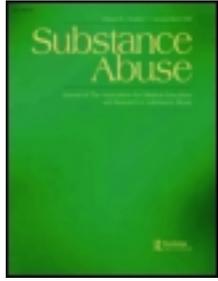


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## Substance Abuse

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/wsub20>

### Heavy Episodic Drinking is a Trait-State: A Cautionary Note

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Accepted author version posted online: 13 Jan 2014. Published online: 13 Jan 2014.

To cite this article: Substance Abuse (2014): Heavy Episodic Drinking is a Trait-State: A Cautionary Note, Substance Abuse, DOI: [10.1080/08897077.2013.876486](https://doi.org/10.1080/08897077.2013.876486)

To link to this article: <http://dx.doi.org/10.1080/08897077.2013.876486>

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## Heavy Episodic Drinking is a Trait-State: A Cautionary Note

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**ABSTRACT.** *Background:* Heavy episodic (binge) drinking is common in and problematic for undergraduates. Researchers often assume an individual's heavy episodic drinking is stable and trait-like. However, this fails to consider fluctuating, state-like variation in heavy episodic drinking. This study proposes and tests a novel conceptualization of heavy episodic drinking as a trait-state wherein the contribution of both trait-like stability and state-like fluctuations are quantified. It was hypothesized heavy episodic drinking is a trait-state such that individuals have trait-like tendencies to engage in heavy episodic drinking, and state-like differences in the expression of this tendency over time. *Methods:* A sample of 114 first-year undergraduates from a Canadian university completed self-report measures of heavy episodic drinking at three time points across 130 days. Hypotheses were tested with repeated measures ANOVA, test-retest correlations, and generalizability theory analyses. *Results:* A substantial proportion of the variance in heavy episodic drinking is attributable to trait-like stability, with a smaller proportion attributable to state-like fluctuations. *Conclusions:* The heavy episodic drinker seems characterized by a stable, trait-like tendency to drink in a risky manner, and this trait-like tendency seems to fluctuate in degree of expression over time. Findings complement research suggesting people have trait-like predispositions that increase their risk for heavy episodic drinking. However, despite this stable tendency to drink heavily, the frequency of heavy episodic drinking appears to be at least partly sporadic or situation-dependent. These findings serve as a caution to alcohol researchers and clinicians who often assume a single assessment of heavy episodic drinking captures a person's usual drinking behavior.

**Keywords:** heavy episodic drinking, binge drinking, stability, trait-state, longitudinal

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## INTRODUCTION

Risky patterns of alcohol use are prevalent among undergraduates, with more than 60% of students reporting heavy episodic drinking within a 2-week period (1). Heavy episodic drinking is operationalized as consuming at least four drinks for women (or five drinks for men) within a 2-hour period and is associated with many negative outcomes (2, 3, 4). Alcohol researchers often assume a single assessment of an individual's level of heavy episodic drinking (e.g., over the past two weeks) represents his or her usual, trait-like tendency to drink in this manner. Evidence from longitudinal studies provides some support for this assumption by revealing moderate to strong stability in heavy episodic drinking over time (1). However, this view fails to account for changes or fluctuations in an individual's level of heavy episodic drinking over time. Thus, we proposed a novel conceptualization of heavy episodic drinking as a *trait-state* in which we quantified the contributions of trait-like stability and state-like fluctuations. This allowed us to test the idea that heavy episodic drinking has substantial trait and state components. Using a longitudinal design, we assessed heavy episodic drinking at three time points. We hypothesized heavy episodic drinking would be moderately to strongly stable across all three waves, yet show some variability, thereby providing evidence for both trait and state components. We tested these hypotheses with test-retest correlations, repeated measures ANOVA, and generalizability theory analyses.

## METHODS

### Procedure

Dalhousie University's Social Sciences and Humanities Research Ethics Board approved our study. As part of a larger study, we sought to recruit first year undergraduate students from Dalhousie University (Halifax, Nova Scotia, Canada) who were attending university for the first time. The larger study involved multiple research questions that have been published elsewhere (i.e., 5, 6, 7). Participants learned about the study via flyers ( $N = 56$ ), class announcements ( $N = 54$ ), advertisements on the psychology subject pool ( $N = 24$ ), and word-of-mouth ( $N = 14$ ) and contacted researchers via email to set up an appointment. All participants provided informed consent and completed pen-and-paper questionnaires in the laboratory, which included the heavy episodic drinking measure, in three waves across 130 days. This timeline was selected to capture first-year students across their first two semesters at university and to account for seasonal variability in heavy episodic drinking (8). Participants completed Wave 1 within the first 50 days of fall term, Wave 2 during the second half of fall term (45 days after Wave 1), and Wave 3 at the beginning of winter term (130 days after Wave 1). Retention rates were high across waves (98.4% at Wave 2; 90.6% at Wave 3). After Wave 3, participants received additional information about the research questions and a list of relevant references, and they were compensated with either \$55 or 3 credit points towards their final grade in a psychology course and \$25.

## Measures

One alcoholic drink was defined as a 12-ounce can/glass/bottle of beer or cooler, a 5-ounce glass of wine, or a drink containing 1 shot of liquor or spirits (9). To assess heavy episodic drinking, we modified the measure recommended by the U.S. National Institutes of Health – National Institute on Alcohol Abuse and Alcoholism ([NIAAA], 10) by limiting the timeframe to 7 days and increasing the range of response options. We asked participants: “During the past 7

days, how often did you have 4 or more drinks (for women) [or five or more drinks (for men)] containing any kind of alcohol, within a 2-hour period?” Participants responded on a 32-point scale ranging from “0 times” to “31 or more times,” which allowed us to capture a wide range of participants’ heavy episodic drinking and increase the likelihood that participants report on higher frequencies of heavy episodic drinking (11). Our measure is strongly correlated with NIAAA’s original measure which assesses heavy episodic drinking over a 2-week timespan with these response options: None, once, twice, 3 to 5 times, 6 to 9 times, and 10 or more times ( $r = .62$ ; 12).

## Data Analytic Strategy

Test-retest correlations provided estimates of between-person stability. Repeated measures ANOVA with planned polynomial contrasts tested mean-level stability in heavy episodic drinking. Using an ANOVA framework and the VARCOMP program in SPSS, generalizability theory analysis decomposed the variance of heavy episodic drinking into variability attributed to person, wave, and the interaction among person and wave (13, 14). Generalizability theory analysis is a statistical method for evaluating the reliability of measurements and allows researchers to disentangle various sources of variability (13, 14). In the present study, if a large proportion of the variance in heavy episodic drinking is attributed to “person,” then heavy episodic drinking is best conceptualized as a static trait; if a large proportion of the variance is attributable to “wave,” then heavy episodic drinking is best conceptualized as a dynamic state; and if a large proportion the variance is attributable to “person-by-wave,” then heavy episodic drinking is best conceptualized as a combined trait and state (15).

## RESULTS

Missing data were minimal (0.0% at Wave 1, 1.6% at Wave 2, 9.4% at Wave 3) and were handled using listwise deletion resulting in a sample of 114 participants (78.1% women; 80.7% Caucasian) with an age range of 17-24 years old ( $M = 18.34$ ;  $SD = 0.83$ ; 78.1% under the legal drinking age). Participants removed via listwise deletion were not significantly different ( $p > .05$ ) from participants retained for further analyses across demographic variables and Wave 1 heavy episodic drinking. Means and standard deviations for heavy episodic drinking at each wave (see Table 1) were consistent with prior studies (16) and suggest participants in the present study engaged in heavy episodic drinking approximately once a week at each wave.

[TABLE 1 HERE]

Data were multivariate non-normal and log-transformed to reduce skew and kurtosis. Hypotheses were tested using log-transformed data. Test-retest correlations were strong, indicating between-person differences in heavy episodic drinking were maintained over time and heavy episodic drinking exhibits trait-like stability. Repeated measures ANOVA indicated an overall significant effect of time,  $F(2, 114) = 4.47, p < .05, \eta^2 = .04$ . Planned polynomial contrasts were used to test for linear and non-linear (e.g., quadratic) patterns in our data. Results showed a significant quadratic trend,  $F(1, 113) = 7.59, p < .01, \eta^2 = .06$ , where participants as a group had less heavy episodic drinking at Wave 2 compared to Wave 1 and Wave 3. This suggests there are state-like fluctuations in heavy episodic drinking that vary with time of

assessment. Generalizability theory analyses indicated 57.3% of variance was attributable to “person” and 41.3% was attributable to “person-by-wave.” Since “person” was the largest contributor (i.e., more than half), heavy episodic drinking is mainly a trait. However, “person-by-wave” contributed substantially to remaining variance, implying heavy episodic drinking has additional state-like variation.

## DISCUSSION

Consistent with hypotheses, results suggested heavy episodic drinking is a *trait-state* reflecting a large trait component with some state-like fluctuations. The heavy episodic drinker seems characterized by a stable, trait-like tendency to drink in a heavy, risky manner—and this tendency fluctuates in degree of expression over time. As in past work (1), results indicated people show consistency in their level of heavy episodic drinking, suggesting an underlying predisposition to drink heavily. Findings therefore complement research suggesting people have core, stable vulnerability factors (17, 18, 19) that increase their risk for heavy episodic drinking. Additional longitudinal research is needed to illuminate factors responsible for this consistency.

Despite a stable tendency to drink heavily, heavy episodic drinking also appears partly state-like or situation-dependent. As in past research showing seasonal variability in undergraduate student drinking (8), participants in the present study drank more at Wave 1 and Wave 3 and less at Wave 2. Waves 1 and 3 occurred at the beginning of the fall and winter terms, respectively, coinciding with less academic commitments and potentially more frivolity (e.g., Frosh week). Wave 2 occurred in the second half of the fall term, coinciding with increased academic demands (e.g., midterm exams). Research is needed to test conditions (e.g., external

influences) under which the predisposition towards heavy episodic drinking is more or less likely to be expressed.

Overall, these findings serve as a caution to alcohol researchers who often assume a single assessment of heavy episodic drinking captures a person's usual drinking behavior. Moving forward, researchers are encouraged to routinely assess heavy episodic drinking across different contexts and time points (within the same individual) rather than rely on a single assessment. Our findings also serve as a caution to clinicians working with undergraduates engaging in heavy episodic drinking. Clinicians should routinely (re)assess their clients' heavy episodic drinking and be aware their clients' behaviour may be explained by both trait-like vulnerabilities and state-like fluctuations. Clinicians might consider a two-pronged approach to treatment in which they tackle both the stable factors that may underlie the person variability, as well as factors potentially impacting state-like fluctuations (e.g., Frosh week activities, peer group influences, participating in drinking games).

Our predominantly young, female, Caucasian, and educated sample may raise questions about the representativeness and generalizability of our findings. Future studies involving community and clinical samples are needed. We relied exclusively on self-reported drinking behavior, which may be inaccurate if participants have faulty recall. We only assessed heavy episodic drinking and cannot answer questions regarding factors responsible for the (in)stability of heavy episodic drinking. Using a single item measure of heavy episodic drinking, our choice of time lags between waves (e.g., 45 days between Wave 1 and 2), and the overall duration of our study may have impacted results. Despite limitations, our results provide support for a novel conceptualization of heavy episodic drinking as a *trait-state* and provide impetus for research clarifying factors responsible for stable and fluctuating aspects of heavy episodic drinking.

## ACKNOWLEDGEMENTS

We thank Jamie Fulmore, Chantal Gautreau, Natalie Gyenes, Michelle Hicks, Anna MacKinnon, Logan Nealis, and Martin Smith for their assistance in data collection.

## FUNDING

This research was funded by a grant from the Dalhousie University Department of Psychiatry Research Fund awarded to Sean P. Mackinnon, Simon B. Sherry, and Michael Pratt (of Wilfrid Laurier University). This research was also supported by a grant from the Nova Scotia Health Research Fund awarded to Simon B. Sherry, Martin M. Antony (of Ryerson University), Sherry H. Stewart, and Dayna L. Sherry (of Queen Elizabeth II Health Sciences Centre). Aislin R. Mushquash and Sean P. Mackinnon were supported by a Canada Graduate Scholarship from the Social Sciences and Humanities Research Council. Sean P. Mackinnon was also supported by an honorary Izaak Walton Killam Level II Scholarship. Funding sources were not involved in the research.

## AUTHOR CONTRIBUTIONS

All authors contributed significantly. Aislin R. Mushquash conducted data analyses, interpretation of results, wrote the first draft and subsequent revisions of the manuscript. All co-authors were involved in writing and revising the manuscript. Simon B. Sherry, Sean P.

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Mackinnon, and Sherry H. Stewart were involved in the research conception and design, and Christopher J. Mushquash was involved in the interpretation of the results.

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TABLE 1  
Means, Standard Deviations, Ranges, and Bivariate Correlations for Heavy Episodic Drinking Measures over Waves

Variables	<i>M</i>	<i>SD</i>	Range	1	2	3
1. Heavy episodic drinking (Wave 1)	1.33	2.01	0-15	-	.54***	.61***
2. Heavy episodic drinking (Wave 2)	0.94	1.64	0-10		-	.59***
3. Heavy episodic drinking (Wave 3)	1.26	2.36	0-20			-

*Note.* Means values are based on raw, non-transformed data. \*\*\*  $p < .001$ .