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Increased Partner Risk Characteristic among Adolescents using Alcohol In-the-moment

Stephanie A. S. Staras, PhD¹, Melvin D. Livingston, PhD^{1,2}, and Kelli A. Komro, PhD^{1,3}

¹Department of Health Outcomes and Policy, College of Medicine, and the Institute for Child Health Policy, University of Florida, Gainesville, FL

²Department of Biostatistics and Epidemiology, School of Public Health, University of North Texas Health Science Center, Fort Worth, TX, USA

³Department of Behavioral Sciences and Health Education, Rollins School of Public Health, Emory University, Atlanta, GA, USA

Abstract

Background—Alcohol is a recognized risk factor for sexually transmitted diseases (STD) acquisition, but the mechanism is unclear. Potentially, adolescents using alcohol in the two hours before sex (in-the-moment use) have riskier sexual partners.

Methods—We used multivariable logistic regression to examine the association between in-the-moment alcohol use and partner risk characteristics reported for the most recent sex among primarily 17-18 year old adolescents originally recruited from a representative sample of Chicago public elementary schools. We created three composite partner risk profiles: partner familiarity risk (casual and unexpected), partner context risk (age discordance and met in public), and overall risk using all measures except partner alcohol use.

Results—Teens who reported any in-the-moment alcohol use were more likely than non-drinking teens to report casual [Adjusted Odds Ratio (AOR)=3.2, 95% CI = 2.1 to 4.9], unexpected (AOR=1.6, 95% CI = 1.0 to 2.5), age discordant (AOR=3.0, 95% CI=2.0 to 4.6), or met in public partners (AOR=1.4, 95% CI = 1.0 to 2.1). For each composite measure, the number of partner risk characteristics reported increased linearly with the percent of teens drinking in-the-moment (Cochran-Armitage trend $P < 0.0001$). Compared to zero characteristics, in-the-moment alcohol use was associated with increased odds of reporting one (AOR=2.8, 95% CI=1.7, 4.5), two (AOR=4.6, 95% CI=2.7, 7.6), or three to four characteristics (AOR=7.1, 95% CI=3.3, 15.3).

Conclusions—Our findings expand the link between in-the-moment alcohol use and partner risk reported in prior studies to encompass adolescents' general sexual experiences and additional partner characteristics including the highly associated composite characteristics.

—For primarily 17-18 year olds' most recent sexual encounter, adolescents using any alcohol in-the-moment were two to three times more likely than non-users to have a risky sex partner.

Alcohol use is a well-established risk factor for sexually transmitted diseases (STDs),¹ but less is known about how exactly alcohol influences STD risk. Alcohol myopia theory maintains that alcohol narrows an individual's focus to the most salient situational cues and may increase sexual risk-taking.² While population-based studies find mixed results regarding the influence of alcohol use in the two hours before sex, referred to as in-the-moment use, on condom use,³ the experimental literature consistently demonstrates alcohol increasing intentions of having unprotected sex.⁴ Alcohol use may contribute to STD risk by increasing sexual partner risk. For example, partners who are older age, met in public places such as street or neighborhood locations, or using alcohol in the moment reduce the probability of condom use, are associated with a higher probability of the partner having a current STD, and reduce the partner's likelihood of disclosing their HIV status.⁵⁻⁹

Theory and evidence suggest in-the-moment alcohol use increases the probability of having a risky sex partner.¹⁰⁻¹³ The theory of interpersonal behavior suggests that in social situations where alcohol is consumed environmental norms and peer modeling are supportive of risky partner selection.¹⁰ Additionally, biologic evidence from experimental alcohol administration studies demonstrates individuals using alcohol have impaired decision making and are more likely to ignore partner sexual risk clues.^{4,14} Individuals using alcohol in-the-moment are more likely to have non-romantic or casual partners.¹¹⁻¹³ But, the association between alcohol use and other important partner characteristics (e.g., unexpected, age discordance, and met in public) is unclear, and, to the best of our knowledge, has not been considered for combined partner characteristics.

To better understand whether adolescent in-the-moment alcohol use increases sexual partner risk characteristics, we assessed the association between any adolescent alcohol use and sexual partner characteristics (casual, unexpected, in-the-moment alcohol use, age discordance, and met in public) for an urban sample of primarily 17-18 year olds reported for his or her most recent sex.

MATERIALS AND METHODS

Study population

We used data from the 2008-2009 follow-up survey of Project Northland Chicago; a group-randomized, alcohol preventive intervention trial conducted among students from a representative sample of Chicago public elementary schools (n=61 schools).^{15,16} During the trial, 5711 youth participated in at least one of four behavioral surveys: one pretest (2002, age 11) and three follow-up surveys (2003, age 12; 2004, age 13; and 2005, age 14). In 2008-2009, 3032 youth completed a mail- or school-based survey (53% Response Rate).¹⁷ Adolescents from intervention and control schools were included because the intervention produced little difference in adolescent alcohol use or hypothesized mediators.¹⁶ Students lost to follow up were more likely to be male ($t(3734)=-6.85$, $p<0.001$) and non-White ($t(3383)=3.15$, $p<0.01$).

We restricted our study population to youth who participated in 2008-2009 because sexual activity items were not included on prior surveys (Figure 1). We omitted adolescents who did not respond to any survey item (n=2) or provided inconsistent responses on 10% of

alcohol, sex, or drug use items (n=34). Because our objective was to assess alcohol use prior to their last sexual event, we restricted the study population to the 1920 (64% of respondents to 2008-2009 survey) adolescents who did not choose "I have never had sex" on any sexual event-level item. We excluded adolescents not reporting the three most common racial/ethnic groups in the sample (non-Hispanic White, non-Hispanic Black, and Hispanic) because other racial/ethnic groups were too diverse to combine and too small to consider independently: Native American (n=20), Native Hawaiian or Pacific Islander (n=6), Asian (n=40), other (n=26), and mixed race (n=57). We also omitted the adolescents who did not report whether they had been drinking prior to sex (n=103). Thus, our analysis included 1,663 adolescents. The University of Florida Institutional Review Board approved this project.

Measures

Measures were adopted and adapted from prior surveys including the National Longitudinal Study of Adolescent Health and the National Longitudinal Survey of Youth 1997.^{18–20} All measures were assessed for content validity with adolescent focus groups. We assessed in-the-moment alcohol use from adolescents' response to: "How many alcoholic drinks did you have in the 2 hours before you had sex the last time." For analysis, because only 12% reported drinking, we assessed in-the-moment alcohol use as yes or no.

Partner Characteristics

Adolescents were asked five questions about their most recent sexual partner's characteristics: casual, unexpected, drinking alcohol, met in public, and age discordance. First, to describe their relationship type, adolescents choose from three response options: "a person you know, but not a steady partner"; "a casual acquaintance or someone you just met"; or "a boyfriend/girlfriend, husband/wife, or steady partner". Because only 40 teens reported they just met their partner, we analyzed just met and not steady partners together as casual partners. Second, we assessed partner expectation with a question adapted from a prior measure of adolescent expectation of sex:²¹ "The last time you had sex, did you expect to have sex with that partner?" Participants had three response options: "yes, I expected to have sex with that partner on that day"; "yes, I expected to have sex with that partner, but not on that day"; or "no, I did not expect to have sex with that partner." Because we were primarily interested in expectation of specific partners, we grouped the two "yes" categories together as expected partners.

Third, we calculated the age difference between the adolescent and their partner by subtracting the participant's age (calculated by subtracting their birthdate from the date we received the completed survey and trimming to years or estimated) from the participants' report of their partner's age in years. We did not have the date 21% of participants completed their survey. Thus, to estimate age, we calculated the first and 99th percentiles for age differences for participants with known ages in 2008-2009 and their age during prior surveys: 3.5 and 4.5 for 2005 participants, 4.5 and 5.5 for 2004 participants, and 5.5 to 6.5 for 2003 participants. To keep all participants within approximately six months of their age, we added years to the participants' most recent survey year (4 years for 2005, 5 years for 2004, and 6 years for 2003). This strategy left only 18 participants (1%) with unknown age.

Based on prior studies suggesting a difference of 2-3 years as a risk threshold for adolescents,^{5,7,22} we conservatively analyzed partner age difference as < 3 years or ≥ 3 years. We could not consider younger partners separately because only 27 youth reported partners ≥ 3 years younger. Fourth, adolescents reported whether their partners were drinking in the 2 hours prior to sex. But, we did not include partner drinking in analyses because partner and participant drinking alcohol were highly correlated (Pearson $r=0.7$).

Fifth, to assess meeting venue, adolescents answered "Where did you first meet this sexual partner?" by selecting one of nine options: school, work, through friends or family, at an organized event, at a party at someone's house, at a bar or nightclub, on the street, Internet, or write in. We created two categories based on written responses: grew up together and around my neighborhood. Similar to our prior studies,^{7,23} for analysis, we assessed two broad groups of meeting venues because of small sample sizes within some categories, comparable condom use frequencies, and similar approximate social distances. For public places, we combined organized events (56 adolescents), work (51 adolescents), party at someone's house (79 adolescents), bar or night club (9 adolescents), Internet (39 adolescents), around my neighborhood (34 adolescents), on the street (148 adolescents), and miscellaneous responses (14 adolescents). For non-public meeting places, we combined school (717 adolescents), through friends or family (488 adolescents), and grew up together (10 adolescents).

Partner Composite Measures

We grouped partner characteristics into three constructs: partner familiarity, partner context, and overall partner risk. Similar to our prior study,⁷ we created partner familiarity from adolescents' perception of their relationships (casual and unexpected) and partner context from situations and sexual networks (met in public and age discordance). To assess overall partner risk, we also created a composite variable of four characteristics (casual, unexpected, met in public, and age discordance).

To create the composite measures, we assigned adolescents a score of 1 for each partner risk characteristic (i.e., casual, unexpected, ≥ 3 years different, or met in public). Within each construct (partner familiarity, partner context, and overall partner risk), we summed the scores across relevant measures. Possible scores for the partner familiarity and partner context composite ranged from 0 to 2. Overall partner risk scores ranged from 0 to 4.

Covariates

We considered eight covariates: race/ethnicity, gender, age (in years), socio-economic status, ever drank alcohol, partners' gender concordance, type of sex, and the risk composite (familiarity or context) that did not include the assessed value. In-the-moment alcohol use and partner risk may vary by race/ethnicity, gender, age, socio-economic status, partners' gender concordance, and type of sex.^{7,11,13,22–26} Socio-economic status was measured by whether teens were eligible for free school lunch at the time of his or her most recent completed survey. Ever drank alcohol was included as a proxy for alcohol-specific and general risk-taking.²⁵ Finally, to isolate the effects of each characteristic from the influence

of partner familiarity or context, we considered the composite that did not include the assessed characteristic as a potential confounder.

Statistical Analysis

To estimate the association between in-the-moment alcohol use and partner characteristics, we used multinomial logistic regression with SAS software version 9.3 (SAS Institute, Inc., Cary, NC). We did not adjust for school level clustering because we found no evidence of clustering of the sexual-risking taking behaviors among 17-18 year olds by the sampled elementary schools (Interclass correlation < 0.001). Multivariable models were adjusted for the partner composite measure that did not include the individual risk factor being assessed, race/ethnicity, gender, age, socio-economic status, ever drank alcohol, partners' gender concordance, and type of sex. We considered potential effect modification by including the interaction between gender and drinking. Statistically significant ($P < 0.05$) interaction terms were retained in the models. As a sensitivity analyses, we re-evaluated all analyses in three different ways: (1) considering age without informed imputation, (2) removing type of sex from the potential confounders, and (3) restricting to teens who reported ever using alcohol.

RESULTS

Half (54%) of the 1663 participants who reported having sex were adolescent girls. Most of the youth identified with minority racial and ethnic groups: 56% non-Hispanic black, 30% Hispanic, and 14% non-Hispanic white. The majority (80%) were eligible to receive free lunch based on economic need. The mean age for both the main sample ($n=1311$) and the estimated age sample ($n=1645$) was 18 years (standard deviation = 0.7).

For their most recent sexual encounter, 58% reported vaginal sex only, 33% reported multiple types of sex, 8% reported oral sex only, and 2% reported only having anal sex. Nearly all youth (96%) reported their most recent partnership was female-to-male, and 4% reported same sex partnerships (2% females and 2% males). Approximately one-third (35%) reported the most recent time they had sex was the first time they had sex with that partner.

In-the-moment alcohol use was similarly common among participants (12%) and their partners (13%). Almost all of the time (94%), participants reported concordant drinking status with their partner (Pearson's correlation = 0.7). Nearly all (96%) teens that were not drinking alcohol also reported their partner was not drinking. Fewer, but still the vast majority (80%) of teens drinking alcohol reported their partner was also drinking.

Approximately half (55%) of teens reported their partner had at least one risk characteristic. Approximately a third of adolescents reported their partner had one or two risk familiarity or context risk characteristics. When all four characteristics were considered, 20% of teens reported their partner had two to four risk characteristics.

Teens who reported in-the-moment alcohol use were more likely than non-drinking teens to report riskier partners regardless of the characteristic considered (Table 2). In-the-moment alcohol users had three times the odds compared to non-users to report casual [Odds Ratio (OR)=3.3, 95% Confidence Interval (CI) = 2.3 to 4.8] or age discordant partners (OR=2.6,

95% CI=1.8 to 3.8). Almost half (42%) of teens drinking reported casual partners compared to 16% of teens not drinking alcohol. Compared to teens who were not drinking, in-the-moment alcohol users had approximately 50% higher odds to report having sex with unexpected partners.

Regardless of the composite considered, the number of partner risk characteristics reported increased linearly with the percent of teens drinking in-the-moment (Cochran-Armitage trend $P<0.0001$). Compared to non-drinkers, teens drinking in-the-moment had higher odds of reporting their most recent partner had one (OR=2.2 for familiarity and OR =1.9 for context) or both (OR=4.3 for familiarity and 2.6 for context) familiarity or context risk characteristics (Table 3). The association between in-the-moment alcohol use and number of partner risk characteristics was even more pronounced when all partner risk characteristics were considered together. Compared to partners without risk characteristics, in-the-moment alcohol use was associated with twice the odds of reporting a partner with one risk characteristic, more than four times the odds of reporting a partner with two characteristics, and seven times the odds of reporting a partner with three to four characteristics. Results were similar for all three sensitivity analyses performed (data not shown).

CONCLUSIONS

Among an urban, school-based community sample of primarily 17-18 year olds, in-the-moment alcohol use was associated with riskier partner selection for all characteristics considered (i.e., casual, unexpected, age discordant, public meeting places, and constructed composites). Our findings agree with and expand on evidence of an association between in-the-moment alcohol use and risky partner selection to include adolescents' most recent sexual experiences.¹¹⁻¹³ The increased associations found when simultaneously considering multiple partner risk characteristics emphasize the importance of considering more than one partner characteristic in risk prediction, evaluation, and interventions. Combined with evidence of partner characteristics reducing condom use,^{5,7,8,20} our results suggest partner characteristics may be an important link between alcohol use and STD or HIV acquisition.

The strong associations we found between in-the-moment alcohol use and partner characteristics are consistent with and expand prior studies to adolescents' general sexual experiences.¹¹⁻¹³ Our observed event-level association between alcohol use and casual partners is consistent with a meta-analysis among young adults and teens demonstrating in-the-moment alcohol use is responsible for 11% of the variance in selecting casual partners.¹³ Complimenting and expanding findings of college students selecting a partner who they met that day and teens having unexpected partners at first coitus,^{11,12} our results suggest alcohol use likely leads to having an unexpected partner throughout the teen years. Similarly, our results expand the global and first coitus event-level connection between alcohol use and age discordant partners among youth to general sexual experiences.^{11,12} The observed association between in-the-moment alcohol use and meeting partners in public places may be consistent with the worldwide use of alcohol venues as meeting places for new sexual partners, especially considering teens drink alcohol at private parties and street locations.^{27,28} Yet, because alcohol use is not associated with a third of teen's reported

public meeting places (e.g., Internet and work), meeting place may also serve as a proxy for meeting higher risk sexual partners.²⁹

Conceptually similar to previous findings of increased predictiveness of condom use and STD acquisition when simultaneously considering multiple partner characteristics,^{5,7,9} in-the-moment alcohol use was increasingly common with increasing number of partner risk characteristics. Thus, our findings further the evidence that considering multiple risk characteristics may more accurately represent a partner's risk profile.

In context of prior findings of partner risk characteristics associated with decreased condom use,⁷ our findings suggest in-the-moment alcohol use may reduce condom use through increased selection of riskier partners. Further combined with evidence that partner risk is associated with STD acquisition,^{5,6,9} our findings suggest partner risk may contribute to the well-established link between alcohol use and STDs.¹ Therefore, adolescent in-the-moment alcohol use may synergistically increase risk by enhancing the probability of choosing a partner with an STD and decreasing the probability of using a condom with that partner.

This study has four limitations. First, our analysis was limited to one sexual event per adolescent. Thus, we could only consider differences between adolescents rather than within adolescents for different sexual events. Second, while we analyzed four partner characteristics, we were unable to consider additional important partner characteristics because either they were not measured (e.g., time since last STD, concurrent partners, relationship length) or because participant and partner drinking were too strongly correlated to consider partner drinking as an independent predictor.^{6,9} The consistency, however, between partners drinking status is commonly reported.^{7,12} Third, because only 12% of participants reported in-the-moment alcohol use, we were limited to assessing alcohol use as a dichotomous variable and were unable to examine differential effects by amounts of alcohol consumed.

This study has four important strengths. First, we evaluated event-level measures of alcohol use and partner characteristics from the adolescent's most recent sexual experience. Thereby, assuring that alcohol use preceded sex with the partner. Second, we considered four separate measures of partner risk allowing for the creation and evaluation of conceptual and total composite risk variables. Third, unlike many previous studies of STD risk among youth sampling from STD clinic attendees or college students,^{7,11} our study population was a community sample of high school students. Fourth, the large sample size allowed statistical adjustment for several potentially important covariates including gender, race/ethnicity, sex type, and relationship type.

Adolescent boys and girls who are drinking alcohol prior to sex are at increased risk of having age discordant, casual, unexpected, met in public, or multiple risk characteristic partners. Among this general population of primarily low-income, urban high school adolescents, in-the-moment alcohol use and partner risk characteristics were common during the most recent sexual encounter. Further research should investigate whether adolescents use alcohol when they think they might have sex with a risky partner, select risky partners following alcohol use, are exposed to alcohol and risky partners in specific risky contexts, or

are part of a sexual victimization scenario.^{7,30} In the meantime, STD and HIV preventive interventions should target reducing in-the-moment alcohol use and the selection of risky partners following alcohol use.

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Study population

Figure 1.
Flowchart of Study Sample to Analysis Sample

Table 1

Percent of adolescents using alcohol in-the-moment by important characteristics

	In-the-Moment Alcohol Users % (n)	In-the-Moment Alcohol Non-Users % (n)
Total	207	1456
Partner characteristics		
Casual partner	42% (86)	16% (235)
Unexpected partner	21% (44)	16% (234)
3 years age difference	32% (64)	15% (219)
Public meeting place	32% (65)	25% (365)
Partner construct composites		
Partner familiarity		
None	50% (103)	72% (1042)
One	36% (74)	24% (342)
Both	14% (28)	4% (63)
Partner context risk		
None	49% (97)	66% (919)
One	38% (75)	27% (384)
Both	13% (25)	7% (95)
Overall partner risk		
None	23% (45)	47% (657)
One	39% (76)	35% (491)
Two	28% (54)	14% (198)
Three to four	11% (21)	3% (44)
Demographics		
Age (years)		
15 -17	0% (1)	1% (12)
17	36% (73)	43% (617)
18	49% (100)	47% (681)
19	14% (28)	8% (119)
20-22	1% (3)	1% (11)
Race		
Non-Hispanic White	19% (39)	13% (192)
Non-Hispanic Black	53% (110)	56% (822)
Hispanic	28% (58)	30% (442)
Free or Reduced Price Lunch	74% (142)	80% (1074)
Male	60% (124)	44% (638)
Behavioral risks		
Ever use alcohol	98% (203)	72% (1053)
Same Sex Partner	3% (6)	4% (53)
Type of sex		
Oral only	9% (19)	8% (117)

	In-the-Moment Alcohol Users % (n)	In-the-Moment Alcohol Non-Users % (n)
Vaginal only	48% (99)	59% (853)
Anal only	2% (5)	1% (20)
Multiple types	40% (83)	32% (457)

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Table 2

Increased odds of partner risk characteristics between drinking compared to non-drinking teens

	Crude Odds Ratio (95% CI)	Adjusted Odds Ratio^a (95% CI)
Casual	3.7 (2.7, 5.1) *	3.3 (2.3, 4.8) *
Unexpected	1.4 (1.0, 2.0)	1.6 (1.1, 2.5) *
3 years age difference	2.6 (1.9, 3.6) *	2.6 (1.8, 3.8) *
Met in public	1.4 (1.0, 1.9)	1.3 (0.9, 1.9)

^a Adjusted for race, gender, partnership type, sex acts, free lunch, and alternate risk composite (i.e., familiarity risk estimates are adjusted for context risk and context risk estimates are adjusted for familiarity risk).

* Statistically significant at P<0.05

Table 3

Odds of risk level of composite partner risks increases between drinking vs. non-drinking teens

	Crude Odds Ratio (95% CI)			Adjusted Odds Ratio ^a (95% CI)		
	1 to 0	2 to 0	3-4 to 0	1 to 0	2 to 0	3-4 to 0
Familiarity risk	2.2 (1.6, 3.0) *	4.5 (2.8, 7.3) *	---	2.2 (1.5, 3.2) *	4.3 (2.4, 7.7) *	---
Context risk	1.9 (1.3, 2.6) *	2.5 (1.5, 4.1) *	---	1.9 (1.3, 2.7) *	2.6 (1.5, 4.7) *	---
Overall risk	2.3 (1.5, 3.3) *	4.0 (2.6, 6.1) *	7.0 (3.8, 12.7) *	2.4 (1.6, 3.7) *	4.4 (2.7, 7.1) *	7.3 (3.5, 15.0) *

^a Adjusted for race, gender, partnership type, sex acts, free lunch, and alternate risk composite (i.e., familiarity risk estimates are adjusted for context risk and context risk estimates are adjusted for familiarity risk).

* Statistically significant at P<0.05