

# Drinking to Dampen Affect Variability: Findings From a College Student Sample

NISHA C. GOTTFREDSON, PH.D.,<sup>a,\*</sup> AND ANDREA M. HUSSONG, PH.D.<sup>b</sup>

<sup>a</sup>*Department of Psychology and Neuroscience, Duke University, Durham, North Carolina*

<sup>b</sup>*Department of Psychology, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina*

**ABSTRACT. Objective:** We hypothesized that individuals who are unable to effectively regulate emotional reactivity, which we operationalized as variability in self-reported affect throughout the day, would use alcohol more frequently and would report higher levels of drinking to cope. Further, we hypothesized that affect variation would be a stronger predictor of alcohol use or drinking to cope than level of negative affect. **Method:** A total of 86 college-age students (53% female, 77% White) participated in an intensive longitudinal study for 28 days. Participants reported positive and negative affect thrice daily and reported alcohol use once daily. Participant coping motives were assessed at study initiation. **Results:** Affect variability predicted increased drinking frequency and

higher levels of self-reported drinking to cope. Mean level of negative affect was not related to an increased probability of drinking, nor was it related to self-reported drinking to cope. Both individual differences in affect variation and intra-individual daily fluctuations in affect were associated with an increased likelihood of drinking. **Conclusions:** Our results imply that individuals with higher-than-average levels of affect variation are at risk for high levels of alcohol involvement and that people are more likely to drink on days characterized by higher-than-normal levels of fluctuation in affect. Future studies on self-medication should consider negative affect variability in addition to—or instead of—level of negative affect. (*J. Stud. Alcohol Drugs*, 74, 576–583, 2013)

IT HAS LONG BEEN HYPOTHESIZED that individuals who have difficulty regulating emotions are at increased risk for developing problematic drinking behaviors and attitudes toward drinking (e.g., Abrams and Niaura, 1987; Cooper et al., 1995; Cox and Klinger, 1988). Unlike adaptive coping methods, maladaptive coping strategies tend to increase emotional reactivity to stressors rather than diminish distress (Larsen and Prizmic, 2004). Thus, one line of reasoning suggests that individuals who engage in maladaptive strategies are subsequently motivated to drink alcohol to escape from the increasing emotional dysregulation brought about by rumination, suppression, or avoidance (Aldao et al., 2010; Heatherston and Baumeister, 1991; Hull, 1981).

Studies based on self-reported strategies for emotional regulation and alcohol consumption provide support for the hypothesized association between the inability to adequately regulate one's stress response and alcohol consumption. For instance, Nolen-Hoeksema et al. (2007) found a positive link between rumination and alcohol misuse, and Stewart et al. (2001) found that individuals who reported excessive anxious reactivity in response to stressors reported increased levels of drinking behavior. Similarly, Simons et al. (2009) found that, among college students, self-reported affective lability predicted alcohol problems 6 months later. Fur-

thermore, Simons et al. (2005) showed that the association between self-reported affective lability and alcohol problems was mediated through self-reported coping motives for drinking.

Although findings from self-report studies are informative, they may be biased to the extent that participants have difficulty accurately introspecting about their own successes and failures in regulating emotions and in identifying true motivations underlying drinking behavior (Aldao et al., 2010). The current study used a more objective measure of emotion dysregulation and subsequent alcohol use through the use of experience-sampling methodology. Rather than relying on participants to accurately assess consequences of their own emotion (dys)regulation, this study measured daily fluctuations in positive and negative affect as well as the behavioral link between these fluctuations and subsequent drinking behavior.

Before providing a full overview of the current study, however, it is pertinent to describe experimental work delineating the physiological and cognitive mechanisms through which alcohol works to temporarily dampen the stress response. Results from these studies may provide insight into why most existing experience-sampling studies have had difficulty recovering self-medication effects. We will then discuss findings and limitations from previous studies that have used experience-sampling methods to understand self-medication behaviors.

## *Alcohol as a stress-dampening agent*

That alcohol consumed in moderate quantities dampens physiological and subjective reactivity to stress and other

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\*Correspondence may be sent to Nisha C. Gottfredson, Department of Psychology and Neuroscience, Campus Box 90086, 417 Chapel Drive, Duke University, Durham, NC 27708, or via email at: nisha.gottfredson@duke.edu.

negative cues has been well documented (e.g., Greeley and Oei, 1999; Lienert and Traxel, 1959). Recent studies have delineated the mechanism through which this dampening occurs. Steele and Josephs's (1990) theory of alcohol myopia, which posits that alcohol limits attentional capacity for unwanted cognitions, was supported by an experiment conducted by Curtin et al. (2001). Curtin and colleagues showed that alcohol impairs cognitive function such that intoxicated individuals have limited cognitive resources with which to divide attention among multiple stimuli. Sher et al. (2007) elaborated on this work, showing that alcohol limited physiological reactivity to a highly aversive public speaking task by reducing capacity for sustained attention to this task. In a related study, Colder (2001) found that individuals who were more physiologically reactive to an aversive stimulus, as measured by change in respiratory sinus arrhythmia, were more likely to self-report drinking to cope. Whereas Colder (2001) found that short-term physiological reactivity (i.e., respiratory sinus arrhythmia) predicted self-reported drinking to cope, he did not find evidence for a link between trait negative affect and drinking motives.

#### *Experience-sampling studies*

To identify which situations and individual differences lead some people to regulate emotions with alcohol in vivo, it is necessary to move outside of laboratory-based manipulations. Experience-sampling methodology provides the capacity to capture fluctuation in affect and concomitant behavior throughout the day, thereby limiting the effects of retrospective recall bias (Shiffman and Stone, 1998). Over the past decade, a number of researchers have used experience-sampling methodology in an effort to identify individual characteristics that lead some individuals to self-medicate their experience of negative affect by using alcohol. In general, these studies have focused on using individual difference moderators to predict a positive association between level of negative affect experienced throughout the day and subsequent drinking behavior.

With few exceptions, it has been difficult to capture a robust association between daily negative affect and drinking behavior. This difficulty has led some to conclude that the process of drinking in response to dysregulated emotion is more complex than previously conceived (e.g., Armeli et al., 2010; Hussong et al., 2001). For instance, Hussong et al. (2005) found that self-reported drinking to cope predicts drinking in response to fear or shyness but not sadness. Swendsen et al. (2000) found that nervousness—but no other type of negative affect—predicts drinking in men but not women. Hussong et al. (2001) found that people who have low levels of social support tend to drink in response to sadness or hostility but not guilt or fear. It is clear from these studies that negative affect predicts subsequent drinking in some circumstances and for some individuals, but it is also

apparent that there is an important theoretical component missing from these models, which has made the definitive identification of a self-medication effect elusive.

#### *Current study*

We perceived a disconnect between experimental studies involving the emotion-dampening effects of alcohol and experience-sampling studies, which tend to characterize self-medication as a link between level of negative affect and alcohol use. Our goal was to implement a revised definition of self-medication as a method of emotion regulation using data from an experience-sampling study. To do this, we focused on variation in affect rather than mean level. Further, we parsed the effect of affect variability on drinking into between and within components. That is, we explored how individual differences in emotion dysregulation are related to college students' tendency to drink, and we also provided a direct test of the self-medication hypothesis, which states that individuals are more likely to drink on days characterized by higher-than-average levels of emotional dysregulation.

The idea that emotion variation is a distinct individual characteristic with potential importance for predicting behavioral outcomes is not new (e.g., Eid and Diener, 1999; Kuppens et al., 2007; Larsen, 1987). Indeed, studies on alcohol consumption have identified an association between self-reported affective lability and alcohol problem symptoms (Simons et al., 2005, 2009). However, to our knowledge, only two studies to date have examined affect variability using experience-sampling methodology. Jahng et al. (2011) conducted research with patients with borderline personality disorder and major depressive disorder, showing that patients' daily variability in positive or negative affect was more strongly related to subsequent drinking than were mean daily levels of positive or negative affect. In other words, it was not the experience of high levels of negative or positive affect that led to subsequent drinking behavior per se; rather, it was the inability to dampen strong emotional responses to daily stimuli that led to drinking. A second study, conducted by Rankin and Maggs (2006), used the total variation in weekly retrospective mood reports over 10 weeks to predict individual differences in drinking behavior for a sample of college students. These authors found that individuals reporting more mood variation over the 10-week period also reported drinking on more days, and these individuals reported more heavy drinking episodes during this period.

We expanded on the existing studies to suggest that emotion dysregulation, as operationalized by the magnitude of within-day fluctuations in affect, is a psychologically meaningful construct for describing normative processes in a nonclinical, college student population. Furthermore, we parsed the effects of within-person, daily levels of affect

variation from the effects of between-person differences in affect variation on drinking behavior.

We first tested whether high variability in self-reported affect was a stronger predictor of drinking behavior than mean level of negative affect. If affect variability predicted alcohol use, then we would have replicated Jahng et al.'s (2011) findings but with a nonclinical population. Second, we tested whether variation in negative affect was a stronger predictor of drinking behavior than variation in positive affect, or whether overall variation was the strongest predictor.

Next, we separated the effects of intra-individual differences in affect variability on daily alcohol use from interindividual differences in overall affect variability on the general tendency to drink alcohol. Self-medication theories predict a proximal increase in risk for alcohol use following a negative affective state (e.g., Greeley and Oei, 1999; Hussong et al., 2001; Park et al., 2004). Using this line of reasoning, we would expect to see an increased likelihood of alcohol use on days characterized by high affective variation. On the other hand, a number of cross-sectional and panel studies have found positive associations between trait negative affect (e.g., anxiety and depression) and alcohol problems (Conger, 1956; Cooper et al., 1992; Khantzian, 1985; Kushner et al., 2000; Tate et al., 2008), and other studies have linked individual differences in affective lability (i.e., variation) with alcohol problems (e.g., Rankin and Maggs, 2006; Simons et al., 2005). These studies would seem to suggest that alcohol use is a stable, learned behavior for coping with generally high levels of dysregulated emotion experienced by some individuals. We expected both that within-person, daily variability in affect would be linked with higher daily rates of alcohol use and that individuals with more variability, on average, would drink on more days of the study. These hypotheses are not in direct competition; both may be true.

Finally, we evaluated whether affect variation predicted self-reported drinking to cope. Because of its affect-dampening effects, we hypothesized that affect variation would predict drinking to cope more strongly than level of negative (or positive) affect.

## Method

### *Sample and procedures*

Data from this secondary analysis were initially reported by Hussong et al. (2001); refer to this study for information on the study protocol. Briefly, college students participated in friendship pairs. A total of 77% ( $n = 64$ ) of participants were White, and 17% ( $n = 14$ ) were African American; 53% ( $n = 46$ ) were female. Eighty-four of the 86 (98%) participants who began the study completed the full 28-day protocol.

Each participant completed an experience-sampling protocol involving daily assessments of alcohol use and thrice-

daily assessments of affect over the 28-day period after an initial visit. Participants were contacted at random within 2-hour intervals, once in the morning (10:00 A.M.–noon), once in the afternoon (3:00 P.M.–5:00 P.M.), and once in the evening (8:00 P.M.–10:00 P.M.) by a pager signal on each of the 28 days. At the end of the sampling period, 100% of participants rated their alcohol use ratings as “very honest.”

### *Measures*

*Alcohol use.* Participants reported daily alcohol use for all 28 days during the experience-sampling period. Each morning, participants were prompted to report the number of drinks they had consumed over the past 24-hour period on a 9-point scale ranging from 0 to 8 or more. Participants drank on an average of 4.48 days in the study (16% of the sampled days), with a range from 0 days to 20 days. Because alcohol use reports were zero-inflated (i.e., on average, people reported more nondrinking days than drinking days, and number of drinks per evening was skewed right), and because the number of drinks was right censored at eight, this measure was dichotomized to measure any alcohol use. A total of 296 drinking episodes were reported.

*Affect.* At each of the three daily pager contacts, participants recorded their affect by using items from the Positive and Negative Affect Schedule—Expanded Form (Clark and Watson, 1991). Sample items from the positive affect scale include “cheerful,” “attentive,” and “proud.” Sample items from the negative scale include “disgusted,” “irritable,” and “downhearted.” These items were rated as present or absent at the time when the paging signal was received. Three daily observations were available for 81.4% of observed person-days, two daily observations were available for 14.3% of person-days, and a single observation was available for 4.3% of person-days. Overall positive and negative affect factor score estimates were generated using a two-factor confirmatory factor model of positive and negative affect in Mplus Version 7. A robust maximum likelihood estimator was used to adjust standard errors to account for nesting of repeated measures and to account for the nonnormal distributions of the affect indicators (Muthén and Satorra, 1995).

We favored using factor score estimates over sum scores for two reasons. First, the former permitted some items to be weighed more heavily than others in the construction of positive and negative affect measures on an empirical basis. For instance, sadness was given a higher factor loading than fear on the negative affect scale. Second, this method enabled us to obtain more accurate scale estimates by taking into account information about time of day (morning, afternoon, or evening) and day of the week (weekend vs. weekday) directly into the computation of the factor score estimates (Bauer and Hussong, 2009). Incorporating this information makes factor scores more reliable (Thissen and

Wainer, 2001). Positive and negative affect factors were strongly correlated ( $r = -.79$ ;  $SE = .06$ ;  $p < .001$ ).

*Affect variation.* Standard deviations were calculated across the daily positive and negative affect measurements for each individual in the study, as shown in Equations 1 and 2.

$$SD_{PA\_di} = \sqrt{\frac{\sum_{t=1}^{T_{di}} (PA_{tdi} - \bar{PA}_{di})^2}{T_{di} - 1}} \quad (1)$$

$$SD_{NA\_di} = \sqrt{\frac{\sum_{t=1}^{T_{di}} (NA_{tdi} - \bar{NA}_{di})^2}{T_{di} - 1}} \quad (2)$$

In Equations 1 and 2,  $i$  subscripts indicate variability over individuals,  $d$  indicates variability over days, and  $t$  is an indicator of time of day, which can range from 1 (morning) to 3 (evening). When all observations are present for an individual within a given day,  $T_{di} = 3$ ; when two observations were present,  $T_{di} = 2$ ; variability was coded as missing when fewer than two daily observations were available.

Total daily affect dysregulation was computed by adding the squared daily standard deviation of standardized positive affect to the squared daily standard deviation of standardized negative affect and taking the square root, as shown in Equation 3 (Kuppens et al., 2007). Positive and negative affect variation were standardized before constructing total affect variation to give equal weight to positive and negative affect variability.

$$SD_{Tot\_di} = \sqrt{\left(Z_{SD_{NA\_di}}\right)^2 + \left(Z_{SD_{PA\_di}}\right)^2} \quad (3)$$

Descriptive statistics for affect variables that were used in the analysis are presented in Table 1. Skew and kurtosis are not a concern because the multilevel models used to predict alcohol use and coping motives do not impose distributional assumptions on predictor variables.

*Motivations for alcohol use.* Cooper’s (1994) four-factor model of self-reported drinking motives was administered at the initial visit. For this analysis, we were interested only in the coping with negative feelings scale. The coping motives scale consisted of five items, each rated on a five-point scale. The items were averaged ( $M = 0.84$ ,  $SD = 0.70$ ). Cronbach’s  $\alpha$  for this scale was .83.

*Data analysis*

Daily alcohol use measures were nested within individuals, and individuals were nested within friendship dyads. To handle nonindependence of observations, three-level generalized linear mixed models were used. These models were estimated using the GLIMMIX procedure in SAS (Version 9.3; SAS Institute Inc., Cary, NC). Gender was controlled for in all models.

As a preliminary step, we compared the effects on alcohol consumption of daily level of negative affect with the degree of affect variability. We next tested an alternative model that alcohol consumption predicts next-day variation on mood (and we rejected this alternative). After confirming the directionality of the effect of affect variability on alcohol consumption, we tested whether variation in negative affect was a stronger predictor of alcohol use than variation in positive affect. Next, we tested whether stable, average individual-level variation in mood is a stronger predictor of alcohol consumption than day-to-day intra-individual fluctuations in affect. Finally, we evaluated whether individual differences in affect variability predict higher scores on self-reported drinking to cope.

**Results**

*Preliminary analyses: Comparing the effect of daily negative affect level with daily affect variability*

Prior research on self-medication has evaluated whether daily levels of negative affect are linked with a higher in-

TABLE 1. Descriptive statistics for affect measures used in analyses

Variable	<i>M</i>	<i>SD</i>	Min.	Max.	Skew	Kurtosis
Negative affect level	0.08	1.76	-2.42	5.79	1.00	0.39
Positive affect variability	0.59	0.40	0	2.04	0.62	-0.09
Negative affect variability	1.55	1.37	0	5.79	0.50	-0.98
Total affect variability	1.30	0.56	0.08	4.60	1.22	0.31
Total affect variability (within-person)	0.00	0.51	-1.51	2.43	0.73	1.89
Total affect variability (between-person)	1.30	0.24	0.89	2.35	1.87	5.38

*Notes:* Within-person affect variability has been person-mean centered to represent the day-level deviation from an individual’s typical level of affect variability. Between-person affect variability represents person-means across all days. Aside from the person-mean centered within-person affect variability measure, all other affect measures were grand mean centered for the analysis. However, descriptive statistics are presented in the raw scale of the variables. Min. = minimum; max. = maximum.

TABLE 2. Summary of results from models predicting daily alcohol use

Variable	Model 1: Effect of daily negative affect			Model 2: Effect of daily affect variation			Model 3: Positive and negative affect variation			Model 4: Within- vs. between- person effects		
	$\beta$ (SE)	<i>p</i>	OR	$\beta$ (SE)	<i>p</i>	OR	$\beta$ (SE)	<i>p</i>	OR	$\beta$ (SE)	<i>p</i>	OR
Intercept	-2.80 (0.31)	<.001	0.06	-2.81 (0.32)	<.001	0.06	-2.79 (0.32)	<.001	0.06	-2.77 (0.30)	<.001	0.06
Male	1.39 (0.42)	<.001	4.01	1.26 (0.43)	<.01	3.52	1.29 (0.43)	<.01	3.63	1.31 (0.41)	.001	3.71
Daily negative affect level	0.08 (0.09)	.34	1.08									
Daily total affect variability				0.23 (0.09)	<.01	1.26						
Daily positive affect variability							0.14 (0.09)	.11	1.15			
Daily negative affect variability							0.16 (0.09)	.07	1.17			
Person-mean <sup>a</sup> affect variability										0.24 (0.12)	.04	1.27
Within-day <sup>b</sup> affect variability										0.18 (0.08)	.03	1.20

Notes: Affect predictors were standardized. Three-level generalized linear mixed models were estimated using Proc GLIMMIX in SAS Version 9.3 with maximum likelihood estimation and a logit link.  $\beta$  = beta coefficient; OR = odds ratio; SE = standard error. <sup>a</sup>“Person-mean” predictor was computed by averaging affect level or variability measures across the 28 days for each participant; <sup>b</sup>“within-day” variability was computed by deviating participants’ mean variability from the variability experienced on each day.

vidence of subsequent drinking. As previously discussed, findings have supported this hypothesis inconsistently. As a preliminary step, we tested whether daily levels of negative affect are linked with increased alcohol consumption in this sample. As shown in Table 2 (Model 1), we found no significant effect of daily level of negative affect on individuals’ daily drinking probability.

Our preliminary investigations of affect variation focused on the aggregate measure of positive and negative affect variation shown in Equation 3. Daily variation was standardized for each parameter interpretation. As shown in Table 2 (Model 2), the effect of total affect variation on the log odds of alcohol use was significant; the odds of drinking on a given day increase by a factor of 1.26 for every 1-SD increase in total affect variation.

#### Testing for an effect of alcohol on next-day mood variation

Students reported only once daily regarding their alcohol consumption, but affect reports occurred three times per day. We would like to infer that because most drinking episodes occur in the evening, variation in mood is a precursor or cause of alcohol consumption and not vice versa. Theoretical support favors this conclusion: Alcohol is known to dampen affect, rather than the reverse (Lienert and Traxel, 1959). However, it is methodologically possible that the positive association between mood variability and alcohol reflects a direct effect of alcohol on mood variability. To assess this alternative explanation for our findings, we tested whether alcohol use predicted mood variability on the following day. We found no association between alcohol use and next-day total affect variability ( $\beta = 0.17$ ,  $SE = 0.11$ ,  $p = .11$ ), next-day variability in positive affect ( $\beta = 0.01$ ,  $SE = 0.03$ ,  $p = .71$ ), or next-day variability in negative affect ( $\beta = 0.17$ ,  $SE =$

0.12,  $p = .14$ ). Therefore, theoretical and statistical evidence points to an effect of mood variability on alcohol consumption, and not the reverse.

#### Positive affect variation and negative affect variation as separate constructs

The separate effects of negative affect variation and positive affect variation were modeled to determine whether emotion dysregulation is a general factor leading to increased alcohol use or whether positive and negative affect variation exhibit differential effects on use. Daily positive and negative affect variation were moderately correlated ( $r = .33$ ,  $p < .001$ ). Results are shown in Table 2 (Model 3). Effect sizes were similar (odds ratio [OR] = 1.15 for positive affect variation; OR = 1.17 for negative affect variation). However, when positive and negative affect variations were modeled separately, neither effect reached traditional levels of significance. This finding, together with the effect of combined daily affect variation being higher than either effect alone, suggests that affect variation should be modeled as a single construct when predicting alcohol use.

#### Parsing within- and between-person effects

Because of its time-varying nature, affect variation may conceivably influence alcohol use either at the individual level (i.e., individuals who are more dysregulated may be more generally predisposed to drinking on any given day of the study) or at the daily level (i.e., individuals who feel more dysregulated than usual may be more likely to drink on those particularly mercurial days). Following the advice of Enders and Tofghi (2007), we used a centering approach to parse the effect of person-mean affect variation on alcohol

use from the effect of within-person, daily affect variation on alcohol use. First, daily affect variation was averaged across all of the days in the study for each individual, as shown in Equation 4, where  $D_i$  is the total number of days of participation in the study for individual  $i$ .

$$S\bar{D}_{Tot\_i} = \frac{\sum_{d=1}^{D_i} SD_{Tot\_di}}{D_i} \quad (4)$$

This person-mean variable represents individual differences in variability of mood states. When standardized, person-mean affect variation represents the individual deviation from the norm in standard deviation units.

Next, each person's daily level of affect variation was deviated from their own mean level of variability as shown in Equation 5.

$$S\bar{D}_{Tot\_di} = SD_{Tot\_di} - S\bar{D}_{Tot\_i} \quad (5)$$

This person-mean-centered variable represents the degree to which a given day is characterized by higher- or lower-than-average levels of mood variability relative to an individual's own baseline. Together, the effect of person-mean-centered affect variation on alcohol use and the effect of person-mean variation in affect make up the total effect of affect variation on alcohol use.

As shown in Table 2 (Model 4), the odds of drinking increased by a factor of 1.27 for every 1-*SD* increase in person-mean affect variability ( $p = .04$ ); the odds of drinking increased by a factor of 1.20 for every 1-*SD* increase in within-day variability ( $p = .03$ ). This finding suggests that both individual differences in affect regulation and intra-individual deviations in affect regulation are predictive of alcohol use. The between-person effect was slightly larger than the within-person effect.

#### *Association between affect regulation and self-reported drinking to cope*

Our final research question was whether individuals reporting higher levels of emotion variation self-report using alcohol to cope with negative emotions. Such a finding would indicate that individuals with dysregulated emotions are aware of using alcohol to dampen affect. To answer this question, we predicted self-reported coping motives from both person-mean affect variation and from person-mean levels of positive and negative affect (the more traditional measure for models of self-medication). A 1-*SD* increase in person-level affect variation was associated with a .09-point increase in self-reported coping motives ( $SE = .02, p < .001$ ). In contrast, a 1-*SD* increase in person-level mean negative affect was associated with a nonsignificant .03-point increase in self-reported coping motives ( $SE = .02, p = .09$ ). A 1-*SD* increase in person-mean positive affect was associated with

a nonsignificant .03-point increase in self-reported coping motives ( $SE = .02, p = .12$ ). Thus, only variation was associated with drinking to cope.

### **Discussion**

We hypothesized that having a higher level of variation in daily affect, an ecologically valid measure of emotional dysregulation that does not rely on subjective interpretation of research participants, would predict alcohol use and self-reported drinking to cope. Specifically, we predicted that individuals who are more affectively variable would drink more frequently than individuals who were more emotionally regulated and that more dysregulated individuals would report higher levels of drinking to cope. We also predicted that, within-person, higher-than-average levels of daily affect variation would contribute to an increased likelihood of alcohol consumption. Daily affect variation did predict alcohol use and, when this association was parsed, we determined that both individual differences in affect variation and intra-individual fluctuations in affect variability predict alcohol use.

The finding that individual differences in affect variability predicted college students' tendency to consume alcohol is consistent with self-reported studies that have found that self-reported affective lability is positively associated with drinking to cope and with alcohol problems (Simons et al., 2005, 2009). It is also consistent with Rankin and Maggs's (2006) findings that variation in retrospectively reported affect across a 10-week period was positively associated with alcohol consumption. Thus, we concluded that individuals who were characterized by frequent fluctuations in affect were at higher risk for more frequent alcohol use than individuals whose affect was more stable, regardless of general valence of affect. Individuals who were more emotionally reactive reported having learned to use alcohol as a mechanism for coping with generally high levels of emotional distress.

Furthermore, we found support for the self-medication hypothesis, an inherently intra-individual hypothesis that predicts that individuals may be inclined to drink in order to regulate mood on days that are characterized by higher-than-average levels of dysregulation. Unlike most tests of the self-medication hypothesis, we found support for this association without respect to individual difference moderators. Our finding indicates that self-medication may be a more normative process than past studies have indicated. In other words, a more careful operationalization of emotion dysregulation has rendered the self-medication effect more robust.

Next, we found that emotion dysregulation was a general construct—individuals who have difficulty controlling emotional reactivity to negative events may also have difficulty tempering reactivity to positive events. Individuals with high

variability in the domain of negative affect also have high variability in positive affect.

#### *Study implications and future directions*

Experiments conducted by Curtin et al. (2001) and Sher et al. (2007) help to elucidate one potential mechanism underlying the link between emotion dysregulation and alcohol use. Both of these studies found support for Steele and Josephs's (1990) alcohol myopia hypothesis. Namely, both studies found that alcohol narrows cognitive functioning so that attention is focused only on one's immediate environmental surroundings and not on ruminations about past and future stressors. Sher and colleagues (2007) showed that alcohol exerts the strongest effects on those whose baseline attentional capacity is strongest. Thus, emotionally dysregulated individuals may be those who cannot effectively dampen emotional reactivity by shifting their awareness from daily stressors or negative thoughts. In turn, the strain of constant fluctuations in emotion may lead to the need to turn to external sources for emotion regulation. At least in the short term, alcohol has been shown to effectively dampen affective reactivity, and thus alcohol use becomes a learned coping mechanism.

Alternatively (or additionally), personality characteristics may help to explain the connection between emotion dysregulation and alcohol use. For instance, Hepburn and Eysenck (1989) showed that neuroticism is associated with increased mood variability. Neuroticism is also associated with alcohol use (Martin and Sher, 1994). Similarly, impulsivity may partially explain the association between inability to regulate affect and higher levels of alcohol use and alcohol-related problems (Dick et al., 2010). Our between-person measure of affective variability was not strongly correlated with any of the personality dimensions measured by the five-factor model; however, it is possible that personality traits and individual differences exacerbate the association between dysregulated emotion and alcohol use. Indeed, Simons et al. (2009) found that individuals with low levels of self-control developed more alcohol dependence symptoms over the course of 6 months if they reported high levels of affective lability.

#### *Limitations*

Limited resources necessitate a balancing of desired sample size and the number of repeated measures that can be collected (Raudenbush, 1997). This is particularly true in intensive longitudinal designs. Although a sample size of 86 individuals is on the larger side of ecological momentary assessment studies, an even larger sample size would have been ideal. Particularly because individuals were nested within friendship dyads, we may have been at increased risk for making type II errors.

Affect variation measures were based on data from a maximum of three daily time points. Although three observations were available for the majority of days, our measures of within-day affect variation would have been more reliable had participants responded to more than three assessments over the course of the day. However, the desire for more assessment was balanced with the need to maintain a reasonable level of participant burden to maximize adherence to the study protocol.

Finally, our censored and zero-inflated measure of alcohol use limited our research question. Rather than modeling any use and drinking intensity, we were only able to predict any use. The decision to use any alcohol may have difference antecedents than the decision to drink in excess; future research should explore these processes uniquely.

#### *Conclusions*

Our study measured dysregulation in a manner that appears to be more consistent with self-medication theory than previous experience-sampling studies. The clinical implication of our findings is that individuals who tend to experience frequent fluctuations in negative affect are at increased risk for drinking to cope with these emotions. Similarly, days that are characterized by higher-than-average levels of emotional variability are linked with a higher probability of drinking for college students in general. Future research should evaluate interventions for emotionally dysregulated individuals who do not have diagnosed psychiatric disorders. Interventions designed to reduce drinking among college students might target the association between high daily levels of affective variability and increased likelihood of drinking on the same day that exists for all college students.

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