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University Students Use Fewer Protective Behavioural Strategies on High-Intensity Drinking Days

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Abstract

Introduction and Aims: High-intensity drinking (HID), or consuming 8+ (10+) drinks in one sitting for women (men), is associated with significant harm. We compared the likelihood of individuals using protective behavioural strategies (PBS) on days with varying levels of drinking (HID, heavy episodic-only drinking [HED; 4–7/5–9 drinks for women/men], moderate drinking [1–3/1–4 drinks]).

Design and Methods: We used an intensive repeated measures longitudinal design with four 14-day measurement bursts across two years (N= 258 university students [50.0% female, average age of 19.95 (SD = 0.41) years] who provided 3,176 daily drinking reports). Each drinking day, participants reported the amount of alcohol consumed and whether they used PBS.

Results: Multilevel models indicated that, relative to HED-only days, students were more likely to use strategies of avoiding drinking too quickly on moderate drinking days (OR = 1.90, CI = 1.50–2.40) but less likely on HID days (OR = 0.38, CI = 0.29–0.48). Relative to HED-only days, students were less likely to use strategies to protect themselves from serious harm on moderate days (OR = 0.53, CI = 0.41–0.67), and equally likely on HID days (OR = 0.84, CI = 0.93–1.41).

Discussion and Conclusions: Despite elevated risk for alcohol-related harms when drinking most heavily, PBS may be under-utilised on higher-risk drinking occasions. In light of prior work supporting the effectiveness of PBS at reducing harms on HID days, increasing PBS should be emphasized in future prevention and intervention efforts.

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Keywords

high-intensity drinking; protective behavioural strategies; measurement-burst design

Heavy episodic drinking (HED; 4+/5+ drinks in one sitting for women/men) is common among young adults [1], and many in this age group drink at two or more times these thresholds [2]. High-intensity drinkers (people who consume 8+/10+ drinks) are at greater odds of experiencing negative consequences, including alcohol-induced injury, passing out from drinking [3], and alcohol use disorder than HED-only drinkers (4–7 drinks/5–9 drinks) [4]. Harms are also more likely on high-intensity drinking (HID) days than other drinking days [5,6]. While elevated risks of HID are known, factors that may decrease the likelihood of experiencing HID-related harms have not been examined. Recent work suggests that protective behavioural strategy (PBS) use is especially effective in reducing harms on HID relative to HED-only days [5], but it remains unknown whether individuals are more or less inclined to use PBS when engaging in HID. PBS may be *more* frequently employed on HID days if individuals plan safety measures because they intend to drink heavily. Alternatively, PBS could be *less* frequently used due to perceptions that using PBS interferes with drinking goals or if HID is not intended. If PBS are underutilised on HID days, findings would suggest PBS as a target for interventions with high-intensity drinkers.

We used a measurement-burst daily design across four university semesters to examine associations between HID and PBS use at the day-, semester-, and person-level. To determine whether HID days are uniquely associated with PBS use beyond *any* heavy drinking, we compared PBS use on HID days to HED-only days. We also compared PBS use between HED-only days and moderate drinking (1–3/1–4 drinks) days. We focused on associations between level of drinking and PBS intended to reduce consequences: serious harm reduction (SHR) PBS (e.g., use a designated driver) and manner of drinking (MOD) PBS (e.g., avoid drinking quickly) [7]. Limiting/Stopping drinking PBS (e.g., pre-plan drinking limits) were not included because they target *amount* of alcohol consumed, rather than negative consequences.

Method

The University Life Study [8] employed a longitudinal measurement-burst design in which students at a public university in the northeastern US completed 14 consecutive daily web-based surveys in their first seven consecutive semesters. Students were recruited using a stratified random sampling procedure to attain a balanced sample for gender and race/ethnicity. To be eligible, participants must have (1) been first-time, full-time, first-year students, (2) been <21 years old, (3) been U.S. citizens/permanent residents, and (4) resided with 25 miles of campus. Students provided informed consent at baseline. Data were from semesters 4–7, when PBS were assessed, from students who reported HID 1+ day. Only drinking days were included. The analytic sample included 258 persons with data from 848 person-semesters across 3,176 person-days. The sample was 50.0% female and 34.5% European American non-Hispanic/Latinx (NHL), 31.8% Hispanic/Latinx, 14.0% Asian

American/Pacific Islander NHL, 9.7% African American NHL, and 10.1% multi-racial NHL. Procedures were approved by the university's institutional review board.

Measures

HID, HED-only, and Moderate Drinking.—Each day, students were provided standard drink definitions and were asked, "How many drinks of alcohol did you drink?" in reference to the previous day. A pull-down menu furnished options ranging from 0–25+ drinks. Two dummy variables were created distinguishing moderate drinking days (1–3/1–4 drinks for women/men), HED-only days (4–7/5–9 drinks), and HID days (8+/10+ drinks). Both variables were coded as 0 and 1; HED-only days served as the reference group for both variables.

PBS.—On days with 1+ drink, participants were asked, "Did you use any of the following strategies when using alcohol or 'partying' on [the previous day]?" (Adapted from Protective Behavioral Strategy Survey [PBSS; 7]). *MOD PBS* were presented as, "Avoid drinking fast (e.g., avoid drinking games, not doing shots, not drink fast)" and *SHR PBS* were presented as, "Avoid serious consequences (e.g., watch your drink, go home with a friend, use a designated driver)." Days PBS were used were coded as 1; days PBS were not used were coded as 0, separately for both PBS types.

Weekend day.—Social weekend days (Thursdays-Saturdays) were coded as 1 and weekdays (Sundays-Wednesdays) as 0.

Analytic Plan

Two logistic multilevel models estimated the likelihood of using both PBS, comparing HID with HED-only days. Intercepts reflected odds of PBS use on HED weekdays for females, with average levels of HID and moderate drinking at the person- and semester-level.

Results

Across 3,176 person-days, students reported HID on 1,185 days (37.3%), HED-only drinking on 1,211 days (38.1%), and moderate drinking on 780 days (24.6%). Students used MOD strategies on 856 days (27.0%) and SHR strategies on 1,504 days (47.4%). The odds of students using MOD PBS were 90% greater (*OR* = 1.90) on moderate days, γ_{100}, and 62% lower (1 - *OR* of 0.38) on HID days, γ_{200}, compared to HED-only days (Table 1). The predicted probabilities of students using these PBS were .34 on moderate days, .22 on HED-only days, and .09 on HID days. The odds of students using SHR PBS were 47% lower on moderate days than on HED-only days, γ_{100}. The predicted probabilities of students using these PBS were .38 on moderate days and .54 on HED-only days. There was no difference in students' likelihood of using these PBS on HID and HED-only days, γ_{200}.

Race/ethnicity was not associated with the likelihood of using either type of PBS and did not moderate associations. Gender moderated only the association between HID and MOD PBS (*OR* = 1.75, 95% *CI* = [1.16, 2.67]). MOD PBS use was less likely on HID days; this association was stronger for females.

Discussion

We examined day-level associations between HID and PBS use. University students reported significantly *lower odds* of using MOD PBS on days they engaged in HID and on days they reported moderate drinking, both relative to HED-only days. Students used fewer SHR strategies on moderate drinking days, but were equally likely to use SHR strategies on HID days, compared to HED-only days. Results provide insight into how young adults use PBS. Despite elevated harms on HID days [5,6], students were less likely to use MOD strategies and were no more likely to use SHR strategies to protect themselves. Differential findings between MOD and SHR PBS are interesting to note. As MOD PBS involve actively modifying drinking behaviour (e.g., drink more slowly) more than SHR (e.g., arranging a designated driver), MOD PBS may be perceived to interfere with drinking goals more than SHR on HID days. Conversely, there may be a threshold effect for SHR such that students are equally likely to plan for a designated driver so long as they consume 4+/5+ drinks.

PBS use is an empirically-supported mechanism of change in interventions [9]. In light of prior findings supporting negative daily associations between PBS use and consequences [5,10] and links between PBS with reduced harms on HID days [5], increasing PBS should be considered in prevention efforts. For high-intensity drinkers especially, existing student interventions may benefit from personalized feedback and decisional balance activities that emphasize PBS education and motivation to increase PBS use. Caution should be used when emphasizing SHR PBS. The pattern of results, together with prior work finding positive associations between this strategy and alcohol use [10], may suggest that on some occasions students may use PBS to facilitate very heavy drinking while trying to minimizing consequences.

Future work is needed to investigate the temporality of alcohol use and PBS throughout drinking episodes. Individuals may be less inclined to use PBS when *planning* to engage in HID because such strategies would interfere with drinking plans. Alternatively, individuals may intend to use PBS but become too impaired to implement PBS when drinking heavily. Findings that individuals were no more likely to report SHR PBS on HID than HED-only days is highly concerning, considering the potential for higher BACs and impaired judgment when drinking at extreme levels.

Although significant associations were observed at the day level, HID vs. moderate drinking and HED-only vs. moderate drinking were unrelated to PBS use at semester- and person-levels. This pattern is similar to prior work comparing negative consequences on HID and HED-only occasions [5]. Between-person and -semester differences may not have occurred because our sample was restricted to high-intensity drinkers. Compared to HED-only drinkers, high-intensity drinkers report greater risk for alcohol use disorder [4]. However, within high-intensity drinkers, drinking-related behaviour such as failing to use PBS is more likely on days they report heavier drinking. Distinguishing situational- from person-level associations requires intensive within-person data, and may importantly suggest different intervention approaches.

Strengths included a large, longitudinal, measurement-burst design to contrast thresholds of drinking. Limitations include data collection from a single U.S. university and reliance on self-report data. To reduce participant burden, single-item measures were used rather than the full PBSS [7] limiting our understanding of the number of PBS used and which types were used. For example, participants who used five MOD strategies would be categorized the same way as individuals who used only one MOD strategy. Dynamically modelling PBS use and intensity of alcohol use in-the-moment within drinking occasions could elucidate decision-making processes to inform real-time interventions.

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Table 1

Logistic Multilevel Models Estimating Use of Protective Behavioural Strategies as a Function of Daily Level of Drinking, Day of the Week, and Gender

Fixed Effects	Manner of Drinking PBS Use[a] *OR* [*CI*]	Serious Harm Reduction PBS Use[b] *OR* [*CI*]
Daily Level (Level-1)		
Intercept, γ_{000}	.25 [.17, .37]***	1.51 [.97, 2.34]
Moderate drinking day[c], γ_{100}	1.90 [1.50, 2.40]***	.53 [.41, .67]***
High-intensity drinking day[c], γ_{200}	.38 [.29, .48]***	.84 [.67, 1.05]
Weekend day[d], γ_{300}	1.30 [1.05, 1.61]*	1.14 [.93, 1.41]
Semester Level (Level-2)		
Semester moderate drinking frequency, γ_{010}	1.94 [.99, 3.79]	.79 [.39, 1.60]
Semester high-intensity drinking frequency, γ_{020}	1.38 [.73, 2.60]	.80 [.41, 1.53]
Person Level (Level-3)		
Person moderate drinking frequency, γ_{001}	2.21 [.59, 8.24]	2.34 [.48, 11.43]
Person high-intensity drinking frequency, γ_{002}	.75 [.23, 2.45]	.32 [.08, 1.28]
Male gender, γ_{003}	.79 [.50, 1.25]	.44 [.25, .77]**
Random Effects	Estimate (*SE*)	Estimate (*SE*)
Level-1 dispersion	.61 (.02)***	.61 (.02)***
Level-2 intercept, r_{0jk}	1.36 (.17)***	1.73 (.19)***
Level-3 intercept, μ_{01k}	2.06 (.30)***	3.46 (.46)***
Variance Explained		
Fixed effects	5.51%	3.54%
Fixed and random effects	53.14%	62.90%

Note. *OR* = odds ratio, *CI* = 95% confidence interval.

[a] *N* = 3,161 person-days.

[b] *N* = 3,155 person-days.

[c] Reference group is heavy episodic drinking only day (4–7 drinks for women and 5–9 drinks for men).

[d] Weekend day refers to Thursday, Friday, or Saturday in comparison to the weekdays of Sunday, Monday, Tuesday, and Wednesday.

* $p < .05$,

** $p < .01$,

*** $p < .001$.