

Original article

Early Adolescent Alcohol Use and Sexual Experience by Emerging Adulthood: A 10-Year Longitudinal Investigation

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Abstract

Purpose: The current study examined the long-term relationship of early adolescent alcohol use to number of sexual partners by emerging adulthood.

Methods: Using data from a 10-year longitudinal study, we collected data on sixth- and seventh-grade students' alcohol use and their lifetime number of sexual partners 10 years later.

Results: We found a significant effect of early alcohol use in the sixth and seventh grades on lifetime number of sexual partners 10 years later, controlling for gender, age, race, peer norms, and sensation seeking. Early age at first intercourse mediated the association between early alcohol use and number of sexual partners.

Conclusions: Interventions focused on preventing use of alcohol at an early age may have the potential to reduce risks for sexually transmitted diseases during adolescence and emerging adulthood.

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Keywords:

Alcohol use; Emerging adulthood; Sexual behavior; Adolescence; HIV/AIDS; STD

The majority of girls and boys engage in sexual intercourse at some point during adolescence, many with multiple sexual partners [1], putting them at greater risk of having unplanned pregnancies and contracting sexually transmitted diseases (STDs) including HIV [2,3]. Adolescent sexual activity is an important health concern, as almost half of all STDs each year are among people between the ages of 15 and 24 [4]. Given these threats to the sexual health of adolescents, it is critical to identify early predictors of sexual risk-taking in adolescence and emerging adulthood.

Problem behavior theory suggests that risky behaviors adopted during childhood or early adolescence put youth on a developmental trajectory that leads to other risky behaviors later in life [5,6]. Risky sexual behavior is viewed as a violation of a social norm affected by an individual's attitudes, and this behavior often covaries with other

norm-breaking behaviors such as substance use and delinquency [7]. Alcohol use in early adolescence is a particularly relevant risk behavior, as youth are more likely to drink than use other drugs [8], and national surveys show that drinking behavior usually increases between the 7th and 10th grades [9].

Alcohol impairs judgment [10], and may increase the risk for unplanned, casual sex by diminishing an individual's ability to consider adverse consequences [11]. Studies have shown that early use of alcohol is associated with an earlier age of first intercourse [12,13] and engaging in sexual activity with multiple sex partners [14]. However, methodologic features of these studies limit the ability to draw temporal, if not causal, inferences about the association between alcohol use and risky sex. First, many of these studies were cross-sectional in nature, sampling youth at only one point in adolescence [15,16]. Second, some of the existing longitudinal studies either did not assess alcohol use early in adolescence when drinking behavior typically begins [17,18] or did not follow students beyond the high

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school years [19]. Third, several of these studies concentrated on alcohol use during the past month [17], but given that only 7% of eighth-grade adolescents report being drunk in the past month [9], total lifetime use of alcohol may be a more representative measure of the drinking behavior of young adolescents. Similarly, previous studies have typically assessed number of sexual partners during the past year [20–22]. Because half of adolescents report having sex at least once by the 12th grade [23], lifetime sexual experience may be a more valid indicator of sexual experience from adolescence to the early adult years. Fourth, although research has established an association between alcohol use and early intercourse initiation, few studies have had the benefit of an extended longitudinal design and tested early age at first intercourse as a mechanism by which early adolescent drinking influences later sexual behavior. Finally, several studies have suggested that other variables may mitigate the relationship between early drinking and later sexual behavior, including sensation seeking [24], and peer norms about alcohol use [25], suggesting that longitudinal studies should consider these important factors.

The current study evaluated the long-term relationship between early adolescent alcohol use and sexual behavior in emerging adulthood 10 years later using cumulative measures of alcohol use (i.e., total lifetime drinking behavior) and sexual behavior (i.e., total number of sexual partners by emerging adulthood) and tested early age at first intercourse as a critical mediator. Because these data do not involve experimental manipulation, significant findings can only support particular causal pathways, but cannot rule out the possibility that an unknown “third variable” accounts for significant associations among the variables. Accordingly, we included several important covariates to eliminate alternative explanations for our results, including gender, age, race, peer norms about drinking, and sensation seeking.

Method

Participants

This study was reviewed and approved by the institutional review board at the University of Southern California. Two longitudinal samples were derived from an ongoing drug abuse prevention trial, the Midwestern Prevention Project, which has been implemented since 1984 in Kansas City and since 1987 in Indianapolis, Indiana. The program was introduced into schools during the initial grant period of the study between grades 6/7 and 12 (from 1984–1992). Details of the program intervention are described elsewhere [26]. All students in these schools gave full active parental and self-consent prior to participation (response rate >96%). The Kansas City sample (N = 1002) was based on entering sixth- and seventh-grade students from eight schools, and the Indianapolis sample (N = 1206) was based on entering sixth- and seventh-grade students from 57

schools. Both samples were demographically matched, randomly assigned to a program or control condition, and targeted for follow-up through emerging adulthood. The current study used data from Time 1 (i.e., approximately age 12) and a follow-up assessment 10 years later (i.e., approximately age 22). Details of follow-up sample selection, attrition, population, and experimental group representativeness are reported elsewhere [27], which showed slightly greater loss of males, but no differential loss of alcohol users or program group over time.

Time 1 measures: early adolescence

Demographic variables. Gender (0 = female; 1 = male), race/ethnicity (0 = nonwhite; 1 = white), grade at Time 1 (0 = sixth grade; 1 = seventh grade), and experimental intervention group (0 = control; 1 = program) were included as covariates.

Early alcohol use. To assess lifetime alcohol use, participants were asked: “How many alcoholic drinks (beer, wine, or liquor) have you ever had in your whole life?” (none, only sips, part or all of one drink, 2 to 4 drinks, 5 to 10 drinks, 11 to 20 drinks, 21 to 100 drinks, more than 100 drinks). The mean was approximately one drink, consistent with previous research on early adolescent drinking [9]. Ten percent of the sample reported never having a sip of alcohol, 37% only sips, 31% part or all of one drink, and 22% 2 or more alcoholic drinks in their lifetime. Thus, 90% reported some lifetime alcohol use, a rate also consistent with previous research [9]. Because we were primarily interested in distinguishing adolescents who would be willing to engage in unsanctioned alcohol consumption, we compared participants who reported having no alcohol or only sips (47% of sample; coded as 0) to those who reported having at least part of a drink or one or more drinks (53% of sample; coded as 1).

Peer norms about alcohol use. The alcohol use of participants’ peers was assessed with one item: “How many of your close friends drink alcohol (beer, wine, or liquor)” (none; 1, 2, 3 or 4; 5 to 7; 8 to 10; more than 10). The mean response was .72 (SD = 1.21), representing approximately one close friend engaging in alcohol use. To simplify the data analysis, we compared participants with no friends using alcohol with participants with equal to or more than one friend using alcohol.

Sensation seeking. Two items adapted from the Sensation Seeking Scale [28] were “Do you like to take chances?” and “Is it worth getting into trouble if you have fun?” Both items were measured on a four-point scale (1 = never to 4 = most of the time), and were aggregated to create a composite variable (correlation between the two items = .40, $p < .001$) with a range from 1 to 8. The mean composite sensation seeking score was 4.41 (SD = 1.55).

Time 2 measures: emerging adulthood (10-year follow-up)

Lifetime number of sexual partners. Participants were asked if they have ever engaged in sexual intercourse. The participants who responded “yes” (94% of the total sample) were asked: “In your lifetime, approximately how many sexual partners have you had?” (1, 2–5, 6–10, 11–15, 16–20, 21–40, more than 40). This question was derived from the National Longitudinal Study of Adolescent Health (Add Health). The mean response was 2.65 (SD = 1.48), representing approximately four sexual partners. Participants who responded “no” to the initial question were coded as “0” or no sexual partners. As a comparison, the median number of lifetime sexual partners for men age 25 to 44 is 6.7 and 3.8 for women [29].

Age of first sexual intercourse. Similar to other assessments of coital debut [30,31], sexually active participants indicated the age at which they first engaged in sexual intercourse. The mean age of first sex was 16.32 (SD = 2.27).

Treatment of missing data and final sample. Of the original 2208 participants at Time 1, 539 (70%) completed the assessment at Time 2; because of a planned missingness procedure whereby only two-thirds of the forms included the sensation seeking scale [32], 476 were missing this variable. This retention rate is similar to other studies [33]. To be included in the analyses, participants had to complete all measures on the surveys at both time points. As a control for Time 1 sexual activity, we removed the 139 participants who reported an age at first sex ≤ 13 . The final sample was 924 participants (78% white, 20% African Americans, and 2% from other races/ethnicities; 56% female; and 74% in the seventh (vs. sixth) grade at Time 1). Participants who completed the Time 2 assessment were more likely to be white, female, and from the control condition, have fewer peers using alcohol, and less likely to use alcohol at Time 1.

Data analysis strategy. Previous analyses have shown no differences between program and control groups in substance use at Time 1 [26]. We used SAS PROC MIXED [34] with individual as unit and controlling for cluster effect of original school (N = 8 in Kansas, N = 57 in Indianapolis) to calculate the ICC (intraclass correlation coefficient) for lifetime alcohol use at Time 1 and for number of sexual partners at Time 2. The ICCs for Kansas and Indianapolis were very small, indicating that the cluster effect of school was negligible; therefore, we simplified the analytic strategy by ignoring the nested design. Statistical analyses also indicated that program intervention assignment yielded no prediction nor did it affect any of the other statistical tests; nevertheless, we retained program intervention as a covariate in all analyses.

We examined the association between early alcohol use at Time 1 and lifetime number of sexual partners at Time 2 using path analysis controlling for grade, gender, race/ethnicity, peer norms about alcohol use, sensation seeking, and program

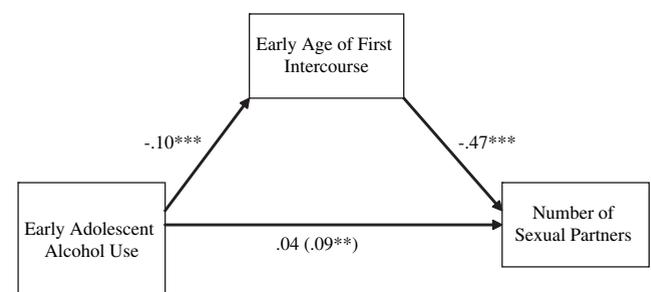
intervention. Because lifetime sexual partners were collected on an ordinal response scale, we treated it as an ordered categorical dependent variable and used a standard logistic link function. The assumption that the covariate and predictor relationships were consistent for all logits (i.e., parallel lines assumption) was confirmed using SPSS 16 [35] prior to fitting the path models. Mediation was tested via path analysis using newer recommendations [36] to use bootstrapping to create empirical standard errors for the mediating effect (Figure 1). To ascertain the strength of the mediating effect, Model 1 tested the covariates without the mediator (age at first intercourse), followed by Model 2, which tested the mediation effect. All analyses were conducted using Mplus 5.2 [37].

Results

Table 1 presents the descriptive statistics regarding reported lifetime sexual partners. Most of the sample (43%) reported two to five partners in their lifetime. Gender, race, group, and grade were all independent of lifetime sexual partners as assessed by chi-square tests of independence. However, participants with friends who consumed alcohol tended to be more likely to have 16 or more partners, and participants who drank at an early age tended to have more partners.

Table 2 presents the standardized results of the two models tested. Model 1 showed that early alcohol use predicted having more sexual partners by emerging adulthood, even after controlling for gender, grade, race/ethnicity, peer norms, sensation seeking, and current alcohol use. Nonwhites (marginally significant) and those with at least one risky peer in early adolescence also reported having a greater number of sexual partners by emerging adulthood. There were no significant interactions between early adolescent alcohol use and either gender or race/ethnicity in predicting number of sexual partners by emerging adulthood.

We then examined age at first sexual intercourse as a mediator of the association between early alcohol use and number of sexual partners by emerging adulthood (Figure 1). The path model depicted in Figure 1 was bootstrapped 1000 times with samples sizes equal to n. The



Note. N = 924; *** $p < .001$, ** $p < .01$, * $p < .05$. Original direct effect in parentheses.

Figure 1. Standardized results depicting early age at first intercourse as a mediator between early drinking and number of sexual partners by emerging adulthood.

Table 1
Descriptive statistics for number of lifetime sexual partners and bivariate relationships among predictors and covariates

	Lifetime sexual partners								Chi-square ^a
	0	1	2–5	6–10	11–15	16–20	21–40	41+	
Sample frequencies	5	148	413	216	87	44	38	13	
Percent male	40.0%	44.6%	37.8%	43.1%	48.3%	38.6%	50.0%	61.5%	$\chi^2(6) = 8.2$
Percent white	80.0%	89.2%	85.7%	89.4%	86.2%	81.8%	78.9%	61.5%	$\chi^2(6) = 12.1$
Percent early Drinkers	20.0%	41.2%	48.4%	53.7%	52.9%	59.1%	65.8%	69.2%	$\chi^2(6) = 13.6^a$
Percent 7th graders	60.0%	73.0%	67.6%	78.7%	75.9%	70.5%	78.9%	76.9%	$\chi^2(6) = 10.7$
Percent with friends who drank	60.0%	69.6%	59.1%	56.5%	59.8%	43.2%	28.9%	53.8%	$\chi^2(6) = 25.9^a$
Percent in control group	40.0%	45.3%	48.9%	54.6%	51.7%	50.0%	42.1%	53.8%	$\chi^2(6) = 4.5$
Coital debut Mean (SD)	17.0 (2.3)	18.4 (1.3)	17.1 (1.7)	16.2 (1.6)	15.9 (1.6)	15.2 (1.6)	15.4 (1.1)	15.3 (1.5)	
Sensation seeking Mean (SD)	4.3 (0.0)	4.1 (1.3)	4.3 (1.2)	4.4 (1.2)	4.5 (1.3)	4.5 (1.2)	4.4 (1.3)	4.4 (1.5)	

^a Denotes significant chi-square at .05 alpha level. Chi-square test of independence did not include the five people who reported no age of first intercourse because of small expected values.

bootstrapped standard errors were used to assess the significance of the mediating effect. As shown in Table 2 (Model 2), early adolescent drinking was associated with age at first intercourse, which was, in turn, associated with lifetime number of sexual partners. Moreover, without accounting for age at first intercourse, early adolescent drinking predicted lifetime sexual partners, but after including the mediating effect, this relationship became nonsignificant, providing evidence for full mediation. This was confirmed by the indirect effect test using the bootstrapped standard error, $\beta = .05$, $p < .001$.

Discussion

Although numerous studies have investigated the link between early adolescent drinking behavior and later sexual behavior, many of these studies were either cross-sectional or short-term longitudinal studies that limit our ability to draw temporal inferences about the association between alcohol use and risky sex. In this 10-year longitudinal study, we found that early adolescent alcohol use was associated

Table 2
Standardized results from the bootstrapped mediational path models predicting lifetime number of sex partners from early adolescent alcohol use, covariates, and age of first intercourse

	Model 1	Model 2
Drinking in early adolescence	.09**	.04
Sex of participant	.03	.04
Grade of participant	.02	.02
Race/ethnicity	-.07*	-.07*
Treatment/control group	-.02	-.02
Peer norms about alcohol use	-.10**	-.10**
Sensation seeking	.05	.06
Age of first intercourse		-.47***
Drinking in early adolescence predicting age of first intercourse		-.10***

Note: $N = 924$.

*** $p < .001$.

** $p < .01$.

* $p < .06$.

with an earlier age of first intercourse and, in turn, with having a greater number of sexual partners by emerging adulthood. This association remained significant after controlling for other important contributors, including age/grade, ethnicity, sensation seeking, peer norms about alcohol use, and current alcohol use. These results go beyond current research by showing that drinking in early adolescence may put adolescents on a risky sexual lifestyle trajectory, leading to frequent sexual encounters with new partners, thus providing important implications for STD transmission as the likelihood of contracting an infection compounds with each additional sexual partner [38].

There were several important effects of the covariates on the number of acquired sexual partners by emerging adulthood. Nonwhite participants reported marginally more sexual partners than did white participants, confirming previous findings [39]. Participants with at least one risky peer in early adolescence also reported significantly more sexual partners 10 years later. Sensation seeking was not associated with lifetime number of sex partners.

Several limitations should be noted. First, the institutional review board approval did not allow for questions about sexual behavior prior to age 18; thus, we do not know at what specific age most of these sexual encounters occurred. Some participants may have had all their sexual interactions before entering college, whereas others may not have accumulated their sexual experiences until shortly before the Time 2 assessment. Second, our study did not explore whether these sexual encounters were casual and unplanned, and future research is needed to address this question. Third, given that this study relied on existing data, all of the variables were measured with only one or two key indicators. Fourth, we should acknowledge that age at first intercourse and number of sexual partners were assessed concurrently, which may have produced biased self-reports. Fifth, and finally, although participants in this study had been in a previous drug use prevention study, results were identical regardless of whether study condition was included in the analyses. Nevertheless, future research is needed to replicate the findings in a new

sample and to examine the impact of early drinking on condom use behavior in emerging adulthood.

These findings have two important implications for designing future prevention programs. First, current evidence-based drug abuse prevention programs that address alcohol use in early adolescence may have the potential to significantly lower risk for contracting STDs later in adulthood potentially by delaying adolescents' first experience of intercourse and number of sexual partners by emerging adulthood. Second, the results suggest that we can potentially intervene to reduce young adults' risk for contracting STDs far earlier than the onset of sexual activity in adolescence or emerging adulthood.

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