

Specifying the Relations Between Affect and Heavy Alcohol Use Among Young Adults

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Current reformulations of the tension reduction hypothesis posit that only a subset of vulnerable individuals are at risk for drinking in response to negative affect. To further specify this model, this study examined the types of mood and social contexts under which affect and alcohol use are associated. Participants were 74 college students who completed repeated assessments of mood, alcohol use, friendship quality, and social support. A complex pattern of findings supported the moderating influences of gender, friendship factors, and the timing of behavior (i.e., weekends vs. weekdays) on the relation between affect and alcohol use. Young adults with less intimate and supportive friendships, as compared with their peers, showed risk for greater drinking following relative elevations in sadness and hostility. Such drinking episodes, in turn, predicted subsequent elevations in these same negative moods the following week. Gender differences in such a cyclical pattern of affect and alcohol use were found to vary across differing emotional experiences. Recommendations for a more refined theory of affect and alcohol use are discussed.

Converging lines of evidence support the relation between affect and alcohol use. First, comorbidity studies show elevated rates of affective and anxiety disorders among those with an alcohol diagnosis as compared with the general population (Kushner, Abrams, & Borchardt, 2000; Swendsen & Merikangas, 2000). Second, those who abuse alcohol report self-medication (i.e., drinking for the sake of stress reduction and mood alteration; Weiss, Griffin, & Mirin, 1992; see also Cooper, Russell, Skinner, Frone, & Mudar, 1992). Third, several researchers have recently demonstrated a relation between affect and alcohol use in nonclinical adolescent and adult samples (Cooper, Frone, Russell, & Mudar, 1995; McCreary & Sadava, 2000; Swendsen, Tennen, Carney, Affleck, Willard, & Hromi, 2000; Wills, DuHamel, & Vaccaro, 1995; Wills, Sandy, Shinar, & Yaeger, 1999). This affect-motivated pattern of drinking may alone be a problem indicator, as those who endorse coping motives for drinking use alcohol more often, in larger quantities, and to greater consequence than those less inclined to drink for this reason (Cooper, Russell, & George, 1988).

The tension reduction hypothesis, as originally offered by Conger (1956), explains this relation as motivated drinking aimed at reducing negative, stressful, or aversive states, which is, in turn, reinforced by the tension-reducing properties of alcohol. However, support for a broadly interpreted tension reduction hypothesis is weak and contradictory (Greeley & Oei, 1999; Sayette, 1999). As a result, researchers have recently proposed reformulated self-medication theories that incorporate aspects of social learning theory, and stress and coping models of health behavior, to identify

for whom alcohol use is likely to be a means of regulating affect. Related studies have indicated that the relation between distress and drinking is stronger among those who are male, lacking in alternative coping skills, expecting alcohol to alleviate negative mood, and motivated to drink for this reason (Cooper et al., 1992, 1995; Kushner, Sher, Wood, & Wood, 1994). These qualifications of the original tension reduction hypothesis suggest that affect-motivated drinking occurs for only a subset of individuals. Alternatively, other researchers have argued that negative affect results from (rather than leads to) the consequences of heavy alcohol involvement (Kushner et al., 2000). As such, reformulated self-medication models must specify the relation between affect and alcohol use to account for potential bidirectionality and group differences. Moreover, these models should consider the types of affect that lead to and follow from alcohol use (Hussong & Chassin, 1994) as well as the social context of these drinkers (Hussong, 2000b). To this end, the current study examined the relation between affect and alcohol use with respect to potential moderating factors across individuals and contexts.

Specifying the Relation Between Affect and Alcohol Use

Greeley and Oei (1999) highlighted the great array of methods and samples that comprise studies of mood and alcohol use. Such variability may underlie inconsistent findings in this field, under the assumption that the relation between affect and alcohol use varies across individuals. To the extent that factors qualifying this relation are differentially represented in the samples of these studies, inconsistent results should be expected. As such, delineating the conditions under which affect and alcohol use are related should reveal a stronger pattern of self-medication for vulnerable individuals. Five such conditions were targeted in the current study.

First, theories of adult alcoholism describe internalizing symptoms and negative affect as precursors of *late-onset* alcohol abuse

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(Sher, 1991; Zucker, 1986), suggesting that alcohol abuse motivated by negative affect may not emerge until after adolescence. Consistent with this supposition, negative affect appears to play only a weak role in the drinking behavior of adolescents (e.g., Henry et al., 1993; Hussong & Chassin, 1994; Rohsenow, 1982; Windle & Barnes, 1988). Peak rates of alcohol involvement and the development of alcohol abuse typically occur among those between 18 and 25 years old. This increase is especially notable among college students, for whom this developmental period reflects a time of stressful transition (Maggs, 1997; Shaver, Furman, & Buhrmester, 1985) as well as easy access and widespread encouragement of alcohol use (Johnston, O'Malley, & Bachman, 1999; Maggs, 1997). Although Aseltine and Gore (2000) and others have noted that stress is not a strong predictor of alcohol use across adolescence and young adulthood, these authors emphasized that stress may still be causally related to alcohol use during the college years. Consistent with reformulated tension reduction models, stress may play a causal role in drinking behavior for only a subset of college students. Further specification of this vulnerable population of young adults is thus needed to evaluate this hypothesis.

Second, the relation between affect and alcohol use may also depend on the type of mood experienced. Cooper et al. (1995) suggested that positive and negative affect have distinct motivational consequences and thus play different roles in predicting alcohol use: "Negative emotions have strong motivational consequences, prompting cognitive and behavioral efforts aimed at managing, minimizing, or eliminating the source of the problem or the emotions themselves, whereas positive emotions do not generally elicit attributional searches or behavioral responding" (p. 991). Consistent with this hypothesis, these authors found that positive affect did not predict drinking motivations and was only weakly related to drinking among adults, whereas negative affect predicted greater coping motives and subsequent drinking behaviors. McCreary and Sadava (2000) also found a rather weak but positive association between positive affect and alcohol use in an adult sample but no relation between the two in a younger adult sample. However, Wills et al. (1999) found that both lower positive affect and higher negative affect predicted greater alcohol and drug use in a sample of adolescents. These findings further support the relation between negative affect and greater alcohol use but they fail to clarify the nature of the relation between positive affect and drinking behavior.

Third, subtypes of negative affect have also shown different relations with alcohol involvement. In a high-risk sample of older adolescents, Hussong and Chassin (1994) found that depression and anger, but not anxiety, uniquely predicted concurrent heavy alcohol use. Related longitudinal analyses found that a global measure of negative affect predicted heavy alcohol use in younger adolescents but did not predict individual changes in heavy alcohol use over time (Hussong, Curran, & Chassin, 1998). However, when negative affect was disaggregated, individual patterns of escalating heavy alcohol use over time were differentially associated with anger, anxiety, and depression across sex (Hussong, Chassin, & Hicks, 1999). Girls showing greater accelerations in heavy alcohol use over time reported lower levels of anxiety and, to some extent, anger in early adolescence. Among boys, higher levels of anger in early adolescence were positively associated with faster growth in heavy alcohol use over time. These findings

suggest a temporal ordering in the types of negative affect that precede versus follow from alcohol use. However, the potentially different contributions of varying types of negative affect to alcohol use have not been systematically examined within a young adult population.

These results also suggest a fourth qualifier for the relation between mood and alcohol use, namely, gender. Previous studies have found that men drink heavier and experience more drinking-related consequences than do women (Prendergast, 1994; Robins & Reiger, 1991). In addition, gendered patterns of psychopathology indicate that women are more likely to internalize distress, whereas men are more likely to externalize distress (Robins & Reiger, 1991). Similarly, men may be more likely to externalize their affect through drinking behavior than are women. Consistent with this prediction, higher rates of drinking to cope and a stronger relation between stress and drinking behavior have been found in men than in women (Cooper et al., 1992).

A final specifying condition is social context. Theories of adolescent substance use indicate that negative self-perceptions and affect may lead adolescents to seek marginalized peer groups, where they can more easily gain acceptance from their peers (e.g., Chassin, Curran, Hussong, & Colder, 1996; Kaplan, 1980). However, these peer contexts may also play a role in promoting more deviant activity, such as heavy alcohol use. Similarly, self-medication may be more likely to occur within impoverished social contexts where drinking to cope may be more commonly practiced and reinforced. Young adults benefit from the social support of their peer groups and friendships, but they also learn how to regulate and cope with their own emotions through social learning within the peer context (Brown, Dolcini, & Leventhal, 1997). Young adults who are in more positive peer contexts may receive encouragement for using effective coping and successful problem-solving strategies that, in turn, protect them from using substances to regulate negative affect. Conversely, affect-motivated substance use learned through deviant peer contexts may become self-perpetuating, leading to substance abuse outside of the social context for purposes of self-medication. Hence, young adults with low friendship support may receive fewer positive resources from their friends to cope with stressors and also learn maladaptive coping strategies within these friendships, such as the use of substances to regulate negative affect.

In contrast to this hypothesis, greater drinking has been found among those with more intimate and supportive friendships than their peers (Aseltine & Gore, 2000; Hussong, 2000b; Neslek, Pilkington, & Bilbro, 1994; Windle, 1994), although support provided by parents or by the larger social network has often been associated with less alcohol involvement, related consequences, and stress-related drinking behavior (e.g., McCreary & Sadava, 1998; Peirce, Frone, Cooper, & Russell, 1996; however, see Steptoe & Wardle, 1999). Such studies, however, rely on young adults' self-reports of friendship interactions, emphasizing self-perceptions over actual experiences within the friendship context. Few studies have examined the moderating role of social context on the relation between affect and alcohol use, and none have incorporated multiple methods of assessing these contexts to better understand the contributions of this specifying factor.

Timing

Collectively, this work suggests a specific relation between distinct moods and alcohol use that varies across time, type of affect, gender, and social context. However, previous study designs complicate evaluation of the self-medication hypothesis. Experimental studies that manipulate affect in the laboratory and assess subsequent drinking have compromised generalizability, especially with respect to unconstrained and social drinking contexts (typifying the college environment of many young adults). Alternatively, field studies predominantly assess affect as a trait (spanning months or years), making it difficult to differentiate self-medication from other potential risk mechanisms that may explain the relation between negative affect and young adult alcohol use. Researchers have identified factors that both precipitate stable patterns of negative affect and promote risk for young adult alcohol use (e.g., parental alcoholism; Chassin et al., 1996; Dawson & Grant, 1998). As such, the relation between such affective traits (or traitlike measures) and alcohol use may result from self-medication motives or may simply reflect a third variable correlation accounted for by shared precipitating risk factors (e.g., genetic factors and disruptive family environment; Swendsen & Merikangas, 2000).

Because affective states are posited to both result from and lead to alcohol use, this focus on negative affective traits rather than states makes directionality difficult to determine. More specifically, self-medication theories posit that proximal, relative elevations in affect (i.e., states) trigger alcohol use. Moreover, outside of the laboratory, affect resulting from alcohol use is probably related to experiences associated with the drinking occasion and subsequent positive and negative consequences, increasing the window within which subsequent affect may be influenced by drinking experiences. In this vein, appropriate tests of self-medication theories must control for affect as a trait and be sensitive to appropriate assessment intervals to determine whether statelike variations in affect predict specific periods of alcohol use and vice versa. Addressing these issues through novel methods, Swendsen et al. (2000) assessed daily mood and alcohol use over 30 days in a community sample of adult drinkers. After controlling for trait measures of anxiety and depression, these authors found that happy and nervous moods predicted greater drinking later in the day, whereas quiet moods predicted less drinking. In addition, alcohol use was associated with higher rates of concurrently assessed nervousness.

However, the effect of mood on drinking behavior may not occur within a single day but may carry over into subsequent days. Social context may further constrain drinking experiences, such that drinking within socially proscribed periods may be associated with affect over the preceding interval. Because drinking among college students shows a strong weekly cycle, the effects of mood on drinking behavior may differ over weekdays versus weekends (Orcutt & Harvey, 1991). The current study examined such associations between affect and drinking through newly emerging statistical techniques that differentiate time-specific variations in mood states from the impact of affective traits in predicting subsequent alcohol use. Such statistical analyses and appropriately matched research designs help to establish temporal precedence directly and differentiate self-medication from mechanisms related to third variable correlates.

The Current Study

To further specify the relation between affect and alcohol use, the current study examined four hypotheses concerning heavy drinking among 18- to 20-year-olds. First, time-specific variations in negative and positive affect were expected to predict subsequent time-specific variations in heavy alcohol use over the following week. Reciprocal effects of heavy alcohol use on negative and positive affect were also expected. Second, a greater association between negative affect and drinking behavior was expected in men than in women. Third, although those showing a pattern of self-medication in their drinking may be more likely to describe their friendships as more intimate, observed social support interactions were expected to show that lower positive social support actually predicts greater risk for self-medication. Fourth, mood-specific associations between affect and alcohol use were expected, such that anger and anxiety show a pattern of association with drinking that is consistent with self-medication. A short-term longitudinal design and recently advanced structural equation modeling techniques were used to test these hypotheses.

Method

Sample

Participants were recruited through campus and community advertisements for same-sex friends aged 18–20 to complete a month-long study of coping with stress through friendships. Participants were screened as same-sex friendship pairs and invited to participate in the study if both friends (a) described their friendship as close and of at least 6 months duration, and (b) agreed to participate in each phase of the 28-day study. A total of 84 of the 86 (98%) participants who began the study completed the full 28-day protocol. Because of funding constraints, we were unable to continue to recruit from the additional 55 friendship pairs who responded to our advertisement. An additional 24 friendship pairs did not meet inclusion criteria, and only 11 friendship pairs refused to participate or did not attend the initial assessment. All participants were full-time college students at a large Southeastern state university. For the current study, those who did not complete relevant assessments ($n = 9$) or who were identified as outliers ($n = 1$) were dropped from analyses, leaving a sample of 74 participants (76% of those screened and eligible to participate; 43% male, 77% Caucasian, 16% African American, 7% of other ethnicity; mean age = 18 years; 76% of participants' parent or parents were college graduates). With respect to overall drinking patterns represented in this sample, between 74% and 79% of students reported drinking during the previous month assessed, as compared with 68% in the national Monitoring the Future college sample (Johnston et al., 1999). At least three negative consequences of drinking were experienced by over 82% of the sample at some point in time. Finally, 84% of participants reported being friends for at least a year, with 85% having daily contact with one another.

Procedure

Participants completed three components of the study. First, each friendship dyad jointly attended a 1.5-hr session (i.e., the initial visit) at the university in which observational and survey assessments were completed on a variety of psychological constructs. Trained undergraduate and graduate research assistants conducted all testing sessions and were present to ensure that participants did not confer on survey responses when friends were tested together. Second, friendship dyads returned together to the university 28 days after the initial visit to again complete a series of observational and survey assessments (i.e., the final visit). Third, each participant completed an experience-sampling protocol involving daily

assessments of substance use and thrice-daily assessments of affect over the 28-day period between the initial and final visits. Participants were instructed in this protocol at the end of the initial visit when they were given a recording booklet, a security pen (using invisible ink read by black light to protect confidentiality of the data in the field), and a digital pager. Participants were contacted at random 2-hr intervals between 10:00 a.m. and 10:00 p.m., three times daily, by a pager signal on each of the subsequent 28 days. Participants were instructed to make recordings on receiving the pager signal or as close to receiving the signal as possible. In the event that signals were not received in a given day, participants were instructed to contact the project office and alternate times for making recordings for that day were given. Compliance and equipment difficulties were assessed each week through phone contact and individual sessions held at the project office (where financial incentives were also given to participants). At the end of the sampling period, 100% of participants rated their alcohol use ratings as "very honest" and 99% of participants rated their affect ratings as "very or somewhat honest." All participants were paid for completing each component of the study and a Certificate of Confidentiality was obtained from the U.S. Department of Health and Human Services to protect participant confidentiality.

Measures

All measures, except for social support, were assessed through self-report. Demographic measures were assessed during the initial visit. Descriptive statistics and correlations among all variables included in subsequent analyses are reported in Table 1.

Friendship quality. Friendship quality was assessed at both the initial and final visits. Positive friendship quality was assessed through four subscales (assessing intimacy, companionship, reliable alliance, and affection) from the Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985). The response scale ranged from 1 (*little to none*) to 5 (*the most possible*). Consistent with previous studies (Furman & Buhrmester, 1985), Hussong (2000a) found these subscales to be reliable and moderately interrelated and to form a reliable composite measure (Cronbach's $\alpha = .93$ to $.95$). A sum of these 12 items formed the Positive Friendship Quality scale for each visit in the current study.

Two scales assessing conflict and peer controlling behaviors were administered to all participants to assess negative friendship quality. The Peer Conflict scale was the sum of three items each assessing conflict frequency (NRI; Furman & Buhrmester, 1985), duration, intensity, and the diversity of conflict topics. Items on the latter three scales were developed by Hussong (2000b). The response scale for these 12 items ranged from 1 (*never*) to 5 (*all the time*), and previous testing found these subscales to be reliable ($\alpha s = .80$ – $.92$) and moderately interrelated ($r s = .45$ – $.67$; Hussong, 2000b). The Peer Control scale was the sum of 17 items, written by Hussong (2000a) and based on the coding scheme of dominant behavior

developed by Savin-Williams (1979), to assess four dimensions of controlling behavior by peers: *overt behavioral control* (e.g., "How often does your friend physically stop you from doing something you want to do?"), *overt verbal control* (e.g., "How often does your friend tell you they will leave or ignore you if you do something?"), *covert behavioral control* (e.g., "How often does your friend give you the cold shoulder when your friend is unhappy with you?"), and *covert verbal control* (e.g., "How often does your friend talk down to you as if you were a child?"). The response scale ranged from 1 (*never*) to 5 (*all the time*), and previous studies have found the four subscales to be acceptably reliable ($\alpha s = .67$ – $.78$) and interrelated ($r s = .58$ – $.75$) and to form a reliable composite scale ($\alpha = .93$; Hussong, 2000a). A mean of the Peer Conflict and Peer Control scales formed the Negative Friendship Quality measure for each visit in the current study. Finally, a difference score (positive friendship quality minus negative friendship quality) was calculated at each time point and then averaged across initial and final visits to form a single index of positive friendship quality for subsequent analyses ($M = 30.79$; $SD = 12.59$; Cronbach's α ranged from $.87$ to $.94$ across subscales).

Social support. At the initial and final visits, each friendship dyad completed an observational task assessing social support, adapted from Cutrona and Suhr's (1994) protocol for marital dyads. Friends were first primed to consider recent stressors by completing a stress checklist (Kohn, Lafreniere, & Gurevich, 1990) in separate rooms. Research assistants asked participants to select a current stressor (not necessarily from the checklist) that they would be willing to discuss with their friend in the following observational task. Friends were then reunited and the research assistant gave instructions for the task before leaving the room. Friend A then shared his or her topic with Friend B and the two discussed this issue for 5 min. A knock on the door signaled the end of the 5 min, and the friends then reversed roles for a second 5-min interaction.

These 10-min interactions were videotaped and subjected to coding by trained undergraduate and graduate research assistants. Although subsequent analyses relied on macrolevel coding, these interactions were first categorized by microlevel codes adapted from Cutrona and Suhr (1994). Macrolevel codes included informational support, emotional support, esteem support, tension reduction, attentiveness (all examples of positive support), and negative support (e.g., interrupting to change the topic, or blaming). Sequences were divided by turn-taking and each distinct supportive behavior provided to the disclosing friend by the listening friend during the first 5 min was recorded as social support received by Friend A. Similarly, during the second 5-min period, supportive behaviors directed toward the disclosing friend by the listening friend were recorded as social support received by Friend B. Reliability between each of three coders and a master coder was assessed for every fourth videotape coded after establishing a baseline reliability (Cohen's kappa = $.80$) on training tapes. Kappa estimates were computed for macrolevel codes and ranged from $.81$ to $.92$ across coders and videotapes. Individual participants received scores for the total amount (i.e., frequency) of positive and the total amount of negative social support provided to them during their disclosure period. Finally, a difference score (positive social support minus negative social support) was calculated at each time point and then averaged across initial and final visits to form a single index of social support for subsequent analyses ($M = 39.20$, $SD = 12.33$).

Experience sampling. Over a 28-day period, measures of affect were collected three times daily (a total of 84 repeated measures), and measures of alcohol use were collected once daily (a total of 28 repeated measures) between the initial and final visit. At the first pager contact of each day (prior to 2:00 p.m.), participants reported the number of drinks they had consumed over the past 24 hr on a 9-point scale ranging from 0 to 8 or more. Although all participants completed 28 days of sampling, the first day of sampling (Tuesday–Saturday) was not uniform across participants. For the current study, a 21-day sampling period was examined, with Day 1 being the first Sunday of sampling for a given participant and Day 21 being the last Saturday of sampling for a given participant. Six scores of

Table 1
Sample Correlations Among Constructs of Interest

Construct	1	2	3	4	5	6
1. Weekday alcohol use	—					
2. Weekend alcohol use	.42***	—				
3. Weekday negative affect	.09	-.09	—			
4. Weekend negative affect	.05	-.13	.33**	—		
5. Weekday positive affect	.30**	-.02	.42***	.04	—	
6. Weekend positive affect	.12	-.02	.17	-.01	.62***	—
<i>M</i>	.19	1.04	.79	.83	1.78	1.80
<i>SD</i>	.45	1.64	.82	.93	1.38	1.59

Note. $N = 74$.

** $p < .01$. *** $p < .001$.

weekday-weekend drinking were formed by taking the average available daily ratings for each Thursday, Friday, and Saturday period (the weekend score) and for each Sunday, Monday, Tuesday, and Wednesday period (the weekday score), respectively, within this 21-day time frame.¹ The interscale reliability of alcohol use indices across the six periods was .76.

At each of the three daily pager contacts, participants recorded their affect by using 59 items from the Positive and Negative Affect Schedule—Expanded Form (PANAS; Watson & Clark, 1990; Clark & Watson, 1991). (A single item was omitted due to typographical error.) These items were rated as present or absent at the time when the paging signal was received. In the current study, scale scores reflected the dimensions of fear, hostility, guilt, and sadness as well as the broadband dimensions of negative affect (the sum of items on the narrowband indicators) and positive affect. Items for each scale were summed within each report (for each of three daily pager contacts) and then averaged within each of the 21 days of interest to the current study to form a daily index for each affect scale. From these daily indices, six scores were formed for each affect scale corresponding to the weekend-weekday time intervals described above for reported alcohol use. A sampling of psychometric properties for measures of alcohol use, negative affect, and positive affect are reported in Table 1. The interscale reliabilities for positive and negative affect indices across the six periods were .88 and .85, respectively. For subscales of affect, mean score (and standard deviation) ranges were as follows: .14–.26 (.28–.52), .15–.29 (.35–.66), .17–.30 (.31–.62), and .14–.18 (.26–.38) for measures of fear, sadness, hostility, and guilt, respectively.

Results

Our theoretical model proposes that repeated measures of affect and alcohol use are governed by both a traitlike tendency toward stability and a time-specific tendency toward change. The stable component represents, for example, average drinking or drinking propensity over the entire time frame assessed. This component reflects an underlying random trajectory or process that may differ across individuals while equally influencing repeated measures of drinking behavior within an individual. The time-specific component represents relative increases or decreases in drinking with respect to an individual's own drinking trajectory. These time-specific indices may also influence one another (e.g., relative elevations in negative affect at Time 1 predicting relative elevations in drinking at Time 2). Importantly, these time-specific associations may exist above and beyond the presence of associations between the estimated trajectories of drinking and affect.

The recently proposed autoregressive latent trajectory (or ALT) model is well suited to evaluate these hypotheses (Bollen & Curran, 2000; Curran & Bollen, 2001). The ALT model combines latent variable-based random coefficient models of change over time with traditional cross-lagged panel analyses focused on time-specific variation. Latent factors estimate the trajectory underlying manifest indicators of time-specific levels of affect and alcohol use. The covariation between these latent factors estimates the shared stable association between affect and alcohol use over time. Time-specific elevations (relative to an individual's baseline) in either construct may then be predicted through the addition of structural paths from, for example, weekday negative affect to subsequent weekend alcohol use. Because these relations are assessed simultaneously, the ALT model provides a conservative test of the unique bidirectional relations between affect and alcohol use at both the stable and time-specific levels.

Analytic Issues

The current data and research design presented multiple challenges that were addressed in our analytic plan. First, even though reports of alcohol use were averaged over multiple days to form repeated weekday and weekend drinking indices, such scores were nonnormally distributed. To address this issue, robust estimates of parameters and chi-squares were estimated within the Mplus program and are reported below for all models (Muthén & Muthén, 1998). Second, the sample size of 74 may raise concerns about available power, given the complexity of the analytic model. However, Muthén and Curran (1997) have shown that the addition of repeated measures increases available power in longitudinal analyses and that such sample sizes are not atypical for labor-intensive ecological momentary designs, as used here. Third, because participants were recruited for the study as friendship pairs, their data are considered potentially nested or hierarchical in nature. Although the hierarchical structure of the data could not be included in our already complex models, the use of simplified models (as described in Khoo & Muthén, 2000) found that the lagged relations between affect and alcohol use did not substantively differ when nestedness was included in the model from those reported below.² As such, the models presented below do not account for this nested structure but they are probably not biased by this omission. Fourth, multiple tests of the relation between affect and alcohol use were conducted to examine hypothesized specificity in the relation between affect and alcohol use over gender, type of affect, and social context. To protect against Type I error, we used a strict alpha of .05 within a very stringent and conservative test of the stated hypotheses (as further described below). Finally, multiple group analyses were used to formally test moderating effects of social context. This statistical technique calls for forming two groups that are then compared on the model of interest (Muthén, 1989). We formed such groups by conducting a median split on the moderating variable of interest. Although this technique has been properly criticized on many grounds (Aiken &

¹ Note that at the first pager contact substance use was reported for the previous day, whereas affect was assessed on the current day. As such, sampled data were realigned so that measures of affect and alcohol use referred to the same reporting period prior to subsequent analyses.

² To examine the extent to which our hierarchical data structure impacted the current findings, simplified models were estimated following procedures described by Khoo and Muthén (2000). In these models, analyses were conducted on each friendship pair, with the baseline ALT model (depicted in Figure 1) being repeated in the same model for each of the two friends. As such, the resulting model included four latent variables (and associated indicators): Friend A's alcohol use, Friend A's affect, Friend B's alcohol use, and Friend B's affect. By including variables for each friend within the same model, the nested structure of participants within friendship dyads was modeled (Khoo & Muthén, 2000). Constraints were added to equate all similar aspects of the model across Friends A and B because the model should not differ as a function of which friend within the dyad is the focus of interest. Two such models were estimated: one including negative affect and a second including positive affect. Findings were highly similar to those reported below at the individual (rather than dyad) level, suggesting that omitting the nestedness due to friendship dyad resulted in no significant change to parameter estimates from the original analyses. Thus, subsequent tests omitted modeling of the dyadic structure.

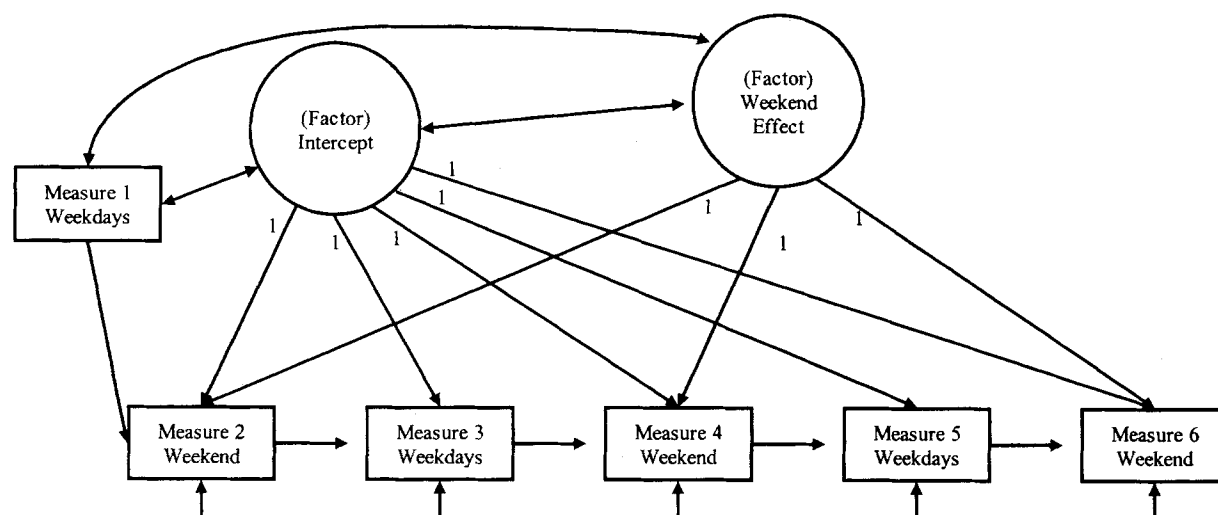


Figure 1. Generic univariate autoregressive latent trajectory model.

West, 1991), alternative procedures for including moderating effects within the current analytic models are not yet available.

Baseline (Univariate) Models

Prior to evaluating the central hypotheses, baseline random coefficient models examined the pattern of stability and change in each construct separately (i.e., heavy alcohol use, negative affect, positive affect, fear, hostility, sadness, and guilt). Each model included (a) a measure of drinking for each time period (time specific indices), (b) an estimate of drinking propensity across the entire six assessment periods (the intercept latent factor), and (c) estimates of the likelihood of drinking during the current period given drinking during the previous period (the auto-regressive component). The first repeated measure for each construct was included in the model as an exogenous variable (to avoid model misspecification associated with series data, see Bollen & Curran, 2000). Nested model comparisons examined whether the data supported (d) the inclusion of a second latent factor representing time-specific changes in affect and alcohol use associated with weekends (with factor loadings set to 1 for weekend measures and to 0 for weekday measures; also see Curran, Muthén, & Harford, 1998) and (e) the imposed equality constraints on the residual error variances of similar measures over time (e.g., across weekday versus weekend drinking measures) as well as on the autoregressive estimates over time (see Figure 1). Because all components of these models were estimated simultaneously, they represent unique effects from one another.

Nested chi-square tests indicated that drinking over the 21 days was best captured through a model that included a weekend factor and unconstrained error variances for weekday measures of drinking, $\chi^2_{S-B}(13) = 14.16, p = .36, IFI = .98, CFI = .98$.³ No models of affect supported the inclusion of a weekend factor, and all imposed constraints were supported for analyses of negative affect, $\chi^2_{S-B}(18) = 13.62, p = .75, IFI = 1.0, CFI = 1.0$; positive affect, $\chi^2_{S-B}(18) = 19.32, p = .37, IFI = .99, CFI = .99$; and guilt, $\chi^2_{S-B}(18) = 7.64, p = .98, IFI = 1.0, CFI = 1.0$. Constraints imposed on autoregressive estimates and error variances were not

supported in analyses of fear, $\chi^2_{S-B}(12) = 7.49, p = .82, IFI = 1.0, CFI = 1.0$. Error variances among weekend measures were also not supported in analyses of hostility, $\chi^2_{S-B}(16) = 15.32, p = .50, IFI = 1.0, CFI = 1.0$. Finally, even with all constraints removed, models for sadness showed a poor fit to the data. Examination of modification indices indicated that the first measure of weekday sadness was directly related to weekday sadness the following week, over and above the autoregressive component in the model. This pathway was added to the model for sadness, $\chi^2_{S-B}(17) = 11.98, p = .80, IFI = 1.0, CFI = 1.0$. All final models fit the data well. Significant residual variance of within-time indicators was found (with the exception of weekday measures in the models of fear), suggesting that individuals varied from one another in how much they deviated from their overall or baseline levels within each time period. Our next models then attempted to predict the extent to which individuals would vary from their own baseline (i.e., whether relative increases in drinking were associated with relative increases in affect). The final baseline, univariate models described here were included in subsequent multivariate models to represent the pattern of stability and change for each construct.

Time-specific associations between affect and alcohol use. Two analyses were conducted to test the hypothesis that reciprocal time-specific elevations in affect predicted subsequent time-specific elevations in alcohol use, after controlling for the stable association over time between alcohol use and affect. As recommended in Curran and Bollen (2001), the two latent factors of alcohol use and affect were correlated, within-time residuals were correlated (i.e., Time 2 affect and Time 2 alcohol use), and cross-lagged structural coefficients examined whether, for example, Time 2 alcohol use predicted Time 3 affect, and vice versa

³ Model chi-squares are traditionally believed to indicate adequate fit if the ratio of the model chi-square to degrees of freedom is 2:1 or lower (Bollen, 1989). The incremental fit index (IFI; Bollen, 1989) indicates adequate fit at .90 and above, as does the comparative fit index (CFI; Bentler, 1990).

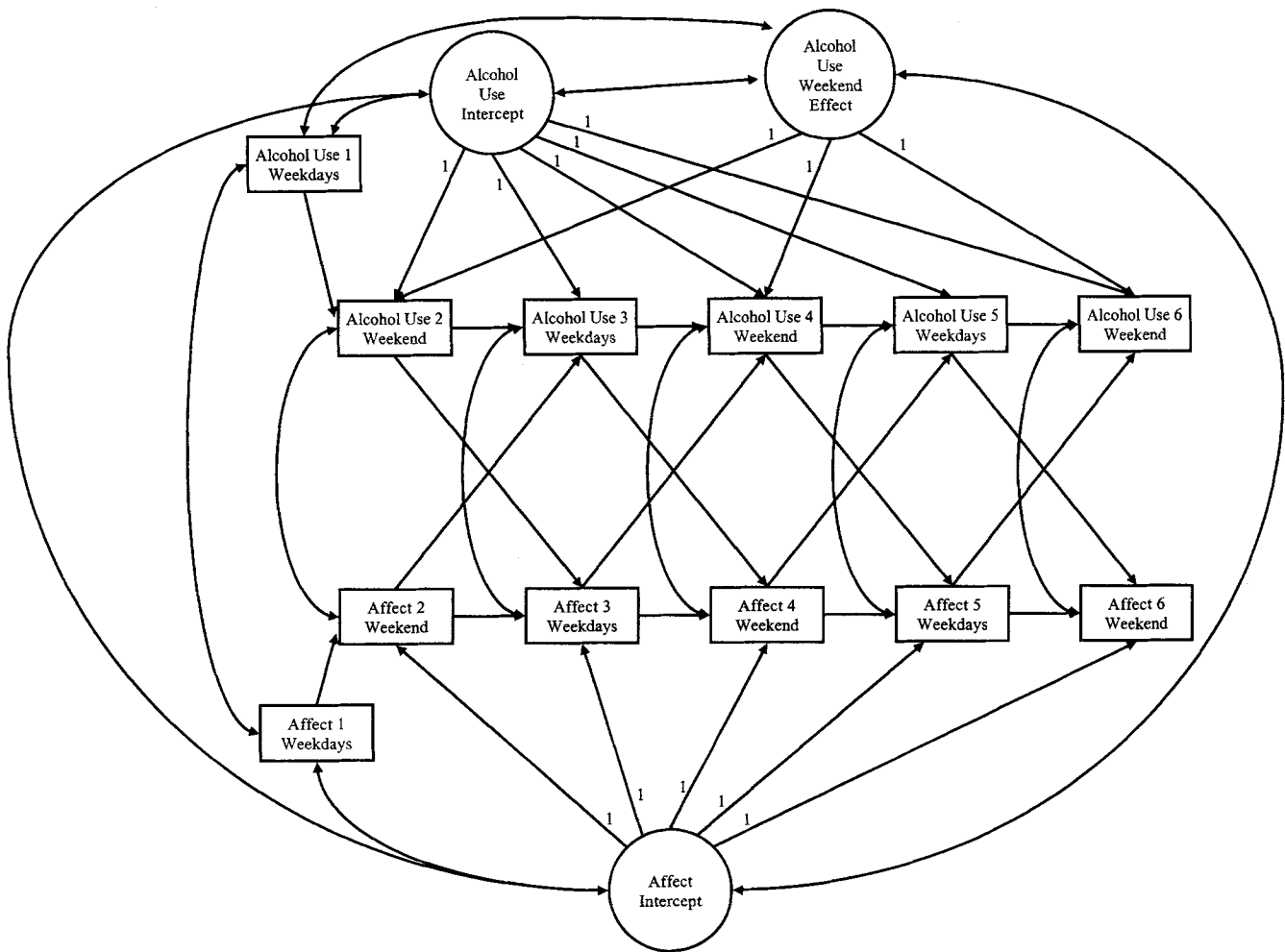


Figure 2. Predicted multivariate autoregressive latent trajectory model of alcohol use and affect. To simplify this diagram, gender is not shown above, although it is an exogenous variable in analyses.

(see Figure 2). Gender was included as a covariate predicting the latent factors and initial measures of affect and alcohol use. To provide a stringent test of the hypothesis, similar structural estimates were constrained to be equal over time (e.g., weekend alcohol use predicting subsequent weekday affect, and weekday affect predicting subsequent weekend alcohol use).

Separate models were estimated for negative and positive affect. Results indicated an excellent fit of the model to the data for both negative affect, $\chi^2_{S-B}(62) = 65.60, p = .35, IFI = .98, CFI = .98$, and positive affect, $\chi^2_{S-B}(62) = 79.85, p = .06, IFI = .94, CFI = .94$. Several associations involving the latent factors for affect and alcohol use were found in the model including negative affect. First, men showed greater drinking over the weekends (i.e., the weekend factor; standardized $\beta = .23, t = 2.29$),⁴ but not greater overall drinking (i.e., the intercept factor; standardized $\beta = .22, t = 1.47$), as compared with women. No gender differences were found in overall levels of negative affect ($\beta = -.05, t = -0.52$). As expected, greater overall drinking levels were positively associated with more drinking on weekends ($\beta = .91, t = 2.60$), but neither index of drinking was associated with the latent factor for

overall negative affect ($\beta = .15, t = 0.48$, for overall drinking; $\beta = -.14, t = -1.51$, for weekend drinking). No within-time correlations among measures of affect and alcohol use (i.e., Time 1 drinking covaried with Time 1 negative affect) were significant (β s = $-.06$ to $.14, t$ s = -1.25 to 1.95 , for other times). Given that such correlations were, however, estimated in the presence of all other effects in the model, the lack of consistent support for unique within-time correlations is not surprising. Finally, tests of the time-specific cross-lags, of greatest interest to the current hypotheses, showed significant associations between negative affect and alcohol use over time. Specifically, greater drinking during the weekend predicted greater weekday negative affect ($\beta = .13, t = 2.07$), but greater weekday drinking was unrelated to negative affect ($\beta = .04, t = 0.91$). Also, negative affect was unrelated to subsequent drinking ($\beta = .08, t = 1.87$, for weekend drinking; $\beta = .09, t = 0.94$, for weekday drinking).

⁴ The t values greater than or equal to 1.96, 2.58, 3.29 are significant at $p < .05, .01$, and $.001$, respectively.

Several interesting associations between positive affect and alcohol use were also found in these analyses. As with the negative affect models, men showed greater weekend drinking ($\beta = .52, t = 2.35$), but not overall drinking ($\beta = .22, t = 1.74$), than women. No sex differences in overall positive affect levels ($\beta = .01, t = .14$) were found. Overall drinking levels and weekend drinking were positively associated ($\beta = .95, t = 2.74$), and overall drinking was inversely related to positive affect ($\beta = -.30, t = -2.41$). No association between increases in drinking associated with weekends and positive affect was found ($\beta = -.03, t = -.37$). No unique associations between within-time positive affect and drinking behavior were found ($\beta = -.08$ to $.10, t = -1.55$ to 1.70). Finally, time-specific cross-lagged effects showed prospective relations between positive affect and alcohol use. Specifically, greater positive affect predicted more drinking regardless of the weekday-weekend interval ($\beta = .18, t = 2.34$, for weekday drinking; $\beta = .10, t = 1.97$, for weekend drinking). Greater drinking during the week also predicted greater positive affect during the weekend ($\beta = .13, t = 2.73$), but weekend drinking did not predict weekday positive affect ($\beta = .01, t = .17$).

To further understand these findings, moderating hypotheses were next explored. All moderating hypotheses were examined through multiple group analyses in which groups differing on the moderating variable were compared on the multivariate ALT model described above (Figure 2). In these analyses, all parameters were constrained to be equal across groups in the initial model. A second model freed parameters of central interest (i.e., the cross-lagged pathways between affect and subsequent alcohol use, and vice versa) to vary across groups. A chi-square difference test (corrected for the robust estimation procedure; Muthén & Muthén, 2000) evaluated resulting model improvement, with an increase in model fit suggesting that the parameters of interest should be free to vary across groups (i.e., that moderating effects were present). Below we report the chi-square difference tests for each moderator of interest as well as the parameters of interest for each group when significant group differences were found.

Gender differences. Multiple group analyses of these models tested potential sex differences in the time-specific relations between each form of affect and alcohol use ($n = 32$ men, $n = 42$ women). Freeing constraints placed on structural coefficients representing time-specific relations between affect and alcohol use did not result in a significant model improvement, failing to support the presence of gender differences in these models, $\chi^2_{S-B}(4) = 4.34, ns$, for negative affect; $\chi^2_{S-B}(4) = 0.26, ns$, for positive affect.

Social context. Next, multiple group analyses examined moderating influences of friendship quality and social support in the multivariate ALT models for positive and negative affect. Each moderating influence was examined separately. Groups were formed on the basis of median splits of friendship quality ($n = 36$ for low, $n = 38$ for high) and social support ($n = 40$ for low, $n = 34$ for high). No group differences were found for models involving either form of affect based on friendship quality, $\chi^2_{S-B}(4) = 5.56, ns$, for negative affect; $\chi^2_{S-B}(4) = 3.55, ns$, for positive affect; or on social support, $\chi^2_{S-B}(4) = 4.49, ns$, for negative affect; $\chi^2_{S-B}(4) = 2.57, ns$, for positive affect.

Subtypes of negative affect. Relations between negative affect and alcohol use were next examined with respect to the four subtypes of sadness, guilt, hostility, and fear. For each type of mood, the same multivariate ALT model as described above was estimated (Figure 2). Once again, resulting models fit the data well, $\chi^2_{S-B}(60) = 72.71, p = .13$, IFI = .94, CFI = .93, for hostility; $\chi^2_{S-B}(62) = 69.92, p = .23$, IFI = .95, CFI = .94, for guilt; $\chi^2_{S-B}(56) = 63.71, p = .22$, IFI = .95, CFI = .95, for fear; $\chi^2_{S-B}(61) = 79.78, p = .05$, IFI = .91, CFI = .90, for sadness. Time-specific lagged associations were found only in models of hostility and guilt (see Table 2). Weekday drinking predicted greater weekday guilt ($\beta = .13, t = 2.00$). In addition, hostility during the weekend predicted more drinking during the subsequent week ($\beta = .18, t = 2.34$) and weekday drinking predicted subsequent weekend hostility ($\beta = .36, t = 2.64$).

Gender, social context, and subtypes of negative affect. The final analyses examined whether context and gender served as moderators of the relation between affect and alcohol use when specific forms of negative affect were considered. Multiple group analyses based on gender, friendship quality, and social support were performed separately for models including each of the four subtypes of negative affect. Releasing constraints across gender on time-specific associations between each form of negative affect and drinking led to significant improvements in model fit only in models of sadness, $\chi^2_{S-B}(4) = 11.14, p < .05$; for other forms of affect, $\chi^2_{S-B}(4) = 5.76$ to $8.42, ns$. For women, drinking during the week was uniquely associated with subsequent elevations in sadness over the following weekend ($\beta = -.17, t = -4.41$). No other associations between sadness and drinking were found. For men, increased sadness over the weekend predicted greater subsequent weekday drinking ($\beta = .30, t = 9.25$), but increased sadness over the week predicted less subsequent weekend drinking ($\beta = -.14, t = -4.41$). In addition, men who drank more during the week

Table 2
Time-Specific Relations Between Subtypes of Negative Affect and Alcohol Use

Type of affect	Weekend affect predicting weekday drinking		Weekday affect predicting weekend drinking		Weekend drinking predicting weekday affect		Weekday drinking predicting weekend affect	
	β	t	β	t	β	t	β	t
Fear	-0.07	-1.12	0.06	1.02	-0.04	-0.66	-0.13	-1.54
Guilt	-0.03	-0.31	0.01	0.30	0.13	2.00	0.15	1.62
Hostility	0.21	2.25	0.02	0.33	0.07	0.84	0.36	2.64
Sadness	0.10	1.20	0.02	0.51	0.05	0.96	0.11	0.95

Note. Parameters in boldface are significant at $p < .05$.

reported greater relative elevations in sadness over the following weekend ($\beta = .24, t = 3.64$).

Multiple group analyses also found that associations between affect and alcohol use varied by social context (see Table 3). Both hostility and sadness showed differential relations with alcohol use across groups varying on friendship quality [$\chi^2_{S-B}(4) = 19.42, p < .05$, for hostility; $\chi^2_{S-B}(4) = 17.72, p < .05$, for sadness] as well as social support [$\chi^2_{S-B}(4) = 9.49, p < .05$, for hostility; $\chi^2_{S-B}(4) = 18.75, p < .05$, for sadness]. For those low in positive friendship quality, weekend hostility uniquely predicted subsequent weekday drinking ($\beta = .30, t = 7.10$), and weekday drinking in turn predicted subsequent elevations in weekend hostility ($\beta = .77, t = 2.29$). For those reporting greater positive friendship quality, weekend hostility also predicted weekday drinking ($\beta = .35, t = 5.71$), but weekday drinking was only marginally associated with subsequent weekend elevations in hostility ($\beta = .21, t = 1.79$). Rather, weekend drinking predicted subsequent increases in hostility ($\beta = .11, t = 2.08$).

Models involving sadness showed that those individuals low in friendship quality were more likely to drink on weekdays following weekends with greater sadness ($\beta = .16, t = 8.01$) and that drinking on either the weekend or during the week predicted greater sadness over the following interval ($\beta = .19, t = 3.95$, for weekday sadness; $\beta = .47, t = 11.91$, for weekend sadness). For those individuals high in friendship quality, time-specific elevations in sadness predicted greater subsequent drinking regardless of the weekday-weekend interval ($\beta = .20, t = 5.23$, for weekday drinking; $\beta = .23, t = 4.58$, for weekend drinking). No associations between drinking and subsequent sadness for those high in friendship quality were found.

Findings were similar, though not identical, for group differences involving social support. For those with less social support, weekend hostility was again related to greater subsequent weekday drinking elevations ($\beta = .24, t = 4.03$) and, in turn, weekday drinking was associated with subsequent elevations in weekend hostility ($\beta = .55, t = 7.70$). For those high in social support, hostility over the weekend also predicted greater drinking during the subsequent week ($\beta = .19, t = 3.70$). With respect to models involving sadness, a pattern of findings consistent with self-

medication was supported for those with less social support, regardless of the weekend-weekday interval. Greater sadness over the weekend ($\beta = .35, t = 6.67$) and the weekdays ($\beta = .15, t = 2.50$) both uniquely predicted subsequent increased drinking. Greater drinking over either the weekdays ($\beta = .29, t = 5.42$) or the weekend ($\beta = .10, t = 2.09$) in turn predicted elevated sadness in this group. For those individuals high in social support, greater weekday drinking reduced weekend sadness ($\beta = -.99, t = -2.00$), although no other unique relations between sadness and drinking were found for this group.

Discussion

Current reformulations of the original tension reduction hypothesis (Conger, 1956) emphasize the importance of individual difference factors in identifying who may be vulnerable to the use of alcohol to regulate emotions (Cooper et al., 1992). In the current study, we used experience-sampling techniques to examine factors that further specify the relations between affect and alcohol use over a 21-day period in a sample of young adult friendship pairs. Support was found for each of three specifying factors, reflecting the influences of gender, type of mood experience, and social context on the relation between affect and drinking. Moreover, these specifying effects were bounded temporally as the relation between affect and drinking varied over weekend versus weekday assessments. Several trends were especially noteworthy in these findings, and each are discussed in turn.

The Cycle of Negative Affect and Alcohol Use

The first prediction of the tension reduction hypothesis is that distress and negative moods prompt alcohol use for purposes of affect regulation (Conger, 1956). However, the lack of support for an association between (globally assessed) negative affect and subsequent drinking in the current study is consistent with previous research showing little evidence for this hypothesis (Greeley & Oei, 1999; Sayette, 1999). The construct of tension has been differentially operationalized across studies of this question, per-

Table 3
Time-Specific Relations Between Subtypes of Negative Affect and Alcohol Use as a Function of Social Context

Type of affect	Weekend affect predicting weekday drinking		Weekday affect predicting weekend drinking		Weekend drinking predicting weekday affect		Weekday drinking predicting weekend affect	
	β	t	β	t	β	t	β	t
Sadness								
Low FQ	0.16	8.01	-0.02	-0.54	0.18	3.95	0.47	11.91
High FQ	0.20	5.23	0.23	4.58	0.02	0.62	-0.01	-0.03
Low SS	0.35	6.67	0.15	2.50	0.10	2.09	0.29	5.42
High SS	0.02	0.43	-0.03	-0.69	0.01	0.29	-0.10	-2.00
Hostility								
Low FQ	0.30	7.10	-0.07	-1.91	0.01	0.31	0.77	2.29
High FQ	0.35	5.71	0.06	0.94	0.11	2.08	0.21	1.79
Low SS	0.24	4.03	-0.01	-0.29	0.06	0.79	0.55	7.70
High SS	0.19	3.70	0.01	0.26	0.03	0.67	0.09	1.09

Note. FQ = friendship quality; SS = social support. Parameters in boldface are significant at $p < .05$.

haps contributing to the resulting discrepant findings regarding the nature of affect-related drinking (Clark & Sayette, 1993). Consistent with this possibility, the current results indicate that all forms of negative affect do not similarly predict drinking behavior. Rather, guilt and fear showed no unique association with subsequent drinking, but greater hostility and sadness did.

The second tenet of the tension reduction hypothesis states that alcohol is effective in reducing such precipitating stress and tension. Although physiological studies support the stress-dampening properties of alcohol for some individuals (Sher & Levenson, 1982; Sher & Walitzer, 1986), the current study examined the impact of drinking on mood over an interval of 1 to 4 days. Given this time frame, we were perhaps more likely to observe the emotional impact of events associated with a drinking experience (e.g., social interactions at a party, later recollections of events that occurred during a drinking episode, or subsequent drinking-related legal sanctions) rather than the direct physiological effects of alcohol on mood. Nonetheless, elevated drinking (and related experiences) predicted subsequent increases in both positive and negative mood in the current study. Moreover, the impact of drinking episodes on negative affect was more generalized across subtypes of negative mood. Drinking behavior predicted later increases in guilt, hostility, and sadness, although no effect of drinking on later fear was found. What emotional experiences are likely to follow from drinking probably depends on the events and experiences associated with these heavier drinking occasions.

Such reciprocal, positive associations between affect and drinking over time depict a problematic cycle in which vulnerable individuals who drink to achieve the short-term, stress-dampening effects of alcohol also face a longer-term risk for greater negative affect, which in turn requires further regulation. This cycle characterized current findings regarding drinking's association with hostility and sadness. More specifically, those with greater sadness and hostility (relative to their own baseline) drank more alcohol (than they usually do) in the following interval. In turn, these relative elevations in alcohol use predicted subsequent spikes in sadness and hostility. These results indicate that alcohol use is sometimes an ineffective means of self-medication. Further supporting this conclusion, alcohol use was unrelated to later reductions in negative mood. As expected, such cyclical effects of drinking and negative affect were limited by the gender and social context of the drinker as well as by the timing of alcohol use (i.e., during the week or weekend).

As is widely known, drinking behavior on the college campus follows a weekly cycle, with alcohol use during the extended weekend (i.e., Thursday–Saturday nights) occurring more commonly than that during the week (i.e., Sunday–Wednesday nights; Orcutt & Harvey, 1991). Given such temporal variation in drinking norms, that the relation between affect and alcohol use differed over the weekend versus weekday interval is perhaps not surprising. Cyclical patterns of negative affect and drinking were primarily found to characterize alcohol use during the week. Given that weekday drinking is more uncommon than that occurring on the weekend, weekday drinking may serve as an indicator of more severe or frequent alcohol involvement and thus may bear greater relation to predictors of other forms of problem drinking, such as coping motivations (Cooper et al., 1988).

The Moderating Influence of Social Context

We found support for the importance of social context in affect-motivated drinking in results concerning hostility and sadness. Regardless of whether friendship influences were observed through social support interactions or reported directly through self-perceptions of friendship quality, those at risk for entering into a problematic cycle of drinking and negative affect were those in less optimal friendships. As compared with their peers, students who perceived their friendships as less intimate, as well as those who received less social support from their friends, drank more heavily during the week if they reported greater hostility or sadness over the preceding weekend. Such elevations in weekday drinking, in turn, predicted greater hostility and sadness the following weekend.

The moderating role of friendships in this cycle may stem from multiple mechanisms. These young adults may find their social contexts to be impoverished if affect-motivated drinkers select their friends on the basis of shared activities, such as drinking behavior, rather than on the support they receive within their friendship. Alternatively, a mild form of social drift may occur within which frequent affect-motivated heavy drinking leads to rejection by more well-adjusted and supportive peers, leaving less desirable peers as the potential friendship choices available to these young adults. Within a social learning framework (Maisto, Carey, & Bradizza, 1999), young adults may not only learn to drink from their friends but may also learn certain styles of drinking and affect regulation. These affect regulation strategies may then extend beyond the peer context and become internalized as a form of coping.

Although students with more optimal friendships did not show this same negative cycle between drinking and affect, negative moods still predicted greater drinking in this group. Both hostility and sadness during the weekend predicted greater weekday drinking. However, these drinking episodes did not impact subsequent negative mood, suggesting a more successful use of alcohol as a means of affect regulation. These results indicate that, for some college students, drinking may sometimes be a successful way to relax. However, this strategy appears to be more successful for those who have supportive, intimate friendships that may provide other means of coping during the actual drinking episode itself.

Gender Differences

Although few gender differences were found in the current study, a cyclical pattern involving sadness and alcohol use did emerge for men but not for women. Once again, this effect characterized weekday drinking, such that elevated sadness over the weekend predicted weekday drinking, which in turn predicted greater sadness the subsequent weekend. No such effects were found for women. Other researchers have also found a greater association between stress and drinking in men than in women (Cooper et al., 1992), although studies of younger samples or other forms of substance use have not always replicated these findings (Laurent, Catanzaro, & Callan, 1997; Peirce et al., 1996). That gender differences in affect-motivated drinking may vary by the type of emotion experienced is suggested by the specificity of the current findings to sadness (to the exclusion of hostility, guilt, and fear). Similarly, studies by Cooper et al. (1992) that also show

greater stress-related drinking in men than in women rely heavily on measures of depression to assess distress. Perhaps partly accounting for these effects, gender differences in rates and expressions of depression indicate that men may manifest sadness through externalizing means, such as substance use, whereas women may do so through more internalizing means (Robins & Reiger, 1991). How such gender differences in patterns of self-medication may vary across development, the form of distress experienced, and the type of substance used is an area for future research.

Fear and Drinking

Fear was the only emotion to show no relation to drinking behavior. These results are in contrast to studies showing that nervousness, anxiety, and tension predict greater alcohol use over intervals ranging from hours to years (Kushner et al., 1994; Swendsen, Tennen et al., 2000), although other studies also find no relation between fear-related emotions and drinking (Greeley & Oei, 1999). These conflicting findings may in part reflect opposing relations between fear and alcohol use. Fear appears to be an ideal target for self-medication, increasing the likelihood that those who are fearful will drink more than their peers. However, the contexts within which adolescent and young adult drinking occurs requires that such fear not inhibit the social contact that provides access to alcohol-related events and settings. For those individuals whose fears concern social interaction, settings in which drinking occurs may seem risky and too socially demanding. For others whose more generalized fear does not obstruct their access to these social settings, fear may serve as a greater stimulus for drinking. Consistent with this hypothesis, Kaplow, Curran, Angold, and Costello (in press) found that adolescents with more socially based anxiety disorders (separation anxiety) were less likely to initiate substance use over the proceeding year, whereas those adolescents with a generalized anxiety disorder were more likely to do so. A better understanding of the source of fear for these college students is likely to demonstrate how the social context of drinking may be mitigating their risk for alcohol involvement.

Positive Affect

Such explanations of drinking to regulate affect have largely been confined to the discussion of negative mood. Few studies have examined the role of positive affect in drinking. Although Wills et al. (1999) reported a negative association between positive affect and alcohol use in adolescents, Cooper et al. (1995) found a positive association between the two within an adult sample. Given the age of our sample, it is not surprising that our findings are more consistent with those of Cooper et al. Although no moderating effects of sex or social context were found, relative elevations in positive affect on either the weekend or weekdays predicted subsequent drinking. These findings are consistent with high endorsement of celebration and social facilitation as a reason for drinking among college students (MacLean & Lecci, 2000). Moreover, such celebratory drinking appears to further good cheer, as weekday drinking in turn also predicted subsequent positive affect.

Conclusions

The current study has several features that strengthen our confidence in the reported findings. First, we used a novel design to

assess affect "on-line" and to assess alcohol use within 24 hours of drinking episodes over a 28-day period. This intensive data collection permits prospective analysis of repeated measures and reduces the potential for memory bias. Second, we subjected these data to a conservative statistical test of the hypothesis such that relations between elevations in affect and alcohol use, relative to each individual's own typical experience, were directly investigated. These methods allowed us to differentiate short-term mechanisms (i.e., self-medication) from longer-term mechanisms as the likely explanation for the current findings. Third, we examined group differences in social context on the basis of self-reported perceptions of friendship quality as well as on the basis of observational assessments of social support. Such strengths bolster our confidence in these results, although replication is needed through methods that overcome the current study's limitation of a relatively small college-based sample. Future studies may also better differentiate the physiological effects of drinking from effects related to the larger social context of alcohol use in explaining how drinking impacts later mood.

The current findings hold additional implications for the treatment and prevention of problem drinking, especially within the college setting. First, a subgroup of vulnerable young adults may show risk for affect-motivated drinking within the early college years that is likely to be a distinct form of alcohol use from that motivated solely by social enhancement (Cooper et al., 1995). In addition to individual risk factors that may help to identify those who are most vulnerable (e.g., expectancies, motives, etc.), social context is an important element of a risk process for self-medication. Interventions that include peers may be especially useful not only in motivating social changes consistent with healthier forms of drinking but also in assessing the nature of the friendships within which these individuals are engaged. The extent to which peers serve to reinforce particular forms of or motives for drinking, rather than alcohol use more generally, has yet to be explored.

Future studies should consider what the appropriate time frame may be for examining the relation between affect and alcohol use. These decisions should be driven by the mechanism that is under consideration as an explanation for this relation. For example, studies of self-medication versus cumulative patterns of risk or shared etiological factors differ in the time interval between affect and drinking, which should be examined to isolate these various mechanisms. However, delineation of the self-medication hypothesis requires attention to factors beyond that of time. Given the current state of the literature, the self-medication hypothesis posits that a particular relation between affect and drinking behavior must be differentiated from competing mechanisms that may underlie this association. Self-medication is not universal but is more likely to explain drinking behavior among those with particular cognitions, affective experiences, and social contexts. Finally, the self-medication hypothesis is not simplistic but must incorporate information about affective experiences as more complex processes involving positive as well as negative affect in addition to the strength, variability, and specific components of precipitating moods.

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