

Do Drinking Episodes Contribute to Sexual Aggression Perpetration in College Men?

MARIA TESTA, PH.D.,^{a,*} KATHLEEN A. PARKS, PH.D.,^a JOSEPH H. HOFFMAN, M.A.,^a CORY A. CRANE, PH.D.,^a KENNETH E. LEONARD, PH.D.,^a & KATHLEEN SHYHALLA, PH.D.^a

^aResearch Institute on Addictions, University at Buffalo, Buffalo, New York

ABSTRACT. Objective: Survey and experimental analog studies suggest that alcohol consumption contributes to perpetration of sexual aggression. However, few studies have considered the temporal association between naturally occurring episodes of drinking and subsequent sexual aggression. This daily report study was designed to examine whether alcohol consumption increases the odds of aggressive sexual activity within the next 4 hours. **Method:** First-year male college students ($N = 427$) completed daily online reports of drinking and sexual activity for up to 56 days. Multilevel modeling was used to determine whether drinking episodes increased the odds of the following outcomes occurring within 4 hours: (a) aggressive sex with a new partner, (b) non-aggressive sex with a new partner, (c) aggressive sex with a previous partner, and

(d) non-aggressive sex with a previous partner. **Results:** Drinking episodes increased the odds of both aggressive and non-aggressive sex with a new partner. In contrast, drinking episodes did not predict aggression involving previous partners and decreased the odds of non-aggressive sex with a previous partner. Contrary to hypotheses, individual difference variables associated with propensity toward sexual aggression (sexual misperception, antisocial behavior, hostility toward women) did not interact with daily alcohol. **Conclusions:** The complex pattern of results is more consistent with situational as opposed to pharmacological effects of alcohol on sexual aggression and suggests that prevention efforts focus on drinking contexts known to facilitate sexual activity. (*J. Stud. Alcohol Drugs*, 76, 507–515, 2015)

THE ASSOCIATION BETWEEN ALCOHOL USE and sexual aggression among college students has been well established. Alcohol consumption is positively associated with men's perpetration and women's victimization, and at least half of college sexual assaults occur when the perpetrator, the victim, or both are drinking (Abbey, 2002; Abbey et al., 2014; Testa, 2002, for reviews). Evidence for the role of men's drinking in sexual aggression perpetration is based primarily on experimental analog studies and on cross-sectional surveys, which demonstrate that heavier drinking men are more likely to report perpetrating sexual aggression (Abbey et al., 2014; Testa, 2002). Although theory and related research suggest a positive, proximal effect of drinking on sexual aggression, there is little direct evidence supporting such a temporal relationship. The current daily report study was undertaken to examine whether drinking episodes among college men increase their likelihood of using sexually aggressive tactics within the next few hours. We also consider whether the effects of alcohol on sexual aggression are stronger among men with predisposing characteristics.

Proximal effects of alcohol

The positive distal association between men's drinking patterns and sexual aggression perpetration observed in survey research is commonly believed to reflect a proximal effect of alcohol, with sexual aggression occurring during periods of intoxication. Such an effect is consistent with well-established pharmacological effects of alcohol on impaired behavioral inhibition (Casbon et al., 2003; Curtin & Fairchild, 2003; Weafer & Fillmore, 2012) and attention allocation (Steele & Josephs, 1990), whereby drinking increases attention to dominant cues (e.g., sexual arousal) while decreasing sensitivity to nondominant cues (e.g., the woman's objections or lack of interest). Experimental studies support these proximal, pharmacological effects on outcomes relevant to aggression. For example, administered alcohol increases ratings of a female character's sexual arousal and decreases recognition that unwanted sexual advances should stop (e.g., Gross et al., 2001).

Experimental analog studies isolate the pharmacological effects of alcohol on sexual aggression through random assignment to beverage condition. However, in the real world, people choose to drink and typically consume alcohol in social settings that are known to facilitate sexual activity (Norris et al., 1996). For example, frequency of attendance at parties, particularly fraternity/sorority parties, predicted alcohol-related sex with a stranger, independent of the effect of proportion of times drunk across all settings (Bersamin et al., 2012). Thus, pharmacological effects of alcohol on sexual aggression may be enhanced by the characteristics of naturally occurring drinking settings relative to the effects

Received: October 31, 2014. Revision: February 3, 2015.

This research was supported by National Institute on Alcohol Abuse and Alcoholism award number R01AA019478. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Portions of this research were presented at the annual meeting of the Research Society on Alcoholism, June 2014, Bellevue, WA.

*Correspondence may be sent to Maria Testa at the Research Institute on Addictions, University at Buffalo, 1021 Main Street, Buffalo, NY 14203, or via email at: testa@ria.buffalo.edu.

of alcohol in controlled, laboratory studies (e.g., Testa et al., 2006).

Few studies have considered whether naturally occurring drinking episodes contribute to subsequent sexual aggression. Neal and Fromme (2007) used daily report methods to examine the relationship between daily drinking and several behavioral risks over 30 days in a large sample of college students. Their analysis allowed them to distinguish the effects of average blood alcohol concentration (BAC) over all monitoring days from the effects of daily BAC on the odds of various behaviors occurring. There was a positive, between-person effect of average BAC on all outcomes, indicating that people who consumed more alcohol across all days were more likely to engage in sexual coercion (and other risky behaviors) on a given day. There was also a within-person effect of daily BAC on sexual coercion, for men and women, indicating that it was more likely to occur on days of higher BAC. Because the study relied on a single item measure of sexual coercion, without defining the term, it is not clear what participants had in mind when they responded.

Several individual characteristics have been linked to increased risk of perpetration, including antisocial personality, hostile masculinity, and a tendency toward sexual misperception (Parkhill & Abbey, 2008; see Tharp et al., 2013, for a review). Alcohol consumption may interact with these personality characteristics such that drinking leads to sexual aggression only among men predisposed toward sexual aggression (Abbey, 2011). Experimental analog studies provide some support. For example, administered alcohol resulted in lower empathy for a female sexual assault victim among men high in hypermasculinity but higher empathy among men low in hypermasculinity (Norris et al., 1999). Other experimental studies show a similar pattern of interaction of alcohol with sexual dominance (Noel et al., 2009) and rape myth beliefs (Norris et al., 2001). However, to our knowledge, no study has examined whether naturally occurring drinking episodes interact with personality characteristics to increase the odds of sexual aggression among men predisposed toward aggression.

Another important variable to consider in examining the effects of alcohol on sexual aggression is the prior relationship between perpetrator and target. Sexual assaults involving non-intimate or less well-known victims are more likely to include alcohol use by the perpetrator (and victim) than assaults involving intimate partners (Abbey et al., 2003; Koss et al., 1988). Because perpetrators already have ready access to intimate partners, alcohol is unnecessary as a prelude to sexual activity or a means of reducing female resistance. Nonetheless, there is some evidence that men's drinking increases sexual aggression toward intimate partners, both at the distal (Lisco et al., 2012) and event level (Shorey et al., 2014). In contrast, a separate body of literature suggests that the temporal effect of alcohol consump-

tion on the occurrence of sexual activity is specific to new or casual, as opposed to established, partners (Goldstein et al., 2007; Howells & Orcutt, 2014; Kiene et al., 2009; Parks et al., 2011). Alcohol is thought to ease sexual inhibitions in situations in which there are inhibitory and disinhibitory cues of relatively equal strength, such as the decision to have sex with a new partner (see Cooper, 2002, for a review). The positive association between alcohol and sex with new partners may also reflect the situations in which alcohol is consumed, which are widely viewed as preludes to sexual activity, or "hooking up" (e.g., Norris et al., 1996). Nonetheless, it is possible that engaging in sexually aggressive behavior toward an intimate partner may also involve competing cues and thus be influenced by alcohol.

Using daily reports to examine the effects of drinking episodes on sexual aggression

Daily report studies, or intensive longitudinal methods, involve collecting repeated measurements at frequent intervals (Bolger & Laurenceau, 2013). Such designs permit modeling of within-person effects separate from between-person effects. By assessing the occurrence of an event on a given day as well as the time of its occurrence, it is possible to test the hypothesis that drinking episodes increase the odds of sexual aggression occurring later that day. To better understand the generality versus specificity of this hypothesized effect, we considered the impact of drinking episodes on perpetration of sexual aggression toward previous partners separate from aggression toward new partners. We also considered whether the effect of alcohol on sexual aggression differed from the effect of alcohol on sexual activity without aggression. We hypothesized that drinking episodes would increase the odds of subsequent sexual aggression toward new partners and tentatively hypothesized an effect on sexual aggression toward regular partners as well. We also expected to replicate prior research indicating that drinking episodes increase the likelihood of sex with new partners but not sex with regular partners (e.g., Goldstein et al., 2007). Hypotheses were tested using a sample of male college freshmen who drink alcohol. First-year college students have the highest rates of sexual aggression perpetration and victimization, with declines over time (Humphrey & White, 2000; White & Smith, 2004).

Method

Participants and recruitment

Participants consisted of 427 male first-year students at a large public northeastern university who met eligibility criteria based on drinking and sexual activity (described below). The sample was 76% European American, 11% Asian, 8% Hispanic, 4% African American, and 1% other.

Participants were selected from a larger sample of freshman men who entered the university in the fall of 2011 or 2012, were 18 or 19 years old, and participated in a survey study at the end of their first semester ($N = 2,037$). Survey responses were used to identify 669 men who in the first semester reported (a) drinking five or more drinks on one occasion at least twice per month or weekly drinking of any amount and (b) at least one occasion of sexual intercourse with a woman or a hookup (“a romantic or sexual encounter usually lasting only 1 night between two people who are strangers, friends or acquaintances. Some physical interaction is typical but it may or may not involve sexual intercourse.”). These eligibility criteria were designed to maximize within-person variability in alcohol and sex (see Leigh et al., 2008). As expected given their higher levels of drinking, men who met eligibility criteria were more likely to report sexual aggression during the first semester (149/669, 20.9%) compared with men who did not meet eligibility criteria (115/1,368, 8.4%) on either the Sexual Experiences Survey (Abbey et al., 2007) or the Sexual Strategies Survey (Strang et al., 2013). However, because men who report first semester perpetration without meeting eligibility criteria are at risk for second semester perpetration, we invited these men to participate in the 56-day daily report study as well.

Email invitations were sent early in the second semester to 761 men who met eligibility criteria based on drinking and sex ($n = 646$ men) or perpetration only ($n = 115$). Men who requested no future contact were not invited ($n = 17$), and 6 others were not invited because of a programming error. Of the 761 who were invited, 451 (59.3%) completed at least one daily report. Following convention (e.g., Parks et al., 2011), we limited analyses to 427 men who completed five or more daily reports, 359 of whom met eligibility criteria based on drinking and sex, 68 based on perpetration. The eligibility subgroup \times daily alcohol effect was not significant in any analyses, and the pattern of results was not altered by exclusion of the smaller perpetration subgroup. Thus, analyses include all 427 men, regardless of eligibility subgroup.

Procedures

All procedures were approved by the Social and Behavior Sciences Institutional Review Board at the University at Buffalo. Participants provided online consent before completing the fall baseline survey and also before completing the first day’s report in the daily report study. For the next 55 days, participants received daily email reminders containing a link to the daily report. If they missed 1 day of reporting, they were allowed to complete an abbreviated make-up report for that day after completing the current day’s report. Omission of more than 1 day triggered a phone call by project staff to determine whether there were any difficulties and to encourage resumption of reporting. Participants were compensated with Campus Cash as follows: \$10 for each completed week

(6/7 reports) and a \$40 bonus for completing all 8 weeks (maximum \$120).

Measures

Each day, participants were asked, “Since this time yesterday have you consumed any alcoholic beverages?” Positive responses were followed by additional questions, including the time they began drinking, how long the drinking episode lasted, and number of drinks. Number of drinks was Winsorized at 15 (the 95th percentile; Reifman & Keyton, 2010) to reduce the effect of outliers.

Each daily report also asked, “Since this time yesterday, have you hooked up, engaged in any sexual activity, or tried to engage in any sexual activity with a woman (including flirting, kissing, touching, or intercourse)?” This question was deliberately made inclusive to capture any attempts to engage in sexual activity, even when thwarted or unsuccessful. Positive responses were followed by additional questions including time of occurrence; whether intercourse, oral sex, touching, and kissing occurred; and whether the woman was “someone you have been sexually intimate with in the past.” Responses to this last question allowed us to categorize sexual events as involving a previous versus new partner.

Within each reported sexual event, sexual aggression was assessed using three items: (a) “To what extent did you use verbal persuasion to encourage your partner to engage in sexual activity with you?” (b) “. . . use physical pressure or force . . .,” and (c) “. . . encourage her to drink or use drugs as a way of getting her to engage in sexual activity with you?” Items were rated on scales of 1 to 7 ranging from *not at all* to *a great deal*. Because distributions were highly skewed, we created separate dichotomous variables for each type of aggression (verbal persuasion, physical force, encourage to drink) by dividing responses into 1 (no aggression) versus 2–7 (some aggression). We also created a composite dichotomous variable indicating whether there was aggression of any type within the event (response greater than 1 on any of the three items) versus no aggression (response of 1 on all three items).

By asking the hour in which drinking and sexual activity began, we were able to determine the temporal ordering of the two events. For example, a drinking episode beginning at 6 P.M. may contribute to sexual activity occurring at 9 P.M. but not to sex occurring at 5 P.M. Consistent with prior research (Leigh et al., 2008; Testa & Derrick, 2014), we were particularly interested in drinking occurring within 4 hours of the start of a sexual event, since this period includes the time in which pharmacological effects of alcohol are most likely to be present. We created a pro-rated estimate of the number of drinks consumed during the 4 hours before sex began based on the start time of sex and the start and end times of the drinking episode. For example, if six drinks were consumed between 7 P.M. and 9 P.M. and sex occurred

at midnight, we estimated that three drinks were consumed within the 4-hour window (8 P.M.–12 midnight) before sex (i.e., between 8 P.M. and 9 P.M.). For days of drinking without sex, we used total number of drinks within the episode. Based on estimated drinks in the 4 hours before sex and self-reported body weight, we were able to calculate estimated BAC at the time sex began (Widmark, 1981). For days without sex, BAC was calculated based on drinks, duration, and weight. Both the estimated pro-rated drinks variable and BAC were log transformed to reduce skewness. As expected, the two variables were highly correlated ($r = .93$).

On the first day of reporting, participants were asked whether they were in a relationship with a woman (yes/no). The following measures, completed during the baseline survey in the previous fall semester, were also used in analyses:

The Antisocial Behavior Checklist, Adolescent version (Zucker, 2005) is an 18-item measure of the frequency of engaging in delinquent acts (e.g., skipped school, took part in a gang fight). Items are rated on 4-point scales ranging from 1 (*never*) to 4 (*often, 10 or more times*) and summed ($\alpha = .80$).

Hostility toward women (Lonsway & Fitzgerald, 1995) consists of 10 items (e.g., “I am easily angered by women”) rated on 7-point scales ranging from *strongly disagree* to *strongly agree* and summed to create a total score ($\alpha = .84$).

Sexual misperception was assessed using a single, open-ended item that has been shown to discriminate between perpetrators and nonperpetrators: “How many times has a woman been friendly to you only for you to discover that you had misperceived her friendliness as a sexual come-on—she was just trying to be nice but you assumed she was sexually attracted to you?” (Abbey et al., 2001). To reduce the effect of outliers, responses greater than 7 (>95th percentile) were set to 7, and values were then transformed using the reciprocal to further reduce skewness.

Data analysis

Analyses were designed to evaluate whether drinking episodes increase the likelihood of aggressive and non-aggressive sexual events occurring within the next 4 hours. Because alcohol facilitates sex with casual or new partners but not with regular or previous partners (e.g., Parks et al., 2011), we distinguished between sexual encounters with new versus previous partners. Multinomial regression using MPlus Version 7.2 (Muthén & Muthén, 2014) was used to model the odds of each type of sexual encounter occurring versus the probability of having no sex. The multinomial dependent variable was type of sexual encounter: (a) previous partner not aggressive, (b) previous partner aggressive, (c) new partner not aggressive, (d) new partner aggressive, and (e) no sex (the referent category). Data consisted of up to 56 daily reports, modeled at Level 1, for 427 participants, with between-participant effects modeled at Level 2. The Level

1 independent variable of interest was the number of drinks consumed within 4 hours before sex began. This variable was grand mean centered for ease of interpretation (Enders & Tofighi, 2007).

We considered the effect of number of drinking days (grand mean centered) reported by each participant over the 56 days of the study as a between-participant (Level 2) variable. Because drinking is more likely to occur on a weekend (Wood et al., 2007), models controlled for whether reporting day was a weekend (Friday or Saturday) versus weekday. To account for any tendency to decrease reporting of relevant events over time (Barta et al., 2012), models were adjusted for week of the study (1–8). We also controlled for whether the man reported being in a relationship with a woman on Day 1 as a Level 2 variable because being in a relationship was expected to increase the odds of sex with a previous partner while decreasing odds of sex with a new partner.

Subsequent multinomial models considered the impact of individual difference variables known to increase the likelihood of sexual assault perpetration: antisocial behavior, hostility toward women, and sexual misperception (e.g., Parkhill & Abbey, 2008). In three separate models, these grand mean centered variables were examined both as Level 2 main effects and as they interacted with daily alcohol use. This allowed us to test the hypothesis that daily alcohol use would exert a stronger effect on sexual aggression for men with characteristics predisposing them toward aggression compared with men low in such characteristics.

Results

Descriptive data

The 427 participants completed 20,366 out of a possible 23,912 daily reports (85.2%). They reported drinking on 2,284 days (11.2%, range: 0–31 days, median: 3 days), with an average of 6.88 ($SD = 4.32$) drinks per occasion. They engaged in sexual activity on 2,092 days (10.2%, range: 0–47 days, median: 2 days), with most sexual events involving a partner with whom they had previously been sexually intimate (1,783/2,092 or 85.2%). On Day 1, 142/427 men (33.3%) reported being in a relationship with a woman. These men accounted for the majority of sexual events (1,322/2,092 or 63.2%), nearly all of these with a previous partner (1,293/1,322, or 97.8%).

Sexual events involving previous partners differed from those involving new partners; for example, the former included more intimate behaviors (Table 1). Consistent with research showing that alcohol use facilitates sex with new but not previous partners, half of new partner events were preceded by a drinking episode compared with 10.1% of events with previous partners. By way of comparison, 9.5% of days without sexual activity involved drinking. Although average amounts of verbal persuasion, physical pressure,

TABLE 1. Characteristics of sexual events with previous versus new partners

Variable	Previous partner (<i>n</i> = 1,783)	New partner (<i>n</i> = 309)	χ^2 or <i>F</i>
Penetration	56.30%	16.60%	165.54***
Oral sex	47.20%	23.00%	62.95***
Sexual touching	83.80%	60.20%	92.72***
Drinking before sex	10.10%	49.80%	310.04***
Verbal persuasion (1–7)	1.49 (1.14)	2.24 (1.42)	107.26***
Physical force (1–7)	1.35 (1.02)	1.52 (1.03)	7.01*
Intentional intoxication (1–7)	1.09 (0.54)	1.48 (1.03)	99.18***
Any sexual aggression	27.0%	63.3%	170.09***

* $p < .05$; *** $p < .001$.

and encouragement to drink were low, events involving new partners involved higher mean levels of all three types of aggressive tactics. When dichotomized according to whether any aggressive tactic was used, 554 (26.5%) sexual events involved some verbal persuasion, 361 (17.3%) involved some physical pressure, and 140 (6.7%) involved some encouragement to drink. Using the broadest definition of sexual aggression, 678 (32.4%) sexual events included at least one coercive tactic, with events involving new partners significantly more likely to be classified as aggressive compared with events involving previous partners.

Drinking episodes and subsequent sexual activity

Table 2 displays the results of the multinomial analyses predicting each of the four types of sexual events with days of no sex as the referent. Analyses control for the effects of being in a relationship (at Level 2) and of weekend versus weekday and week of the study (at Level 1). Number of drinking days over the 56-day study, a Level 2 variable reflecting between-participant propensity to drink, was positively associated with the occurrence of all four types of sexual events. However, the temporal (Level 1) effect of daily drinking differed according to the type of sexual outcome. As predicted, the more drinks consumed, the higher the odds of having sex with a new partner in the next 4 hours, both with and without the use of aggressive tactics. Although the odds ratio (OR) was higher for aggressive sex with a new partner compared with non-aggressive sex with a new partner, in a separate post hoc comparison of the two categories, this difference was not significant ($p = .15$). In contrast, as more drinks were consumed, the odds of sex with a previous partner in the next 4 hours decreased, an effect that was significant for non-aggressive sex and marginal for aggressive sex.

To ensure that the pattern of results was robust, we repeated the analysis with various changes to the independent and dependent variables. First, we defined the outcome variable based on a more stringent definition of aggression: use of physical aggression or intentional

intoxication (i.e., verbal-only aggression was categorized as not aggressive). The pattern of results was identical. Results were also unchanged when we used BAC as the indicator of daily drinking and when we used a dichotomous variable representing any use of alcohol before sex. We then repeated analyses without accounting for the Level 2 effect of number of drinking days. With omission of the between-person effect, the negative effect of daily drinking on non-aggressive sex with a regular partner became nonsignificant; however, the pattern of results for the other outcomes was unchanged.

The temporal effect of naturally occurring drinking episodes may encompass both pharmacological effects of alcohol and situational effects of drinking context. In an attempt to distinguish between the two, we repeated the above analysis using as the independent variable a tripartite measure of drinking 4 hours before sex consisting of (a) no drinking, (b) drinking fewer than two drinks, and (c) drinking two or more drinks. If significant effects are associated with consumption of fewer than two drinks, this suggests an effect of drinking setting because this dose is insufficient to yield pharmacological effects (Steele & Southwick, 1985). The odds of sex with a new partner, whether aggressive or not, were increased similarly by consumption of a low (OR = 2.78 for non-aggressive, OR = 3.91 for aggressive) or a high (OR = 2.63, OR = 4.20, respectively) dose of alcohol in the previous 4 hours. Consumption of either dose tended to reduce the odds of sex with a previous partner; however, this was significant only for high dose on non-aggressive sex (OR = 0.48).

Are the temporal effects of alcohol moderated by individual characteristics?

To test the hypothesis that alcohol's effects would be stronger for men predisposed toward sexual aggression, we repeated the analysis presented in Table 2 in three separate multinomial models considering (a) antisocial behavior, (b) hostility toward women, and (c) sexual misperception as Level 2 main effects and as they interact with daily alcohol use. There were small main effects, in the expected direction, of antisocial behavior on odds of aggressive sex with a new partner ($p = .017$) and of hostility toward women on aggressive sex with a new ($p = .047$) and previous partner ($p = .028$). However, contrary to the hypothesis that alcohol would exert a stronger effect on men predisposed toward sexual aggression, none of the Personality \times Daily Alcohol interactions was significant. None of the findings presented in Table 2 was altered by the moderator variables and model fit (Bayesian Information Criterion) was smaller, that is better, for the base model than for any of the models including moderators. Because addition of moderators did not improve fit, the model presented in Table 2 is preferred as the most parsimonious.

TABLE 2. Multilevel multinomial models: Effects of daily drinking on aggressive and non-aggressive sex with previous and new partners

Parameter	<i>B</i>	<i>SE</i>	<i>Z</i>	<i>p</i>	OR	[95% CI]
Previous partner—no aggression (<i>n</i> = 1,301)						
Intercept	-3.98	0.23	-17.37			
Relationship status	2.10	0.26	8.52	.000	8.99	[5.42, 14.90]
Drinking days	0.13	0.02	7.64	.000	1.13	[1.10, 1.17]
Drinks 4 hours before	-0.12	0.02	-5.50	.000	0.89	[0.86, 0.98]
Weekend (vs. weekday)	0.48	0.00	5.56	.000	1.61	[1.36, 1.91]
Week of study (1–8)	-0.04	0.02	-2.14	.032	0.97	[0.94, 1.00]
Previous partner—aggressive (<i>n</i> = 482)						
Intercept	-4.15	0.18	-22.92			
Relationship status	1.63	0.22	7.40	.000	5.11	[3.32, 7.89]
Drinking days	0.07	0.02	4.52	.000	1.08	[1.04, 1.11]
Drinks 4 hours before	-0.06	0.03	-1.85	.064	0.95	[0.89, 1.00]
Weekend (vs. weekday)	0.59	0.12	4.95	.000	1.79	[1.42, 2.26]
Week of study (1–8)	-0.16	0.03	-4.98	.000	0.85	[0.80, 0.91]
New partner—no aggression (<i>n</i> = 113)						
Intercept	-5.00	0.26	-19.62			
Relationship status	-0.88	0.32	-2.79	.005	0.42	[0.22, 0.77]
Drinking days	0.07	0.02	3.71	.000	1.07	[1.03, 1.11]
Drinks 4 hours before	0.14	0.04	3.68	.000	1.15	[1.07, 1.24]
Weekend (vs. weekday)	1.30	0.21	6.05	.000	3.65	[2.40, 5.56]
Week of study (1–8)	-0.26	0.05	-5.13	.000	0.77	[0.70, 0.85]
New partner—aggressive (<i>n</i> = 196)						
Intercept	-4.56	0.18	-24.85			
Relationship status	-1.30	0.34	-3.83	.000	0.27	[0.14, 0.53]
Drinking days	0.09	0.02	3.82	.000	1.09	[1.04, 1.14]
Drinks 4 hours before	0.21	0.03	6.75	.000	1.24	[1.16, 1.32]
Weekend (vs. weekday)	0.69	0.20	3.42	.000	2.00	[1.34, 2.97]
Week of study (1–8)	-0.14	0.04	-4.11	.000	0.87	[0.81, 0.93]

Notes: OR = odds ratio; CI = confidence interval. Referent category is days with no sex (*n* = 18,274). Relationship status = in a relationship with a woman on first day of reporting; drinking days = total days out of 56 on which some drinking was reported; drinks 4 hours before = pro-rated, log-transformed number of standard drinks consumed 4 hours before start of sexual event.

Discussion

Findings from this daily report study of male college freshmen provide insight into the role of drinking episodes on subsequent sexual activity, including sexual aggression. However, they do not provide a simple answer to the question of whether—and how—alcohol facilitates sexual aggression. Drinking episodes increased the odds of sexual aggression toward a new partner occurring within the next four hours. However, drinking did not increase the likelihood of sexual aggression toward a previous sexual partner. Drinking also increased the odds of non-aggressive sex with new partners. The facilitative effect of drinking on sex with new but not with previous partners has been shown in several earlier studies (e.g., Goldstein et al., 2007; Parks et al., 2011). Our findings extend this research by showing that when sexual precedence has not been established, the use of verbal persuasion or physical aggression is common, with the majority of new partner events including some use of aggressive tactics.

In contrast to the facilitative effects of alcohol on sex with new partners, drinking reduced the likelihood of sex with a previous partner. This inhibitory effect suggests that drinking may represent an alternative activity to spending intimate time with one's girlfriend and points toward the importance

of situational effects associated with drinking. The negative effect of daily drinking emerged only after we controlled for the effect of number of drinking days, a Level 2 variable. Even within a sample selected because of their alcohol use, there was still a positive between-participant effect of drinking frequency on all types of sexual activity, consistent with findings of Neal and Fromme (2007). Findings highlight the advantage of multilevel modeling, which allows distinguishing of between-person from within-person effects, while serving as a reminder to use caution in extrapolating from between-person to within-person effects (see Reis & Gable, 2000).

The complex pattern of results, indicating that alcohol's effects depend on the type of partner, argues against a pharmacological interpretation of alcohol's effects and toward a situational interpretation. College students perceive alcohol and drinking contexts as a means of meeting new partners and hooking up, and they drink in these contexts to achieve these sexual goals (Kiene et al., 2009; Lindgren et al., 2009; Ven & Beck, 2009). Our results support the importance of drinking contexts in facilitating sex with new partners, showing that even doses of alcohol too small to yield pharmacological effects (e.g., Steele & Southwick, 1985) increased the odds of aggressive and non-aggressive sex with new partners.

Our failure to support the hypothesis that drinking increases sexual aggression with previous partners also argues against a pharmacological explanation for alcohol's effects. The null finding contrasts with the positive findings of Shorey and colleagues (2014); however, there were several methodological differences between the two studies. Shorey and colleagues used the Conflict Tactics Scale sexual coercion subscale (Straus et al., 1996) to assess daily sexual aggression within dating couples and identified only 18 such events. Moreover, their analyses did not account for the between-participant (Level 2) effect of alcohol, which would result in confounding general drinking tendencies with effects of drinking on a given day. Although drinking episodes did not predict these events in our study, sexual aggression events involving previous partners were more common than events involving new partners and deserving of prevention efforts.

Contrary to hypotheses, the individual difference factors that we considered did not moderate the temporal effects of alcohol. Level 2 effects associated with hostility toward women and antisocial behavior were very small and did not improve overall prediction of sexual aggression. Although variables such as hostility toward women have been strong predictors of sexual assault in unselected survey samples (e.g., Thompson et al., 2013), their limited importance in this sample may reflect a truncation of range. That is, participants were selected on the basis of characteristics known to increase risk of sexual aggression (heavy episodic drinking, prior perpetration) and, as such, had scores on antisociality, hostility, and misperception that were much higher than those of nonselected men (results available from the author). Men high in these traits may be particularly likely to seek out drinking contexts that provide the opportunity to use sexually aggressive tactics with a new partner (e.g., fraternity parties).

Limitations

The study's strengths include a large sample and excellent compliance with daily reporting, facilitating generalizability to other samples of male college drinkers. Nonetheless, there are potential limitations associated with various methodological decisions. For example, relationship status was assessed on Day 1 and may have changed over the 56-day reporting period. Men were able to report only a single episode of drinking and of sex each day, potentially omitting some events. Perhaps more important in terms of potential effects on our findings, we assessed sexually aggressive tactics nested within episodes of sexual activity to provide a broader and less blatant assessment of our key outcome. In contrast, previous studies used a single item assessing perpetration of sexual coercion (Neal & Fromme, 2007) or a presentation of multiple sexual coercion items each day (Shorey et al., 2014), independent of assessment of sex. Assessing sexual

aggression within identified episodes of sexual activity may have contributed to the lack of distinction between aggressive and non-aggressive sexual events. However, our method revealed the ubiquity with which sexually aggressive tactics are used, particularly with new partners. Moreover, even with a more stringent definition of sexual aggression (use of physical coercion or deliberate intoxication), we still found the identical pattern of results. Another potential limitation is that for practical and ethical reasons, we were unable to consider the women's perspective in what is essentially a dyadic process. However, because most research on sexual aggression, including data on perpetrator behavior, is derived from victim's reports, data obtained directly from the perpetrator's perspective may also be viewed as a strength (Kolivas & Gross, 2007).

Conclusions and implications for prevention

Findings do not present a clear or simple path to prevention of college sexual assault based on reducing men's drinking. Drinking episodes did not increase risk of sexually aggressive events involving previous partners. Rather, findings suggest that drinking episodes increase the odds of sex with a new partner and that the majority of those sexual events involve some sexually aggressive tactics. Effects are more consistent with situational as opposed to pharmacological effects associated with alcohol, suggesting that college drinking contexts may constitute "hot spots" (Weisburd et al., 2014) deserving of greater attention from campus and community authorities as a way of reducing potential offenses.

Acknowledgment

The authors thank Joseph Lucke for his assistance with data analyses.

References

- Abbey, A. (2002). Alcohol-related sexual assault: A common problem among college students. *Journal of Studies on Alcohol, Supplement 14*, 118–128.
- Abbey, A. (2011). Alcohol's role in sexual violence perpetration: Theoretical explanations, existing evidence and future directions. *Drug and Alcohol Review, 30*, 481–489.
- Abbey, A., Clinton-Sherrod, A. M., McAuslan, P., Zawacki, T., & Buck, P. O. (2003). The relationship between the quantity of alcohol consumed and the severity of sexual assaults committed by college men. *Journal of Interpersonal Violence, 18*, 813–833.
- Abbey, A., McAuslan, P., Zawacki, T., Clinton, A. M., & Buck, P. O. (2001). Attitudinal, experiential, and situational predictors of sexual assault perpetration. *Journal of Interpersonal Violence, 16*, 784–807.
- Abbey, A., Parkhill, M. R., Clinton-Sherrod, A. M., & Zawacki, T. (2007). A comparison of men who committed different types of sexual assault in a community sample. *Journal of Interpersonal Violence, 22*, 1567–1580.
- Abbey, A., Wegner, R., Woerner, J., Pegram, S. E., & Pierce, J. (2014). Review of survey and experimental research that examines the relationship

- between alcohol consumption and men's sexual aggression perpetration. *Trauma, Violence & Abuse*, 15, 265–282.
- Barta, W. D., Tennen, H., & Litt, M. D. (2012). Measurement reactivity in diary research. In M. R. Mehl & J. K. Connor-Smith (Eds.), *Handbook of research methods for studying daily life* (pp. 108–123). New York, NY: Guilford Press.
- Bersamin, M. M., Paschall, M. J., Saltz, R. F., & Zamboanga, B. L. (2012). Young adults and casual sex: The relevance of college drinking settings. *Journal of Sex Research*, 49, 274–281.
- Bolger, N., & Laurenceau, J.-P. (2013). *Intensive longitudinal methods*. New York, NY: Guilford Press.
- Casbon, T. S., Curtin, J. J., Lang, A. R., & Patrick, C. J. (2003). Deleterious effects of alcohol intoxication: Diminished cognitive control and its behavioral consequences. *Journal of Abnormal Psychology*, 112, 476–487.
- Cooper, M. L. (2002). Alcohol use and risky sexual behavior among college students and youth: evaluating the evidence. *Journal of Studies on Alcohol, Supplement 14*, 101–117.
- Curtin, J. J., & Fairchild, B. A. (2003). Alcohol and cognitive control: Implications for regulation of behavior during response conflict. *Journal of Abnormal Psychology*, 112, 424–436.
- Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, 12, 121–138.
- Goldstein, A. L., Barnett, N. P., Pedlow, C. T., & Murphy, J. G. (2007). Drinking in conjunction with sexual experiences among at-risk college student drinkers. *Journal of Studies on Alcohol and Drugs*, 68, 697–705.
- Gross, A. M., Bennett, T., Sloan, L., Marx, B. P., & Juergens, J. (2001). The impact of alcohol and alcohol expectancies on male perception of female sexual arousal in a date rape analog. *Experimental and Clinical Psychopharmacology*, 9, 380–388.
- Howells, N. L., & Orcutt, H. K. (2014). Diary study of sexual risk taking, alcohol use, and strategies for reducing negative affect in female college students. *Journal of Studies on Alcohol and Drugs*, 75, 399–403.
- Humphrey, J. A., & White, J. W. (2000). Women's vulnerability to sexual assault from adolescence to young adulthood. *Journal of Adolescent Health*, 27, 419–424.
- Kiene, S. M., Barta, W. D., Tennen, H., & Armeli, S. (2009). Alcohol, helping young adults to have unprotected sex with casual partners: Findings from a daily diary study of alcohol use and sexual behavior. *Journal of Adolescent Health*, 44, 73–80.
- Kolivas, E. D., & Gross, A. M. (2007). Assessing sexual aggression: Addressing the gap between rape victimization and perpetration prevalence rates. *Aggression and Violent Behavior*, 12, 315–328.
- Koss, M. P., Dinero, T. E., Seibel, C. A., & Cox, S. L. (1988). Stranger and acquaintance rape: Are there differences in the victim's experience? *Psychology of Women Quarterly*, 12, 1–24.
- Leigh, B. C., Vanslyke, J. G., Hoppe, M. J., Rainey, D. T., Morrison, D. M., & Gillmore, M. R. (2008). Drinking and condom use: Results from an event-based daily diary. *AIDS and Behavior*, 12, 104–112.
- Lindgren, K. P., Pantalone, D. W., Lewis, M. A., & George, W. H. (2009). College students' perceptions about alcohol and consensual sexual behavior: Alcohol leads to sex. *Journal of Drug Education*, 39, 1–21.
- Lisco, C. G., Parrott, D. J., & Tharp, A. T. (2012). The role of heavy episodic drinking and hostile sexism in men's sexual aggression toward female intimate partners. *Addictive Behaviors*, 37, 1264–1270.
- Lonsway, K. A., & Fitzgerald, L. F. (1995). Attitudinal antecedents of rape myth acceptance: A theoretical and empirical reexamination. *Journal of Personality and Social Psychology*, 68, 704–711.
- Muthén, L. K., & Muthén, B. O. (2014). *MPlus user's guide* (7th ed.). Los Angeles, CA: Authors.
- Neal, D. J., & Fromme, K. (2007). Event-level covariation of alcohol intoxication and behavioral risks during the first year of college. *Journal of Consulting and Clinical Psychology*, 75, 294–306.
- Noel, N. E., Maisto, S. A., Johnson, J. D., & Jackson, L. A., Jr. (2009). The effects of alcohol and cue salience on young men's acceptance of sexual aggression. *Addictive Behaviors*, 34, 386–394.
- Norris, J., George, W. H., Davis, K. C., Martell, J., & Leonasio, R. J. (1999). Alcohol and hypermasculinity as determinants of men's empathic responses to violent pornography. *Journal of Interpersonal Violence*, 14, 683–700.
- Norris, J., Martell, J., & George, W. H. (2001). Men's judgments of a sexual assailant in an eroticized rape: The role of rape myth attitudes and contextual factors. In M. Martinez (Ed.), *Prevention and control of aggression and the impact on its victims* (pp. 249–254). New York, NY: Kluwer Academic/Plenum.
- Norris, J., Nurius, P. S., & Dimeff, L. A. (1996). Through her eyes: Factors affecting women's perception of and resistance to acquaintance sexual aggression threat. *Psychology of Women Quarterly*, 20, 123–145.
- Parkhill, M. R., & Abbey, A. (2008). Does alcohol contribute to the confluence model of sexual assault perpetration? *Journal of Social and Clinical Psychology*, 27, 529–554.
- Parks, K. A., Hsieh, Y.-P., Collins, R. L., & Levonyan-Radloff, K. (2011). Daily assessment of alcohol consumption and condom use with known and casual partners among young female bar drinkers. *AIDS and Behavior*, 15, 1332–1341.
- Reifman, A., & Keyton, K. (2010). Winsorize. In N. J. Salkind (Ed), *Encyclopedia of research design* (pp. 1636–1638). Thousand Oaks, CA: Sage.
- Reis, H. T., & Gable, S. L. (2000). Event-sampling and other methods for studying everyday experience. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 190–222). New York, NY: Cambridge University Press.
- Shorey, R. C., Stuart, G. L., McNulty, J. K., & Moore, T. M. (2014). Acute alcohol use temporally increases the odds of male perpetrated dating violence: A 90-day diary analysis. *Addictive Behaviors*, 39, 365–368.
- Steele, C. M., & Josephs, R. A. (1990). Alcohol myopia: Its prized and dangerous effects. *American Psychologist*, 45, 921–933.
- Steele, C. M., & Southwick, L. (1985). Alcohol and social behavior I: The psychology of drunken excess. *Journal of Personality and Social Psychology*, 48, 18–34.
- Strang, E., Peterson, Z. D., Hill, Y. N., & Heiman, J. R. (2013). Discrepant responding across self-report measures of men's coercive and aggressive sexual strategies. *Journal of Sex Research*, 50, 458–469.
- Straus, M. A., Hamby, S. L., Boney-McCoy, S., & Sugarman, D. B. (1996). The Revised Conflict Tactics Scales (CTS 2): Development and preliminary psychometric data. *Journal of Family Issues*, 17, 283–316.
- Testa, M. (2002). The impact of men's alcohol consumption on perpetration of sexual aggression. *Clinical Psychology Review*, 22, 1239–1263.
- Testa, M., & Derrick, J. L. (2014). A daily process examination of the temporal association between alcohol use and verbal and physical aggression in community couples. *Psychology of Addictive Behaviors*, 28, 127–138.
- Testa, M., Vanzile-Tamsen, C., Livingston, J. A., & Buddie, A. M. (2006). The role of women's alcohol consumption in managing sexual intimacy and sexual safety motives. *Journal of Studies on Alcohol*, 67, 665–674.
- Tharp, A. T., DeGue, S., Valle, L. A., Brookmeyer, K. A., Massetti, G. M., & Matjasko, J. L. (2013). A systematic qualitative review of risk and protective factors for sexual violence perpetration. *Trauma, Violence & Abuse*, 14, 133–167.
- Thompson, M. P., Swartout, K. M., & Koss, M. P. (2013). Trajectories and predictors of sexually aggressive behaviors during emerging adulthood. *Psychology of Violence*, 3, 247–259.
- Ven, T. V., & Beck, J. (2009). Getting drunk and hooking up: An exploratory study of the relationship between alcohol intoxication and casual coupling in a university sample. *Sociological Spectrum: Mid-South Sociological Association*, 29, 626–648.
- Weafer, J., & Fillmore, M. T. (2012). Comparison of alcohol impairment of

- behavioral and attentional inhibition. *Drug and Alcohol Dependence*, 126, 176–182.
- Weisburd, D., Groff, E. R., & Yang, S.-M. (2014). Understanding and controlling hot spots of crime: The importance of formal and informal social controls. *Prevention Science*, 15, 31–43.
- White, J. W., & Smith, P. H. (2004). Sexual assault perpetration and re-perpetration: From adolescence to young adulthood. *Criminal Justice and Behavior*, 31, 182–202.
- Widmark, E. M. P. (1981). *Principles and applications of medico-legal alcohol determination*. Davis, CA: Biomedical Publications.
- Wood, P. K., Sher, K. J., & Rutledge, P. C. (2007). College student alcohol consumption, day of the week, and class schedule. *Alcoholism: Clinical and Experimental Research*, 31, 1195–1207.
- Zucker, R. A. (2005). *Manual for the Antisocial Behavior Checklist*. Ann Arbor, MI: University of Michigan, Departments of Psychiatry and Psychology and Addiction Research Center.