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Drinking with mixed-gender groups is associated with heavy weekend drinking among young adults

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Abstract

Aims—To investigate how gender composition of the drinking group affects young adults' alcohol consumption on weekend evenings over and above the effect of drinking-group size.

Design—Using the Internet-based cell phone-optimized assessment technique (ICAT), participants completed online questionnaires on their cell phones every hour from 8 p.m. to midnight on Thursday, Friday, and Saturday evenings over five consecutive weekends.

Setting—French-speaking Switzerland.

Participants—Convenience sample of 183 young adults (53.0% female, mean age=23.1) who completed a total of 4,141 hourly assessments.

Measurements—Alcohol consumption and number of male and female friends present assessed at 8 p.m., 9 p.m., 10 p.m., 11 p.m., and midnight.

Findings—Results of three-level negative binomial regression analyses showed that women consumed significantly more drinks per hour when drinking in mixed-gender groups (z-values ranging from 2.9 to 5.3, all $p<.01$) and significantly fewer drinks when drinking with men only ($z=-2.7$, $p<.01$), compared with drinking with women only. Men reported consuming more drinks per hour in mixed-gender groups of equal gender composition ($z=2.4$, $p<.05$) or mixed-gender groups with men in the majority ($z=2.2$, $p<.05$), and fewer hourly drinks when drinking with women only ($z=-4.9$, $p<.001$), compared with drinking with men only. Drinking-group size predicted the hourly number of drinks for women ($z=6.0$, $p<.001$) and men ($z=5.5$, $p<.001$).

Conclusions—Drinking-group gender composition is associated with number of drinks consumed per hour, over and above the impact of the drinking-group size. Young adults report consuming more drinks per hour when drinking with mixed-gender groups than with same-gender groups.

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Keywords

alcohol use; event-level; young adults; gender; group composition; multilevel models

Introduction

Excessive drinking among young people primarily occurs on Friday and Saturday nights (1) and is associated with a significant risk of adverse psychological, social, and physical health consequences, including injuries, unplanned sex, and academic failure (2,3). While heavy weekend drinking is highly prevalent, evidence based on event-level data collected in natural drinking environments is scarce concerning which factors predict alcohol use and the amounts of alcohol consumed during these drinking events. This knowledge is crucial to improve our understanding of situational drivers of alcohol use in real-world settings and can help to develop targeted prevention messages to curb harmful drinking among young adults.

The social context during a drinking occasion can impact drinking behavior (4). Previous studies found that a larger drinking-group size was associated with heavier alcohol use among the group members (5,6). Using event-level data collected in the participants' natural environment, we previously reported that the greater the number of friends present, the more drinks were consumed at any given hour over the course of the evening (7). While this effect was observed for both genders, the impact of the number of friends present was stronger for men than for women.

Beyond the drinking-group size, the presence or absence of opposite-gender friends may also play an important role in nightlife drinking behavior among young adults. Risky drinking is associated with higher peer status among young adults (8,9) and alcohol use is an important factor in sexual "hookup" culture and courtship behavior (10–12). It may also matter whether the drinking group consists of same-gender or mixed-gender companions. However, the few studies that have investigated the relationship between gender composition of the group and young adults' drinking behavior have reported inconsistent results. One observational study in bars found that members of same-gender groups engaged in heavier drinking than the ones in mixed groups (13), while another observational study reported that presence or absence of group members of the opposite gender did not affect the number of drinks consumed by young adult study participants (14). A retrospective survey study did not find an effect of mixed vs. same-gender groups on the number of drinks consumed per occasion (15) and a more recent study also reported no significant impact of the group gender composition on blood alcohol concentration (16).

One reason for these inconsistent findings may be that the gender composition of the group may impact the drinking behavior of men and women differently. One observational study in public drinking places suggested such an effect: Men drank faster in all-male groups than in mixed-gender groups, while the opposite was found for women, who drank more slowly when drinking in all-female than in mixed-gender groups (17). Women may drink more heavily in mixed-gender groups because they are offered drinks by men, or because they want to conform to perceived social norms (18), to make a favorable impression on young

men in their drinking group (19), or imitate the behavior of the more heavily drinking male group members (20,21). For women, previous research also suggests that same-sex friends may have a protective effect on alcohol use by promoting less permissive drinking norms (22–24). On the other hand, young men tend to perceive pressure to drink from their male peers (24) and engage in pre-drinking in all-male groups before going to public venues such as bars and nightclubs (25). These findings highlight the need for studies to investigate the effects of gender composition of the drinking group on alcohol consumption in both men and women.

In sum, there is inconsistent evidence on the impact of gender composition of the drinking group on alcohol use in real-world settings and current studies are scarce. The generalizability of earlier findings is limited since retrospective assessments of alcohol consumption are subject to recall bias (26,27) and observational studies in bars only allow for limited data collection with regard to time and location (28). Further, previous studies mainly investigated the differences between mixed- and same-gender groups without more detailed differentiation of group gender composition (e.g., whether men or women are in the majority) and few studies have examined how gender composition of the drinking group may affect men and women differently.

Study aims

To address gaps in the current literature, we used Ecological Momentary Assessment (EMA), a method for collecting self-reported data from study participants in near real-time, to assess both alcohol use and drinking-group characteristics in the natural environment with minimal recall bias (29). The present study aims to investigate the impact of gender composition of the drinking group on drinking behavior among young adult men and women on weekend evenings over and above the effect of drinking-group size.

Methods

Procedure and participants

The Internet-based cell phone-optimized assessment technique (ICAT) (30) consists of a baseline Internet questionnaire completed after online registration and a series of online questionnaires completed on participants' personal cell phones. We recruited students from three higher education institutions in French-speaking Switzerland, the Lausanne Hotel School (1,200 students), the Apprenticeship School in Lausanne (500 students), and the University of Applied Sciences in Geneva (3,500 students). All students at these schools were sent an email invitation directing them to the study registration website. Consented and enrolled participants were sent text messages (hourly from 8 p.m. to midnight, and one the next morning at 11 a.m.) containing a hyperlink to complete a questionnaire in their cell-phone browser every Thursday, Friday, and Saturday evening for five weeks between April and July 2010. All study procedures were approved by the ethical committee of Lausanne University (Canton de Vaud Protocol No. 223/08).

During the one week recruitment period, 276 participants enrolled. We excluded participants for not completing any cell phone assessments (n=24, 8.7%), not reporting any alcohol use

during the study period (n=16, 5.8%), or missing more than two assessments on every evening (n=53, 19.2%). This left 183 participants, who submitted 7,828 assessments over 1,441 evenings. Data of missing assessments (n=818) were imputed by means of chained equations using the Stata ICE procedure (31). More information about this study design and sample is provided elsewhere (7,32–34). Since the question assessing the number of friends present was not included in the next day's questionnaire at 11 a.m., 623 observations (8.0%) were excluded. For the purpose of the present paper, an additional 3,064 observations (39.1%) with no male or female friend present were excluded. Our analyses are thus based on 183 participants (97 women, 53.0%; mean age=23.1, SD=3.1), providing 4,141 hourly assessments (22.6 assessments per participant).

Measures

Baseline questionnaire (individual level)—Participants were asked to indicate their age and gender.

Cell-phone questionnaires (assessment level)—To assess the *number of drinks per hour*, participants were asked, “How many of the following alcoholic drinks did you have between...?” with the time frames of the five assessments being 5-8 p.m., 8-9 p.m., 9-10 p.m., 10-11 p.m., and 11 p.m.-midnight. With separate questions, participants could indicate how many of the following drinks they had consumed in the given time frame: beer, wine or champagne, aperitifs (e.g., Port) or liqueurs, (straight) spirits, self-mixed drinks (e.g., whiskey and coke) or cocktails, and alcopops (pre-mixed drinks). The six answer categories ranged from “0” to “five or more” (coded as 5.5). Due to the extended time period of the first assessment (i.e. 5-8 p.m.), two-thirds of the indicated consumption was taken to approximate the consumption before 8 p.m. (32,35). For example, three reported drinks between 5 and 8 p.m. were coded as two drinks.

To assess the *number of friends present*, participants were asked, “How many people were you with between...?” with the same time frames mentioned above. Two questions asked participants to indicate respectively how many male and female friends were present in the given time frame (response options: “Male friends (including your romantic partner)” and “Female friends (including your romantic partner)”). The five answer categories ranged from “0” to “more than 20” (coded as 23.5). For each time frame, the numbers of male and female friends were added together to create a measure of total friends present.

Group gender composition was calculated based on the number of male and female friends present and classified in five categories: 1) women only, 2) more women than men, 3) equal numbers of men and women, 4) more men than women, and 5) men only.

Statistical analyses

Descriptive statistics were used to investigate hourly number of drinks and number of friends by group gender composition. Since the outcome hourly number of drinks was an overdispersed count variable, significant differences were investigated using negative binomial regression analyses.

To answer our main research question, three-level negative binomial regression analyses were conducted to account for the nested structure of the data (hourly assessments nested within evenings nested within individuals) and hourly number of drinks was used as the outcome variable. The main predictor of interest was group gender composition (hourly assessment level). Since we intended to investigate the impact of group gender composition over and above the group size (7), the model included the total number of friends present as a covariate (hourly assessment level). We included dummy variables for weekend day (evening level) to adjust for daily differences in hourly number of drinks. Thursday was chosen as the reference category because previous publications found that the amounts of alcohol consumed were lower on this weekday than on Fridays and Saturdays (7,32). No predictors were included at the individual level and it was only used to account for the nested data structure. Separate models for men and women were estimated to account for expected differences between genders (17). Women drinking with all-female groups and men drinking with all-male groups were used as the reference categories for drinking-group gender composition, respectively. This approach was chosen because estimating one model for both men and women and including interaction effects would not have given us the option to use the specific same-gender reference categories. Pairwise post-hoc analyses were conducted to investigate significant differences between all other pairs of the group gender composition predictor (Chi-square tests). Since previous studies investigating event-level drinking have reported associations between beverage choice (e.g., consumption of straight spirits) and risky drinking (36,37), we estimated additional models controlling for the consumption of straight spirits or spirit-based self-mixed drinks at every time point. Controlling for this additional predictor did not change the associations between drinking-group gender composition and number of drinks (results not shown, but available upon request). All analyses were conducted with Stata 14 (38).

Results

Descriptive results

The associations between gender composition of the drinking group and hourly number of drinks were similar for women and men (Table 1), i.e. a greater number of drinks per hour was generally observed in mixed-gender drinking groups compared to drinking with same-gender groups for both women and men (Table 2). Post-hoc pairwise comparisons between all remaining group gender compositions can be found in Table 3 (values above the diagonal). With regard to drinking-group size, groups of equal gender composition were the largest groups for both women and men.

Multilevel negative binomial regression analyses predicting number of drinks per hour

Compared to drinking with groups of only women, women consumed significantly more drinks per hour when drinking with mixed-gender groups and significantly fewer drinks per hour when drinking with only men (Table 4). We further examined pairwise post-hoc differences between all other pairs of gender group compositions (Table 3 – values below the diagonal). These comparisons suggested that women consumed the largest hourly number of drinks in mixed-gender groups where men were in the majority and the lowest hourly

number of drinks when drinking with all-male groups after accounting for the drinking-group size and weekend day.

Compared to drinking with groups of only men, men reported consuming more drinks per hour in mixed-gender groups of equal gender composition or mixed-gender groups with men in the majority, and fewer drinks per hour when drinking with women-only groups (Table 4). Pairwise comparisons between all other pairs of the group gender composition predictor indicated no significant differences between all pairs of mixed-gender groups whether men or women were in the majority or were in equal numbers. However, the results indicated that men had the lowest hourly number of drinks when drinking with all-female drinking groups (Table 3 – values below the diagonal).

For both men and women, the number of friends, i.e. the drinking-group size, was positively associated with number of drinks consumed per hour and men but not women consumed more drinks per hour on Saturdays than on Thursdays (Table 4).

Discussion

The aim of this study was to investigate the impact of gender composition of drinking groups on young adults' alcohol use on weekend evenings using event-level data collected in the natural environment. Compared to same-gender groups, a greater number of drinks per hour was reported when participants were drinking with mixed-gender groups. Both men and women consumed fewer drinks per hour when drinking with groups of all-opposite-gender members (e.g., men drinking with all-female groups, women drinking with all-male groups) compared to same-gender groups. All the effects of group gender composition emerged over and above the impact of the drinking-group size (7).

The finding that more alcohol is generally consumed in mixed-gender groups contrasts previous studies that reported greater alcohol use in same-gender groups (13) or no association between gender composition of the group and alcohol consumption (14–16). When comparing our results to previous studies that investigated the effect of gender composition of the drinking group on alcohol consumption, it should be noted that such comparisons are limited by differences in study methodology. To the best of our knowledge this is the first study to investigate this research question on the basis of self-reported event-level drinking behavior collected in the participants' natural environment. Our data collection technique minimizes recall bias (26), while allowing us to observe the same study participants over multiple evenings and locations – another limitation of previous studies (28).

A hypothetical explanation for alcohol consumption being higher in mixed than in same-gender groups may be the role alcohol plays in flirting and hooking-up among young adults (10–12). Several factors may increase drinking behavior of women in mixed-gender groups: They may imitate the heavy drinking of male group members (20,21), perceive permissive drinking norms (18), or want to make a positive impression on men in their drinking group (19). On the other hand, drinking with groups consisting of a higher proportion of women seems to have a protective effect on how much women drink. This finding is consistent with

a previous study on the associations of gender-friendship groups with alcohol use, which showed that a higher proportion of same-gender friends was associated with lower weekly alcohol consumption among female college students (23). Drinking norms among all-female groups may be less permissive (22,24). Furthermore, women engage in less event-level drinking than men (7,32), and may thus function as models for the moderation of alcohol use in other women. The finding that women reported lower alcohol consumption when drinking with all-male groups may further reflect their possible concerns about negative consequences of heavy drinking. Past research found that women tend to avoid being alone in male-dominated spaces such as bars out of fear of unwanted interactions or (sexual) violence (39).

For men, the picture is less clear. Like women, men also consumed the highest amounts of alcohol when drinking with mixed-gender groups of equal gender composition or mixed-gender groups where men were in the majority. Alcohol consumption was significantly lower when men were drinking in groups of all women. Notably, men also consumed relatively high quantities of alcohol when drinking with all-male groups. This is consistent with young men's perceived pressure to drink in order to fit in with their peers (24) or to maintain their social status among their peers (9). Moreover, previous research suggests that pre-drinking of alcohol among exclusively male groups in the nightlife setting serves a functional role, namely to prepare for flirting with women (25).

We also found that both men's and women's alcohol consumption was generally low when drinking with opposite-gender-only drinking groups, and these drinking events consisted of a high proportion of dyadic group situations (84.5% for women, 79.6% for men). We speculate that these situations may be dates or romantic evenings with a partner and this finding may thus reflect young adults’ desires to show a favorable image of themselves in an intimate dyadic dating situation. In these situations, negative expectancies of high alcohol consumption (e.g., “I might say stupid things” or “I might become gloomy”), which have been shown to predict reduced alcohol use among young adults (40), may be responsible for the low number of drinks reported.

Limitations and strengths

The current study investigated associations between characteristics of drinking groups and drinking behavior among young adults. There may be unobservable reasons for why drinkers gather in drinking groups of different gender compositions and sizes, and these reasons may be independently associated with the quantities of alcohol consumed. We operationalized the drinking group as friends present and did not include other people who may have been present as well (e.g., family members, acquaintances, unknown people). Moreover, this study did not assess the friends’ drinking behavior, which may have a separate impact. In addition, drinking location was not controlled for in the current analyses. We did not collect data on special events, such as birthdays or campus parties, or on other situational factors that may have an influence on drinking-group gender composition and size, as well as on drinking behavior. Future studies in this area are needed to investigate whether drinking-group characteristics truly cause differences in the drinking behavior of group members. Our findings are based on a relatively small convenience sample of college students from two

cities in Switzerland, and may not apply to community samples or other cultural contexts. Also, we did not assess participants' sexual orientation and associations found may not be illustrative of young sexual- and gender-minority adults' preferences and behaviors. Among the study's strengths is the unique design, which allowed us to assess a large number of drinking situations over the course of the evening. The analyzed data are based on reports of drinking behavior on more than 1,000 evenings among 183 students, collected over five weekends. This suggests that our findings are robust across different settings and special drinking events. By collecting event-level data at hourly intervals and in the participants' natural drinking environment, this study minimized recall bias while maximizing ecological validity (27,29).

Conclusions

Based on event-level data for drinking situations, we found that the drinking-group gender composition has an impact on young adults' drinking behavior independently of the drinking-group size. Overall, a greater number of drinks per hour was reported in mixed-gender than in same-gender groups, and both men and women consumed fewer drinks per hour when drinking with only opposite-gender drinking groups. Our findings show that EMA is a useful method for investigating group-level influence factors on young adults' alcohol use in the natural environment and in near real-time. Fine-grained event-level data such as ours could be used to derive typologies of drinking practices (41). In addition, the results of this study could be incorporated into brief interventions aimed at reducing risky alcohol use among young adults (42–44). For example, tailored messaging on mobile devices has been shown to reduce the number of drinks consumed by college students (45). Our results suggest that these interventions should assess the situational context of the drinking event and include information on the impact of drinking-group characteristics on drinking behavior. Smartphone-based mobile health interventions could assess the situational context either by self-reports or by relying on smartphone or wearable sensor data and deliver situationally tailored just-in-time or ecological momentary interventions (EMIs) (46–48). In high-risk situations for excessive alcohol use, such as – according to our data – events at which young adults are drinking with large, mixed-gender drinking groups, intervention messages could inform participants of potential risks associated with these situations and promote protective behavioral strategies for reducing alcohol use (49).

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Table 1

Mean hourly number of drinks and number of friends (standard deviations in brackets) by group gender composition for women and men

	Women (N=97 participants, N=616 evenings)			Men (N=86 participants, N=530 evenings)		
Group gender composition	**Number of hourly assessments**	**Number of drinks (M, SD)**	**Number of friends (M, SD)**	**Number of hourly assessments**	**Number of drinks (M, SD)**	**Number of friends (M, SD)**
Women only	715	0.45 (0.84)	2.49 (2.86)	595	0.58 (1.03)	1.49 (1.46)
Women > men	187	0.84 (1.24)	8.60 (7.07)	134	1.38 (1.75)	7.29 (6.27)
Women = men	549	1.12 (1.45)	13.81 (13.63)	466	1.56 (1.73)	13.53 (12.78)
Women < men	173	1.25 (2.39)	8.09 (7.61)	126	1.40 (1.62)	9.41 (7.19)
Men only	618	0.35 (0.94)	1.47 (1.74)	578	1.01 (1.54)	3.86 (4.68)

Table 2

Negative binomial regression models predicting hourly number of drinks separately for women and men

	Women		Men	
	Coef (SE)	**z**	**Coef (SE)**	**z**
Group gender composition				
Women only	Reference	-	−0.558 (0.090)	-6.2^{***}
Women > men	0.617 (0.135)	4.6^{***}	0.314 (0.127)	2.5^{*}
Women = men	0.905 (0.095)	9.6^{***}	0.432 (0.083)	5.2^{***}
Women < men	1.011 (0.131)	7.7^{***}	0.326 (0.131)	2.5^{*}
Men only	−0.246 (0.108)	-2.3^{*}	Reference	-

Note:

**p<.01

*p<.05

***p<.001.

Table 3

Pairwise post-hoc comparisons (Chi-square values) based on parameter estimates from the negative binomial regression models (above the diagonal) and the multilevel negative binomial regression models (below the diagonal), which accounted for clustering of data (hourly assessments nested within evenings nested within individuals), and controlled for weekend day as well as drinking-group size.

Models: Women	Women > men	Women = men	Women < men	Men only
Women > men	-	4.8*	6.1*	37.1***
Women = men	0.3	-	0.7	123.7***
Women < men	5.4*	5.7*	-	83.5***
Men only	24.8***	39.7***	56.7***	-

Models: Men	Women only	Women > men	Women = men	Women < men
Women only	-	43.4***	120.5***	42.8***
Women > men	31.6***	-	0.9	0.0
Women = men	48.8***	0.0	-	0.7
Women < men	34.7***	0.3	0.3	-

Note:

**p<.01

*p<.05

***p<.001.

Table 4

Negative binomial regression models (three-level models – hourly assessments, evenings, individuals) predicting hourly number of drinks separately for women and men

	Women			Men		
	Coef (SE)	**z**	**IRR (95% CI)**	**Coef (SE)**	**z**	**IRR (95% CI)**
Group gender composition						
Women only	Reference	-	-	−0.535 (0.110)	−4.9***	0.59 (0.47-0.73)
Women > men	0.408 (0.140)	2.9**	1.50 (1.14-1.98)	0.207 (0.126)	1.6	1.23 (0.96-1.58)
Women = men	0.475 (0.119)	4.0***	1.61 (1.27-2.03)	0.221 (0.094)	2.4*	1.24 (1.04-1.50)
Women < men	0.770 (0.144)	5.3***	2.16 (1.63-2.86)	0.284 (0.127)	2.2*	1.32 (1.04-1.70)
Men only	−0.365 (0.133)	−2.7**	0.69 (0.53-0.90)	Reference	-	-
Covariates						
Number of friends	0.025 (0.004)	6.0***	1.03 (1.02-1.03)	0.022 (0.004)	5.5***	1.02 (1.01-1.03)
Fridays	0.077 (0.136)	0.6	1.08 (0.82-1.41)	0.182 (0.122)	1.5	1.20 (0.94-1.52)
Saturdays	0.231 (0.124)	1.9	1.26 (0.99-1.61)	0.478 (0.115)	4.2***	1.61 (1.29-2.02)

Note: SE = standard error; IRR = incidence-rate ratio (e.g., value of 1.50 means 50%-greater number of drinks compared to reference category); CI = confidence interval

*p<.05

**p<.01

***p<.001.

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