this developmental period, a strength not found in larger, nationally representative datasets. This work extends existing literature by testing associations that largely have been unexplored to date and builds on prior work with this sample by using longitudinal data to examine within-person change over time. Substance use, grades, and sexual risk behavior during high school were included in statistical models to test the behavioral continuity hypothesis from adolescence to young adulthood. Based on theory and existing literature, we hypothesized that being in a romantic relationship would be related to a lower likelihood of casual sex and a higher likelihood of inconsistent condom use. We expected that living with a parent, participating in full-time work, and attending college would be associated with a lower probability of sexual risk behavior. Participation in part-time work was expected to predict a higher probability of sexual risk behavior. Finally, we expected the probability that young adults would engage in sexual risk behavior to increase across the two years following high school.

METHODS

Participants

The present study included data from 801 youth participating in the Raising Healthy Children (RHC) project, a longitudinal study of students drawn from 10 public schools in a suburban Northwest school district. RHC is an ongoing study of the etiology of positive and problem behaviors. A total of 938 first- and second-grade students and their families (76% of those eligible) consented to participate in the project in the fall of 1993. An additional 102 students who had transferred to the study schools were enrolled in the fall of the subsequent year (total project N = 1040). Data were collected annually in the spring through grade 12 and semiannually for two years [fall (Time 1), spring (Time 2), fall (Time 3), spring (Time 4)] beginning in the fall after the final year of high school for each of the two grade cohorts. These six-month data collection intervals were implemented in order to capture rapid changes in behavior and context during the transition out of high school. The ethnic composition of the original sample was 81% White, 7% Asian or Pacific Islander, 4% Hispanic, 4% African American, and 3% Native American. The sample was gender balanced (47% female). Approximately 29% of participants experienced economic hardship in childhood, as evidenced by their receipt of free or reduced price school lunch in the first year of the project. Respondents averaged about 18 years of age at Time 1 and 19.5 years of age at Time 4.

Attrition and exclusion accounted for the reduction in sample size from the available 1040 respondents to the 801 respondents included here. About 94% (n = 979) of the original sample participated in at least one of the four semiannual data collection interviews. Attrition was not related to gender, ethnicity, or low-income status at baseline. Participants who were married, divorced, or separated at any of the four semiannual interviews (n = 53: 15 at Time 1, 23 at Time 2, 43 at Time 3, 38 at Time 4) were excluded because married individuals are extremely unlikely to use condoms and because the number of individuals who were divorced or separated by age 21 was too small to permit reliable analyses. Participants who had been held back and were still in high school in the fall following what should have been their senior year (n = 13), and participants who reported exclusively same-sex partners across the four waves (n = 10) were also excluded. Because numbers of African American, Hispanic, and Native American participants were too small to permit reliable

analysis and generalizable conclusions ($n < 40$ of any one group) and because we felt that combining these ethnic categories into an “other ethnicity” group would be uninformative, only White and Asian American participants were included in the analyses presented here.

Procedures

Study questionnaires and procedures were approved by the University of Washington Human Subjects Review Board. Parents gave written consent for themselves and the target child at the start of the study. The parental consent form described the longitudinal nature of the study, and served to permit children to participate until they reached the age of 18. Before the age of 18, children gave written assent each year. After age 18, they gave consent, either in writing or over the internet at each survey time point. The 12th-grade and most semiannual spring surveys were administered in person between March and August using a combination of Computer-Assisted Personal Interviewing (CAPI) and Computer-Assisted Self Interviewing (CASI). Participants self-administered sensitive questions, including those about sexual behavior. Semiannual surveys occurring in the fall were administered between September and December, with a small number of interviews ($< 5\%$) completed in January of the next calendar year. At each semiannual fall interview and the final semiannual spring interview for the younger cohort, about half of the sample completed the survey over the Internet and half were interviewed using the combined CAPI/CASI technique described above. A randomized trial of this method indicated no differences in rates of reported sexual activity or risk behavior by survey mode (McMorris et al., 2009).

Measures

Sexual risk behavior—Participants self-reported their sexual risk behavior at each of the semiannual interviews that followed their 12th-grade year, hereafter referred to as Time 1 (T1), Time 2 (T2), Time 3 (T3), and Time 4 (T4). Three dimensions of risk were assessed: (1) sex with multiple and/or casual partners; (2) inconsistent condom use for acts of vaginal or anal intercourse; and (3) high-risk sex defined below. All questions referred to the month prior to the interview. A *casual sex* variable was based on whether a respondent reported that they (1) had sex with someone they did not “consider to be a boyfriend or girlfriend, that is [outside of] an exclusive relationship,” (2) had sex with a partner the respondent had known for less than two weeks, or (3) had more than one sexual partner in the prior month. A measure of *inconsistent condom use* was based on whether the respondent reported having either vaginal or anal intercourse without “always” using a condom. This dichotomous measure was used, as opposed to an available categorical measure of the frequency of condom use, because even infrequent acts of unprotected intercourse may have carried increased risk for STI acquisition during this age period when STI prevalence among both respondents and their likely partners was at its peak. A *high-risk* variable was created based on whether participants reported having both casual and unprotected sex or reported that they had sex with a man who had sex with other men, with a partner who was HIV positive, or with an intravenous drug user.

Developmental context—Four developmental contexts were examined: residential status, romantic relationship status, college attendance, and work. These contexts were measured at each semiannual wave, and all were based on self-report. Residential status was based on whether participants reported living with a parent (coded as 1) or not (e.g., alone, with roommates; coded as 0) at the time of each interview. Romantic relationship status was dichotomized: being involved in a relationship was coded as 1 and not being involved in a romantic relationship was coded as 0 at the time of each interview. College status variables were based on enrollment in a two- or four-year college (coded as 1) or no college enrollment (coded as 0) at the time of each interview. Two- and four-year college attendance were collapsed following preliminary analyses suggesting that both were related in highly

similar ways to sexual risk behavior outcome variables. Two mutually exclusive dummy variables indicating involvement in full-time work and involvement in part-time work were created. Work was categorized as full-time (> 30 hours per week), part-time (1–30 hours per week), or no work in the month prior to each interview.

Prior risk behavior variables—Academic grades were self-reported by participants in Grades 9–12. These reports were averaged to obtain a measure of high school grade point average (GPA). A dichotomous high school substance use variable was created by combining participant self-reports of any heavy episodic drinking (i.e., consuming 5+ drinks in a two-hour period) or any marijuana use in Grades 9–12. Participants who reported either type of substance use received a score of 1, and those who did not report either type of substance use received a score of 0. A dichotomous early sexual debut variable was constructed based on respondents' self-reports. Participants reporting sexual debut before the spring of Grade 9 were considered to have had early sex (coded as 1); those who had not had sex for the first time by the spring of Grade 9 received a score of 0. Participants averaged 15 years of age when the sexual debut question was asked, and national data indicate that fewer than 20% of U.S. teens report having had sexual intercourse by age 15 (Abma, Martinez, Mosher, & Dawson, 2004), making the age 15 cutoff for early sex coding appropriate.

Demographic control variables—Past research has shown that the prevalence of contraceptive use and outcomes associated with sexual risk behavior, including STI, varies by ethnicity and gender (Abma et al., 2004; Santelli, Lowry, Brener, & Robin, 2000). Therefore, it was important to include these variables in statistical models. Ethnicity was taken from school records at the outset of the study. As noted above, the sample did not include sufficient representation of African Americans, Native Americans, or Hispanics to allow generalizable conclusions to be drawn. Therefore, a dummy variable indicating Asian American or White ethnicity was created (Asian or Pacific Islander coded as 1, White coded as 0) and members of other ethnic groups were dropped. Gender was self-reported by participants, and was indexed by a dichotomous variable (male coded as 1, female coded as 0).

Analysis

A series of multilevel models was estimated using HLM for Windows software (version 6.06) (Congdon, Raudenbush, & Bryk, 2005–2009; Raudenbush, Bryk, Cheong, & Congdon, 2004) to test study hypotheses. Multilevel models enable the examination of between-individual differences in within-individual change over time and account for correlation among measurement occasions associated with having multiple measurements nested within persons (Raudenbush & Bryk, 2002). Thus, they are ideally suited to testing hypotheses of differences in patterns of behavior across time between individuals or groups. Because outcome variables were dichotomous, models were estimated using a logit link function. For each risky sexual behavior outcome, a series of two models was estimated. Model 1 tested for unique associations between the developmental contexts and the risky sexual behavior (i.e., casual sex, inconsistent condom use, and high-risk sex) while controlling gender and ethnicity. Model 2 added early sex, high school GPA, and high school substance use in order to determine whether any associations between the context variables and the risky sex outcome remained significant. Thus, Model 2 tested the alternative hypothesis of continuity in risk behavior from high school into young adulthood. Time and time-squared terms were tested in all models in order to examine possible nonlinear patterns of change in sexual risk behaviors over time. Time-squared terms never reached statistical significance and were not included in the models below. A linear time term was retained.

A portion of participants (54%) received a preventive intervention in grades 1 through 12, and the study design included two age cohorts. Details of the intervention have been reported previously (Catalano et al., 2003; Haggerty, Catalano, Harachi, & Abbott, 1998). Although the current study is not focused on examining intervention or cohort effects, it was important to establish the acceptability of pooling all participants in analyses. In multilevel models, we tested for differences in the prevalence of sexual risk behavior between intervention and control group participants and between younger and older cohort group members (not shown). We found no evidence of intervention effects or cohort differences on risky sexual behavior intercepts or slopes. Therefore, all analyses were based on the pooled sample.

Due to changes in the survey between the final time point for the older cohort and the final time point for the younger cohort one year later, one of the indicators of casual sex (sex outside a committed relationship) was unavailable for the younger cohort at the final time point. The other two indicators of casual sex (known partner less than two weeks, multiple partners) were available for all participants at all time points. About 34.8% of the sample was missing information on the sex outside a committed relationship variable. This was by far the highest proportion missing on any variable in the analysis. Overall, only 6% of the 41,652 (801 participants x 52 variables) data points were missing. Therefore, we used multiple imputation in order to make use of all the data that were not missing (Graham & Hofer, 2000; Graham, Hofer, Donaldson, MacKinnon, & Schafer, 1997; Rubin, 1987; Schafer, 1997; Schafer & Olsen, 1998). This strategy minimizes bias in parameter estimates and standard errors more effectively than alternative strategies such as listwise deletion or mean substitution. We used NORM software to impute “sex outside a committed relationship” scores for the younger cohort at Time 4 that were then used--along with the non-missing data for the other two indicators of casual sex--to create a casual sex score at Time 4 for this cohort. We imputed 20 datasets,^a and used the batch processing feature available with HLM for Windows to estimate and average the results from the separate datasets. Because the older cohort was not missing data for any of the casual sex indicator variables, we also estimated the final casual sex model (Casual Sex Model 2) using the older cohort only, and conclusions were identical to those presented below.

RESULTS

Descriptive Findings

Table I presents the prevalence of the developmental context variables at each time point. Participants reported changing levels of exposure to key developmental contexts from Time 1 to Time 4. Specifically, the prevalence of living with a parent decreased from 60% to 48%. There was a small increase in the prevalence of romantic relationship involvement and a small decrease in the reported prevalence of college attendance. The prevalence of part-time work involvement remained relatively stable across the four time points, and the prevalence of full-time work increased from 30% to 43%. About 64% of participants reported substance use in high school, and 18% reported early sexual debut. High school academic performance averaged 3.8 (SD .84, 1 = Mostly Fs, 2 = Mostly Ds, 3 = Mostly Cs, 4 = Mostly Bs, 5 = Mostly As). Table I also shows the prevalence of casual sex, inconsistent condom use, and

^aThe imputation model included 52 variables. Time-invariant variables included gender, ethnicity, age at study entry, experimental condition, cohort, early sexual debut, high school drug use, and high school GPA. A number of time-varying variables also were included, all measured at Time 1, Time 2, Time 3, and--with the exception of sex outside a committed relationship for the younger cohort--Time 4: sexually active/nonactive, multiple partners, sex outside a committed relationship, sex with a partner known less than two weeks, inconsistent condom use, sex with a high-risk partner, romantic relationship status, college attendance, living arrangement, full-time work, and part-time work. The imputation model converged in 65 iterations. Two thousand imputations were performed, with one dataset saved every hundred imputations, following ~2 x EM-convergence rule (Graham & Hofer, 2000), for a total of 20 datasets.

high-risk sex at each of the four young adult time points. The prevalence of casual sex decreased slightly from 21% to 18%. The prevalence of inconsistent condom use increased from 33% at Time 1 to 40% at Time 4. Between 12% and 14% reported high-risk sex at each of the four time points. Table II presents the prevalence of risky sexual behavior by developmental context over the four time periods.

Developmental Context Models

Table III displays the results of a simultaneous, multilevel regression analysis including all developmental contexts examined in this study. Living with a parent was uniquely related to the probability of reporting all three sexual risk behavior outcomes. Young adults who lived with a parent were less likely to report casual sex (OR = 0.78, Casual Sex Model 2), inconsistent condom use (OR = 0.69, Inconsistent Condom Use Model 2), and high-risk sex (OR = 0.75, High-Risk Model 2) than those who did not live with a parent, even when early sexual debut, high school substance use, and high school grades were controlled. Being in a romantic relationship showed a significant, negative association with engaging in casual sex (OR = 0.41, Casual Sex Model 2) and a significant, positive association with inconsistent condom use (OR = 5.86, Inconsistent Condom use Model 2) when controlling gender, ethnicity, high school risk behavior, and academic performance. Relationship status was not associated with high-risk sex. Significant associations between college attendance and the probability of casual sex (OR = 0.60, Casual Sex Model 1) and inconsistent condom use (OR = 0.55, Inconsistent Condom Use Model 1) did not persist when controls for early sexual debut, high school grades, and high school substance use were included. Attending college was associated with a lower likelihood of reporting high-risk sex (OR = 0.45, High-Risk Model 1). This relationship did persist when high school control variables were added to the model (OR = 0.67, High-Risk Model 2). Neither full-time work nor part-time work was associated with any of the risky sex outcome variables. Although Asian Americans had a significantly lower probability of engaging in all three sexual risk behaviors when early sexual debut, high school grades, and high school substance use were not controlled, ethnicity was not associated with any of the risky sexual behaviors when high school variables were held constant. Males were less likely than females to report inconsistent condom use (OR 0.60), but did not differ from females in the probability of engaging in casual or high-risk sex.

Prior risk behavior—Early sexual debut and high school substance use were associated with a higher likelihood of casual sex, inconsistent condom use, and high-risk sex (ORs = 1.66 to 5.02). Higher grades in high school were not associated with a lower likelihood of any of the sexual risk behaviors.

Risky sexual behavior across time—Analyses revealed little consistent evidence for significant change in the probability of casual sex, inconsistent condom use, or high-risk sex over time. The negative linear time term for casual sex (OR = 0.90) and the positive linear time term for inconsistent condom use (OR = 1.10) were only significant when high school risk variables were not modeled.

DISCUSSION

The present study tested associations between common developmental contexts experienced by young adults and their risky sexual behavior across the two years following high school. A competing framework emphasizing behavioral continuity across developmental stages also was tested. Results supported both the notion that developmental context was related to sexual risk behavior during early adulthood and the notion that risk behavior shows continuity from high school into young adulthood. Specifically, living with a parent and

being in a romantic relationship were associated with a lower probability of engaging in some sexual risk behaviors after accounting for prior risk behavior. Being in college was associated with a reduction in high-risk sex, but not casual sex or inconsistent condom use after controlling for prior risk behavior. Being involved in work was not associated with sexual risk behaviors. However, early sexual debut and high school substance use were positively related to all three risky sex outcomes in all models tested. Contrary to expectations, participants did not report increasing levels of risk behavior across the two years following high school.

In contrast to prior, cross-sectional analyses based on this sample (Bailey et al., 2008), we found that living with a parent predicted a lower probability of sexual risk behavior over time. This association was not explained by prior risk behavior in high school. This finding was consistent with the hypothesis that parental monitoring continues to play a protective role against sexual risk behavior in young adulthood as it does in adolescence (Padilla-Walker et al., 2008) and as it also does for substance use in young adulthood (Wood, Read, Mitchell, & Brand, 2004). Whether this is because parental monitoring discourages sexual risk behavior in particular or because those who live with a parent simply are less likely or have less opportunity to be sexually active (Bailey et al., 2008) remains to be determined. Future research should investigate these potential mechanisms to explain the association between living with a parent and reduced sexual risk behavior in young adulthood.

The observed links between romantic relationship involvement and higher levels of inconsistent condom use but lower levels of casual sex were consistent with a large body of prior research (Cooper et al., 1998). Prominent theories of criminal and antisocial behavior suggest that affective bonds to others may reduce antisocial behavior because individuals are unwilling to risk important relationships (Catalano & Hawkins, 1996; Hawkins & Weis, 1985). This reluctance to damage the bond with a romantic partner may explain why participants in this sample were less likely to report casual sex when they were in a relationship. Prior research suggests that this same emotional bond, however, may also explain the higher probability of inconsistent condom use observed here. Feelings of emotional closeness, the desire to demonstrate trust, and the wish to avoid jeopardizing closeness and trust are frequently given reasons for unprotected sex among young people in romantic relationships (Bauman & Berman, 2005; Siegel, Klein, & Roghmann, 1999). Although unprotected sex with a committed partner may be less risky than unprotected sex with a casual partner, it does not eliminate the risk for STIs (Corbin & Fromme, 2002). Further, research shows that there is high turnover in relationships in emerging adulthood (Corbin & Fromme, 2002), making inconsistent condom use risky even in the context of a monogamous relationship.

The current findings from longitudinal analyses of associations between college attendance and risky sexual behavior replicated prior analyses of a single time point using this sample (Bailey et al., 2008). With the exception of high-risk sex, associations between college attendance and sexual risk behavior were nonsignificant once high school grades, high school substance use, and early sexual debut were modeled. This pattern of results was not consistent with the hypothesis that college attendance may reduce risk behavior because it reflects a commitment to education and associated prosocial norms (Catalano & Hawkins, 1996; Hawkins & Weis, 1985). Nor was it consistent, however, with theories suggesting that increased freedom and the experience of new contexts should be associated with increased risk (Arnett, 2000, 2005). Rather, the present results suggest that young adults continue the patterns of risk behavior that they established in high school, regardless of whether they attend college. This conclusion is in line with findings from studies including incoming classes of college freshmen that have examined changes in sexual behavior from the summer before matriculation to early in the college career. These studies also suggest that patterns of

risky sex may develop before college (Wetherill et al., in press). However, those who engaged in less risk behavior in high school may self-select into college. Future research should more closely investigate what it is about planning to go to or attending college that seems to reduce the probability of high-risk sexual behavior specifically.

Contrary to expectations, neither part-time nor full-time work was consistently related to sexual risk behavior across the two years following high school. Although part-time work in adolescence has been linked to higher levels of substance use (Breslin & Adlaf, 2005; Valois et al., 1999), this association may not generalize to other risk behaviors or may not continue into young adulthood. The move to full-time work in early adulthood has been linked to declining levels of substance use, and the adoption of adult roles in general has been proposed as an explanation for the “ageing out” of risk behavior over the course of the 20s (Bachman et al., 1997). It may be that participants in this study were, in fact, experimenting with the role of full-time worker (Arnett, 2000, 2005), and were too young to more completely adopt the role. Alternatively, the decline in risk behavior associated with full-time work may occur more slowly or at an older age than the measurements used here could detect. Future research should test associations between full-time work and sexual risk behavior across a longer age span.

We have puzzled over why some contexts seem to matter and others exert less influence. Both living with a parent and being in a romantic relationship involve aspects of behavioral monitoring by others that may contribute to a lower probability of certain types of sexual risk behavior. Parents or partners may disapprove of risky sexual behavior and young adults may be less likely to engage in risk behavior that might jeopardize these emotionally important relationships (Catalano & Hawkins, 1996; Hawkins & Weis, 1985). Further, prior research suggests that young people’s perception that they are being monitored and are cared about by parents and peers, to a lesser extent, predicts less engagement in risky sex (Wetherill et al., in press). It is less clear, however, how engagement in risky sexual behavior may jeopardize college attendance or participation in full- or part-time work. With the notable exception of unplanned pregnancy, engagement in sexual risk behavior may not be seen as a threat to participation in these contexts. In that case, school and work contexts may exert less influence to discontinue patterns of risky behavior from prior developmental periods. More research is needed to examine mechanisms and motivations for engaging in high-risk sex among individuals involved in different contexts.

Limitations

Several limitations should be kept in mind when interpreting the present findings. First, the sample was largely Caucasian, and was drawn from a single school district serving a suburban area in the Pacific Northwest in the U.S. Caution should be used in generalizing to other young adults. Second, the present study asked about casual sex, inconsistent condom use, and high-risk sex in the month preceding each interview. This somewhat short timeframe may have led to underestimates of the rates of sexual risk behavior among participants. Third, although longitudinal, this study spanned two years of the transition to adulthood, a process that may take significantly longer (Arnett, 2000). Future research should examine associations between developmental contexts and sexual risk behavior across a longer time span. Finally, the data were based on self-reports of sexual behavior, which is highly sensitive. Although self-reports of sexual behavior appear to be valid (Cooper, 2002), there is no way to determine if individuals involved in certain contexts (e.g., in a monogamous relationship) may be less likely to report honestly than those involved in other contexts. Nonetheless, participants reported on their sexual behavior in a self-administered format not shared with the interviewer.

Prevention Implications

Findings from the present study suggest that developmental context may affect young adults' engagement in risky sexual behavior. Programs aimed at reducing risk behaviors for STIs and promoting sexual health should consider targeting those in romantic relationships, those not living with parents, and those not attending college. Further, to develop effective programs for these targeted groups, it is critical that we understand the mechanisms leading to risky sex in these groups. Parents should be made aware of the possible influence that they may have on their offspring's high-risk sexual behavior even after they leave high school. The present results, taken with other research showing lower levels of condom use among romantic partners, suggest that STI prevention programs should encourage young adults in romantic relationships to continue to use condoms, perhaps by sharing information on relationship turnover and risk associated with serial monogamy. Recommendations that young people seek STI testing when beginning a new relationship may be beneficial. Programs promoting condom use should continue to provide support and build skills for condom use negotiation among participants involved in romantic relationships. This study supports the continuity of behavior hypothesis as well. Thus, efforts to prevent early sexual initiation and initiation of alcohol and drug use are important strategies to reduce sexual risk behavior in young adulthood.

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References

- Abma, JC.; Martinez, GM.; Mosher, WD.; Dawson, BS. Teenagers in the United States: Sexual activity, contraceptive use, and childbearing, 2002. Washington, DC: National Center for Health Statistics; 2004.
- Arnett JJ. Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*. 2000; 55:469–480. [PubMed: 10842426]
- Arnett JJ. The developmental context of substance use in emerging adulthood. *Journal of Drug Issues*. 2005; 35:235–254.
- Bachman JG, Safron DJ, Sy SR, Schulenberg JE. Wishing to work: New perspectives on how adolescents' part-time work intensity is linked to educational disengagement, substance use, and other problem behaviours. *International Journal of Behavioral Development*. 2003; 27:301–315.
- Bachman, JG.; Wasdsworth, KN.; O'Malley, PM.; Johnston, LD.; Schulenberg, JE. Smoking, drinking, and drug use in young adulthood: The impacts of new freedoms and new responsibilities. Mahwah, NJ: Lawrence Erlbaum Associates; 1997.
- Bailey JA, Fleming CB, Henson JN, Catalano RF, Haggerty KP. Sexual risk behavior 6 months post-high school: Associations with college attendance, living with a parent, and prior risk behavior. *Journal of Adolescent Health*. 2008; 42:573–579. [PubMed: 18486866]
- Bauman LJ, Berman R. Adolescent relationships and condom use: Trust, love and commitment. *AIDS and Behavior*. 2005; 9:211–222. [PubMed: 15933840]
- Bearinger LH, Resnick MD. Dual method use in adolescents: A review and framework for research on use of STD and pregnancy protection. *Journal of Adolescent Health*. 2003; 32:340–349. [PubMed: 12729983]
- Breslin FC, Adlaf EM. Part-time work and adolescent heavy episodic drinking: The influence of family and community context. *Journal of Studies on Alcohol*. 2005; 66:784–794. [PubMed: 16459940]
- Catalano, RF.; Hawkins, JD. The social development model: A theory of antisocial behavior. In: Hawkins, JD., editor. *Delinquency and crime: Current theories*. New York: Cambridge University Press; 1996. p. 149-197.

- Catalano RF, Mazza JJ, Harachi TW, Abbott RD, Haggerty KP, Fleming CB. Raising healthy children through enhancing social development in elementary school: Results after 1.5 years. *Journal of School Psychology*. 2003; 41(1):143–164.
- Centers for Disease Control and Prevention. Sexually transmitted disease surveillance, 2002. Atlanta, GA: U.S. Department of Health and Human Services; 2003a.
- Centers for Disease Control and Prevention. YRBSS: Youth online comprehensive results. 2003b May 5. 2004 Retrieved August 9, 2004, from <http://apps.nccd.cdc.gov/yrbss/CategoryQuestions.asp?Cat=4&desc=Sexual%20Behaviors>
- Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance, 2008. Atlanta, GA: U.S. Department of Health and Human Services; 2009.
- Congdon, R.; Raudenbush, S.; Bryk, A. HLM (Version 6.06). Lincolnwood: Scientific Software International, Inc; 2005–2009.
- Cooper ML. Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol, Suppl.* 2002; 14:101–117.
- Cooper ML, Shapiro CM, Powers AM. Motivations for sex and risky sexual behavior among adolescents young adults: A functional perspective. *Journal of Personality and Social Psychology*. 1998; 75:1528–1558. [PubMed: 9914665]
- Corbin WR, Fromme K. Alcohol Use and Serial Monogamy as Risks for Sexually Transmitted Diseases in Young Adults. *Health Psychology*. 2002; 21:229–236. [PubMed: 12027028]
- Dalton AL, Galambos NL. Affect and sexual behavior in the transition to university. *Archives of Sexual Behavior*. 2009; 38:675–687. [PubMed: 18814022]
- Dariotis JK, Sonenstein FL, Gates GJ, Capps R, Astone NM, Pleck JH, et al. Changes in sexual risk behavior as young men transition to adulthood. *Perspectives on Sexual and Reproductive Health*. 2008; 40:218–225. [PubMed: 19067935]
- Dunne EF, Unger ER, Sternberg M, McQuillan G, Swan DC, Patel SS, Markowitz LE. Prevalence of HPV infection among females in the United States. *Journal of the American Medical Association*. 2007; 297:813–819. [PubMed: 17327523]
- Graham, JW.; Hofer, SM. Multiple imputation in multivariate research. In: Little, TD.; Schnabel, KU.; Baumert, J., editors. *Modeling longitudinal and multi-group data: Practical issues, applied approaches, and specific examples*. Hillsdale, NJ: Lawrence Erlbaum and Associates; 2000. p. 201–218. p. 269–281.
- Graham, JW.; Hofer, SM.; Donaldson, SI.; MacKinnon, DP.; Schafer, JL. Analysis with missing data in prevention research. In: Bryant, KJ.; Windle, MT.; West, SG., editors. *The science of prevention: Methodological advances from alcohol and substance abuse research*. 1. Washington, DC: American Psychological Association; 1997. p. 325–366.
- Haggerty KP, Catalano RF, Harachi TW, Abbott RD. Description de l'implémentation d'un programme de prévention des problèmes de comportement à l'adolescence. (Preventing adolescent problem behaviors: A comprehensive intervention description). *Criminologie*. 1998; 31:25–47.
- Hawkins JD, Weis JG. The social development model: An integrated approach to delinquency prevention. *Journal of Primary Prevention*. 1985; 6:73–97.
- King KM, Meehan BT, Trim RS, Chassin L. Marker or mediator? The effects of adolescent substance use on young adult educational attainment. *Addiction*. 2006; 101:1730–1740. [PubMed: 17156172]
- Longmore MA, Manning WD, Giordano PC. Preadolescent parenting strategies and teens' dating and sexual initiation: A longitudinal analysis. *Journal of Marriage & the Family*. 2001; 63:322–335.
- Masten AS, Roisman GI, Long JD, Burt KB, Obradovic J, Riley JR, et al. Developmental Cascades: Linking Academic Achievement and Externalizing and Internalizing Symptoms Over 20 Years. *Developmental Psychology*. 2005; 41:733–746. [PubMed: 16173871]
- McMorris BJ, Petrie RS, Catalano RF, Fleming CB, Haggerty KP, Abbott RD. Use of Web and in-person survey modes to gather data from young adults on sex and drug use: An evaluation of cost, time, and survey error based on a randomized mixed-mode design. *Evaluation Review*. 2009; 33:138–158. [PubMed: 19029360]
- Miller BC, Benson B, Galbraith KA. Family relationships and adolescent pregnancy risk: A research synthesis. *Developmental Review*. 2001; 21:1–38.

- Padilla-Walker LM, Nelson LJ, Madsen SD, Barry CM. The role of perceived parental knowledge on emerging adults' risk behaviors. *Journal of Youth & Adolescence*. 2008; 37:847–859.
- Raudenbush, SW.; Bryk, AS. Hierarchical linear models: Applications and data analysis methods. 2. Newbury Park, CA: Sage; 2002.
- Raudenbush, SW.; Bryk, AS.; Cheong, YF.; Congdon, RT, Jr. HLM 6: Hierarchical linear and nonlinear modeling. Lincolnwood, IL: Scientific Software International; 2004.
- Rubin, DB. Multiple imputation for nonresponse in surveys. New York: Wiley; 1987.
- Santelli JS, Lowry R, Brener ND, Robin L. The association of sexual behaviors with socioeconomic status, family structure, and race/ethnicity among U. S. adolescents. *American Journal of Public Health*. 2000; 90:1582–1588. [PubMed: 11029992]
- Schafer, JL. Analysis of incomplete multivariate data. London: Chapman and Hall; 1997.
- Schafer JL, Olsen MK. Multiple imputation for multivariate missing-data problems: A data analyst's perspective. *Multivariate Behavioral Research*. 1998; 33:545–571.
- Schulenberg, JE.; Maggs, JL.; O'Malley, PM. How and why the understanding of developmental continuity and discontinuity is important. In: Shanahan, JTMMJ., editor. *Handbook of the life course*. New York: Kluwer Academic/Plenum; 2003. p. 413-436.
- Siegel DM, Klein DI, Roghmann KJ. Sexual behavior, contraception, and risk among college students. *Journal of Adolescent Health*. 1999; 25:336–343. [PubMed: 10551664]
- Valois RF, Dunham A, Jackson KL, Waller J. Association between employment and substance abuse behaviors among public high school adolescents. *Journal of Adolescent Health*. 1999; 25:256–263. [PubMed: 10505843]
- Wetherill RR, Neal DJ, Fromme K. Parents, peers, and sexual values influence sexual behavior during the transition to college. *Archives of Sexual Behavior*. (in press).
- White HR, Jackson K. Social and psychological influences on emerging adult drinking behavior. *Alcohol Research & Health*. 2004/2005; 28:182–190.
- White HR, Labouvie EW, Papadaratsakis V. Changes in substance use during the transition to adulthood: A comparison of college students and their noncollege age peers. *Journal of Drug Issues*. 2005; 35:281–306.
- White HR, McMorris BJ, Catalano RF, Fleming CB, Haggerty KP, Abbott RD. Increases in alcohol and marijuana use during the transition out of high school into emerging adulthood: The effects of leaving home, going to college, and high school protective factors. *Journal of Studies on Alcohol*. 2006; 67:810–822. [PubMed: 17060997]
- Wood MD, Read JP, Mitchell RE, Brand NH. Do parents still matter? Parent and peer influences on alcohol involvement among recent high school graduates. *Psychology of Addictive Behaviors*. 2004; 18:49–55. [PubMed: 15008685]

Table I

Prevalence of developmental contexts and sexual behaviors at Time 1, Time 2, Time 3, and Time 4.

Prevalence of...	Time 1	Time 2	Time 3	Time 4
Developmental contexts				
Live w/parent	60%	61%	48%	48%
Romantic relationship	48%	49%	50%	53%
Full-time work	30%	33%	43%	43%
Part-time work	31%	32%	29%	32%
In school	47%	44%	43%	40%
Sexual behaviors				
Sexually active	55%	58%	58%	58%
Casual sex	21%	20%	20%	18% ^a
Inconsistent condom use	33%	36%	38%	40%
High-risk sex	12%	13%	12%	14% ^a

^aT4 prevalences for these variables were averaged across the 20 imputed datasets.

Table II

Prevalence of risky sexual behavior by developmental context at Time 1, Time 2, Time 3, and Time 4.

Context	Casual Sex				Inconsistent Condom Use				High-Risk Sex			
	T1	T2	T3	T4 ^a	T1	T2	T3	T4	T1	T2	T3	T4 ^a
Living situation												
Live w parent	20%	17% *	18%	17%	32%	30% *	30% *	33% *	12%	11%	10% *	11%
Do not live w parent	23%	24%	22%	19%	35%	44%	45%	46%	12%	15%	15%	16%
Romantic relationship												
Romantic partner	16% *	16% *	16% *	17%	54% *	57% *	62% *	61% *	13%	14%	13%	16% *
No partner	26%	24%	25%	20%	13%	16%	14%	15%	11%	12%	12%	11%
College attendance												
In college	14% *	16% *	17% *	11% *	25% *	26% *	31% *	28% *	6% *	7% *	11%	6% *
Not in college	27%	23%	23%	23%	40%	43%	43%	48%	17%	17%	14%	18%
Work												
Full-time work	24%	24%	24%	22% *	38%	47% *	43%	47% *	12%	15%	14%	17% *
Part-time work	19%	21%	18%	12%	31%	33%	33%	32%	13%	11%	10%	7%
No work	21%	16%	18%	19%	30%	32%	37%	37%	11%	12%	12%	14%

*
 $p < .05$ ^aT4 prevalences for these variables were averaged across the 20 imputed datasets.

Table III

Multilevel models testing unique associations between developmental contexts and risky sexual behavior.

	Casual Sex		Inconsistent Condom Use		High-Risk Sex	
	Model 1 B (SE)	Model 2 B (SE)	Model 1 B (SE)	Model 2 B (SE)	Model 1 B (SE)	Model 2 B (SE)
Intercept	-.98* (.18)	-1.90* (.44)	-.90* (.17)	-1.33 (.42)	-1.53* (.20)	-2.43* (.46)
Male	.04 (.15)	.02 (.15)	-.51* (.14)	-.56* (.14)	-.17 (.15)	-.21 (.16)
Asian	-.68* (.32)	-.30 (.33)	-.67* (.29)	-.28 (.29)	-.93* (.41)	-.59 (.43)
Early sex	---	.54* (.18)	---	.51* (.17)	---	.69* (.18)
High school GPA	---	-.12 (.10)	---	-.18 (.10)	---	-.15 (.10)
High school drug use	---	1.61* (.19)	---	1.28* (.16)	---	1.57* (.23)
Live w/parent	-.31* (.12)	-.28* (.13)	-.37* (.12)	-.37* (.12)	-.32* (.13)	-.29* (.14)
In relationship	-.73* (.12)	-.90* (.13)	1.80* (.12)	1.77* (.12)	-.06 (.14)	-.21 (.14)
In school	-.52* (.14)	-.17 (.15)	-.59* (.13)	-.26 (.14)	-.79* (.16)	-.41* (.17)
Full-time work	.24 (.14)	.20 (.15)	.12 (.14)	.07 (.14)	.10 (.17)	.07 (.17)
Part-time work	.11 (.16)	.19 (.15)	-.05 (.15)	.02 (.15)	.08 (.18)	.17 (.19)
Time	-.10* (.05)	-.09 (.05)	.07 (.04)	.09* (.04)	<-.01 (.06)	.01 (.06)

*
p < .05