An Evaluation of the Stress-Negative Affect Model in Explaining Alcohol Use: The Role of Components of Negative Affect and Coping Style

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The stress-negative affect model for alcohol use was examined. The mediating roles of different components of negative affect were tested in the context of coping style. Data from 1,057 drinking adults (M̄age = 44.45) and 352 drinking college students (M̄age = 19.07) collected during 2001–2005 and in 2010, respectively, were examined separately. Participants completed self-administered measures of alcohol use, coping strategies, negative life events, and negative affect. A structural equation modeling framework detected stress-related drinking only in the adult sample. Sadness, anger, and guilt were significant mediators and the significant pathways differed based on coping style. The implications and limitations of the study are discussed.

Keywords problem drinking, alcohol, stress, coping style, negative affect

INTRODUCTION

Excessive alcohol consumption has been associated with high rates of preventable death due to its association with serious medical illness, such as liver cirrhosis and malnutrition, and physical injury due to car accidents, violence, or falling (Mokdad, Marks, Stroup, & Gerberding, 2004). Heavy drinking also has widespread psychosocial consequences, such as difficulties achieving life goals and increased interpersonal conflict (Bondy, 1996; Sloan et al., 2011). Given the harmful impact of excessive alcohol use, it is important to investigate underlying mechanisms of heavy alcohol use as the information can be used to develop relevant intervention strategies.

Studies investigating the underlying mechanisms of alcohol use have identified several drinking motives that are associated with alcohol consumption, including drinking to cope with stress, drinking for enhancement, drinking to improve social interactions, and drinking for conformity (Cooper, Frone, Russell, & Mudar, 1995). Drinking to cope with stress has been of particular interest to researchers due to its unique association with problematic alcohol use and the development of alcohol use disorders (Cooper et al., 1995; Kuntsche, Knibbe, Gmel, & Engels, 2005). The process by which stressors promote heavy alcohol use has been conceptualized with the stress-negative affect model (Wills & Shiffman, 1985). According to the stress-negative affect model, negative affect mediates the relation between stressors and alcohol use. Specifically, an individual drinks in an attempt to alleviate negative affect due to stressors. The pattern of alcohol use intended to relieve negative affect has been hypothesized to sustain a frequent pattern of self-medication (Cooper, Russell, & George, 1988), which has prompted research of this model to explain underlying mechanisms of harmful alcohol use patterns that could be targeted with interventions.

Research has not consistently supported the mediating role of negative affect. Negative affect, operationalized as internalizing disorders or depressed affect, was supported as a mediator in two studies of adolescents (Colder & Chassin, 1993; Hussong & Chassin, 1994) and a composite measure of negative affect mediated relations between parenting stress and alcohol use among mothers with low social support (Handley & Chassin, 2008). However, select studies have not supported a composite measure of negative affect as a mediator between stressors and alcohol use in young adult and adult samples, due to nonsignificant relations between negative affect and alcohol use (Cooper, Russell, & Frone, 1990; McCreary & Sadava, 2000). Given the inconsistent findings of prior studies on the mediating role of negative affect, the goal of the current projects was to further evaluate the stress-negative affect model in explaining heavy alcohol use.
One factor that may have contributed to the inconsistent results across studies is the various types of negative affect tested as mediators. While some studies examined composite measures of negative affect, which average various components of negative affect (e.g., McCrery & Sadava, 2000; Cooper et al., 1990; Handley & Chassin, 2008), others have focused on internalizing symptoms and depression (Colder & Chassin, 1993; Hussong & Chassin, 1994). The different ways of examining negative affect may be problematic as there may be specificity as to which affective responses would lead to increased drinking (Hussong & Chassin, 1994). Hypotheses about the specificity of relations between negative affect and alcohol use are grounded in the hierarchical structure of mood. Specifically, high global negative affect corresponds to subjective distress and aversive mood states and encompasses several correlated, yet distinguishable, emotion states: fear, anger, sadness, and guilt (Watson & Clark, 1992). The hierarchical structure highlights the presence of distinguishable components of affect, which could each have unique predictive utility when predicting alcohol use (Hussong & Chassin, 1994). Thus, researchers who have used composite measures of negative affect, which average across several specific components of negative affect, may not find a mediating role of negative affect if only particular components of negative affect relate to drinking.

Few studies have compared the specific components as predictors of alcohol use (Hussong & Chassin, 1994; Hussong, Hicks, Levy, & Curran, 2001). One study examined the direct effect of each component of negative affect on alcohol use in separate models. It appeared that sadness but not anger, fear, guilt, or global negative affect, predicted increased alcohol use in college students; however, mediation was not tested (Hussong et al., 2001). To date, there has been one study in which the components of negative affect were tested simultaneously as mediators (Hussong & Chassin, 1994). Using an adolescent sample, it was confirmed that sadness, but not anger or fear, mediated the relation between controllable stressors and increased alcohol use above and beyond the other specific negative affects (Hussong & Chassin, 1994). Based on this research, it appears that adolescents may drink to cope with sadness; however, they may not drink in response to fear or anger. One aim of the present study was to attempt to replicate the findings of the study in samples of late adolescence and adulthood.

While correctly specifying the mediating processes may clarify how stressors relate to alcohol use, additional theories suggest that stress-related drinking may not be a universal phenomenon. In particular, individuals who self-medicate with alcohol may lack alternative, adaptive coping strategies, to alleviate stress-induced negative affect (Cooper et al., 1988). The effect of limited coping resources is two-fold. According to the transactional model of stress, individuals who cannot initially cope with a stressor will experience more negative affect than individuals who can cope with the same stressor (Lazarus & Folkman, 1984). Furthermore, based on the Social Learning Theory of alcohol use, those who cannot effectively cope with the negative affect due to the stressor may drink alcohol in order to alleviate the negative affect (Cooper et al., 1988). Thus, incorporating coping resources into the stress-negative affect model can account for individual differences in the likelihood of experiencing negative affect following a stressful event as well as the need to drink alcohol in order to reduce negative affect.

In the research literature, coping style is often classified into approach and avoidant coping styles (Folkman & Moskowitz, 2004). Individuals who rely on approach coping strategies tend to process or resolve a situation, cognitively or behaviorally, by dealing directly with the situation by planning, seeking social support, positive reframing, acceptance, or focusing on and venting of emotions. In contrast, individuals who rely on avoidant coping strategies avoid thinking about or confronting a stressful situation through behavioral disengagement, self-distraction, or self-blame. Research has supported that individuals who respond to negative life events with approach coping styles appear to experience less negative affect than individuals who use avoidant coping styles (Billings & Moos, 1981; Folkman & Lazarus, 1988). Likewise, individuals who use avoidant coping styles are more likely to experience negative affect (Beasley, Thompson, & Davidson, 2003) or drink alcohol (Cooper, Russell, Skinner, Frone, & Mudar, 1992; Veenstra et al., 2007) following negative life events. Therefore, individuals who confront stressors using approach coping strategies may be less likely to drink due to stress, but individuals who rely on avoidant coping strategies may be at-risk for stress-related alcohol use.

Although, evidence supports the potential moderating role of coping style within the stress-negative affect model, a model encompassing both negative affect as a mediator and coping style as a moderator has not been tested. The model could offer significant specificity as to who engages in stress-related drinking as well as information about the possible mediated process through different negative affect components that could be targeted through intervention work. Furthermore, levels of avoidant coping, approach coping, or both, could distinguish those who tend to self-medicate from those who do not. As research suggests that individuals tend to use several coping strategies to deal with stressors (Skinner, Edge, Altman, & Sherwood, 2003), one goal of the present study was to consider relative levels of approach and avoidant coping strategies as a moderating variable for each individual. A sophisticated analytic approach called latent profile analysis was used to characterize relative use of approach and avoidant coping strategies by each participant.

In addition to examining a model incorporating negative affect as a mediator and coping style as a moderator, the model was examined in two studies using two different samples at different stages in life, adults in Study I and college students in Study II. Testing the stress-negative affect model in two distinct samples will clarify the generalizability of the results across different populations. Research suggests that patterns of stress-related drinking may change across the lifespan, with adults reporting
more drinking to cope motives than adolescents (Kuntsche et al., 2005; Perkins, 1999). It is possible that alcohol use in response to stress-induced negative affect may be more pronounced during adulthood. Furthermore, Study II was designed to address some of the limitations of the measures used for Study I.

STUDY I: EVALUATION OF THE STRESS-NEGATIVE AFFECT MODEL IN AN ADULT SAMPLE

The purpose of Study I was to test the mediating effects of different components of negative affect between stressors and alcohol use. Based on previous examinations of the model using adolescent samples (e.g., Hussong & Chassin, 1994), it is expected that only some components of negative affect will mediate the relations between stressors and alcohol use, particularly sadness. However, the current study adds a novel component by simultaneously evaluating the moderating effect of coping style. Examining the moderating effect of coping style is important as the stress-negative affect model may best explain alcohol use among those who rely heavily on avoidant coping strategies as they cannot effectively cope with the stress-induced negative affect and may use alcohol to alleviate the negative affect (Cooper et al., 1988). Furthermore, the relative importance of different components of negative affect when understanding alcohol use may be moderated by coping style. For Study I, data from the Adult Health and Behavior (AHAB) registry was used to evaluate the stress-negative affect model among adults. Participants were originally recruited via mass-mail solicitation from communities in Southwestern Pennsylvania (principally Allegheny County) between 2001 and 2005.

**Method**

**Sample**

The data for participants in the Adult Health and Behavior (AHAB) registry, who reported any alcohol use in the past year (81.7%, n = 1,057), were examined in this study. The original protocol of the AHAB study took approximately 16 hours across four sessions completed within 2–4 hours and informed consent was obtained in accordance with approved guidelines of the Institutional Review Board. There was evidence of moderate alcohol use in the sample, with 24.1% of the drinking sample who drank at least 21 alcoholic beverages in the past month, 24.3% who reported binge drinking one or more times per month, and 12.2% reported becoming drunk one or more times per month. The participants were predominantly of European American descent (87.2%) who were married or living with a partner (66.3%) and half of the sample was female (50.3%). The participants’ ages were between 30 and 54 years old (M = 44.45, SD = 6.85) and they had no clinical history of atherosclerotic cardiovascular disease, chronic kidney or liver disease, cancer treatment within the preceding year, or major neurologic disorders, schizophrenia, or other psychotic illnesses. Other AHAB study exclusion criteria included pregnancy and the use of insulin, glucocorticoid, antiarrhythmic, psychotropic or weight-loss medications.

**Measures**

**Negative Life Events.** Participants completed a 26-item Life Events List to report the events that they experienced during the last 12 months and its valence on a 6-point scale (1 = very good and 6 = very bad) (Cohen, Tyrrell, & Smith, 1991). Events including death, illness, relationships getting worse, negative business or investment, negative problems at school or work, and crime experienced were all coded as negative events during data analyses. Events that could be interpreted positively or negatively (e.g., Have you moved during the last 12 months?) were classified as negative only when the participant rated it negatively. The final negative life events variable was the total number of negative events.

**Negative Affect.** Participants completed the 20-item Positive and Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1988). They rated the extent to which they felt each emotion in general on 5-point scales (1 = very slightly or not at all and 5 = extremely). Four items measured fear, two items for guilt, two items for anger, and one item for sadness (Watson & Clark, 1994). Participants also completed the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977), which included 20 depressive symptoms experienced during the past week (0 = Rarely or none of the time [less than 1 day] and 3 = most or all of the time [5–7 days]). Two items from the CES-D scale, “I felt depressed” and “I felt sad,” supplemented the sadness scale based on their correlations with the PANAS sadness item, 0.51 and 0.47, respectively. Each component of negative affect (i.e., fear, guilt, anger, and sadness) was represented as a latent factor in the analyses.

**Alcohol Use.** Participants completed a brief interview that included questions assessing alcohol use. Two questions assessed frequency of drunkenness and binge drinking (i.e., four or more drinks for women, five or more drinks for men on one occasion) during the past year (0 = never and 10 = everyday, 11 = other). A small number of participants who indicated “other” (n = 2 for drunkenness and n = 6 for binge drinking) were coded as missing. A third open-ended question assessed how many alcoholic drinks each participant drank in the past month. The three items were modeled as indicators for a latent factor that represented the participant’s level of alcohol use.

**Coping Style.** Participants in rated how often they engage in particular coping behaviors, using a 4-point response scale (1 = I usually don’t do this at all, 4 = I usually do this a lot) on the brief COPE, which includes 28 statements measuring 14 coping strategies (Carver, 1997). The current study excluded two items related to substance use for coping because they are directed related to the outcome in the current study. The Cronbach’s alpha for the brief COPE was 0.76.

**Covariates.** Demographic variables, including respondent’s age, gender, race, and marital status, were assessed. Personality was assessed using the 240-item Revised NEO
Personality Inventory, which includes five subscales based on the five-factor model of personality: Neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (Costa & McCrae, 1992). The 48 items in each subscale were averaged and Cronbach’s alphas of the subscales ranged from 0.71 to 0.83.

**Analytic Overview**
Models were run in the structural equation modeling (SEM) framework using Mplus (Muthen & Muthen, 2004). A robust estimation method, MLR, was used to account for the nonnormality of negative life event and alcohol use variables. Negative life events were modeled to be related to four components of negative affect, which, in turn, were modeled to be related to alcohol use. The direct pathway from negative life events to alcohol use was also estimated and demographic covariate variables predicted each model variable. The moderating effects of coping style were examined by estimating the overall mediation model for stress-negative affect model in a multiple-group framework using coping style group as the grouping variable. Finally, the mediated effects via different negative affect components were estimated and the significance tests were carried out using the Asymmetric Confidence Interval (ACI) method implemented in Proclin software program, which takes into account the nonnormality of the distribution of the mediated effect (MacKinnon, Fritz, Williams, & Lockwood, 2007). Although the study data was cross-sectional, we utilized mediation tests to investigate association between negative life events and alcohol use potentially through negative affect components.

**Preliminary Analyses**
Coping Style Latent Profile Analysis. Exploratory factor analyses (EFA) were conducted on the Brief COPE items to extract approach and avoidant coping styles from the 13 coping strategies. A four-factor solution fit the data best based on the visual inspection of the Scree Plot, the eigenvalues, and meaningful content of the items. Factor 1 included approach coping strategies such as active coping, positive reframing, planning, humor, acceptance; Factor 2 included items related to social support such as use of emotional support, use of instrumental support, venting; Factor 3 included items related to avoidant coping strategies such as denial, behavioral disengagement, self-blame; and Factor 4 included items related to religion as a coping strategy. The items in Factors 1 and 3 were averaged to create an approach coping score and an avoidant coping score, respectively.

Based on the approach and avoidant coping scores, latent profile analysis (LPA) was carried out to identify subgroups of individuals based on their relative use of approach and avoidant coping strategies. LPA is a type of mixture modeling that allows identification of distinctive subgroups in the entire sample based on the patterns of responses to continuous variables (Muthen & Muthen, 2004) and is a superior method to classifying individuals based on median or mean split. To extract a meaningful and optimal number of coping typologies, two-, three-, and four-group solutions were examined. Personality traits (i.e., neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) were included as covariates for identifying coping style groups as these personality traits are related to coping style (Carver & Connor-Smith, 2010).

Comparing the model fit indices, the two-group solution was more appropriate (AIC = 2,328.64, BIC = 2,397.81, entropy = 0.74) than the three- and four-group solutions. Extracting additional classes in the three- and four-group solutions did not necessarily improve the model fit: entropy increased slightly as expected but AIC and BIC increased as well (as opposed to decrease). Furthermore, the sample sizes of the additional classes were small (ranging from 4 to 35), which would lead to unstable estimates if modeled as a separate coping group. In the two-class solution, Class 1 (n = 256; 24.76%) showed a moderate level of avoidant coping and moderate level of approach coping, while Class 2 (n = 778; 75.24%) showed a low level of avoidant coping and high level of approach coping (Table 1) Thus, Class 1 was named moderate approach-moderate avoidant group and Class 2 was named high approach-low avoidant group. The average latent profile probabilities for most likely class membership of two class solution were 0.89 in the moderate approach-moderate avoidant group and 0.94 in the high approach-low avoidant group, which suggests that most individuals were properly assigned to each coping style group. Neuroticism (b = 0.10, SE = 0.01, p < .001) and conscientiousness (b = −0.02, SE = 0.01, p < .05) were significantly related to Class 1 membership, suggesting that compared to the high approach-low avoidant group, the moderate approach-moderate avoidant group was more likely to be high on neuroticism and low in conscientiousness.

**Measurement Models.** The latent factor indicators for the components of negative affect were chosen based on specific affect scales derived in a previous factor analytic study of the PANAS-X (Watson & Clark, 1994). The indicators for fear included: jittery, afraid, nervous, scared; guilt included: guilty and ashamed; anger included: hostile and irritable; sadness included: upset and two additional indicators obtained from the CES-D, including: “I felt depressed.” and “I felt sad.” Measurement invariance of the components of negative affect across coping style groups was not fully supported, thus, the partially invariant measurement model was used in the main analyses. The model fit was acceptable, $\chi^2 (87) = 184.76, p < .001$; RMSEA = 0.047; CFI = 0.96. The alcohol use measurement model included a single latent factor with three indicators, as described in the measures section. The measurement model for the alcohol use latent factor was evaluated for measurement invariance across coping style groups. The model demonstrated

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1 Greater entropy and smaller AIC and BIC suggest better model fit in the latent profile analysis framework.
strong measurement invariance, with acceptable model fit, $\chi^2(6) = 683.72, p < .001$; RMSEA = 0.069; CFI = 0.98.

Results

The final multiple-group mediation model was analyzed twice, with and without forcing measurement invariance of negative affect across coping groups, which did not influence the pattern of findings. The results from the model with the partial measurement invariance were reported. The final multiple-group mediation model fit the data adequately, $\chi^2 (282) = 531.21, p < .001$; RMSEA = 0.04; CFI = 0.94. The final model is depicted in Figure 1 with the standardized parameter estimates. The omega reliability coefficients (Raykov, 1997) for the measures were adequate. For the sadness, fear, anger, and guilt latent variables the omega reliability coefficients were 0.60, 0.74, 0.66, and 0.57 for the high approach-low avoidant coping subgroup and 0.77, 0.81, 0.76, and 0.61 for the moderate approach-moderate avoidant coping subgroup. The omega reliability coefficients for alcohol use were 0.97 for the high approach-low avoidant group and 0.98 for the moderate approach-moderate avoidant group.

High Approach-Low Avoidant Coping Subgroup

Negative life events in the past 12 months were significantly and positively associated with sadness ($b = 0.03$, SE = 0.008, $p < .001$), anger ($b = 0.02$, SE = 0.10, $p < .05$), and fear ($b = 0.02$, SE = 0.008, $p < .05$). Negative life events were marginally associated with greater levels of guilt ($b = 0.01$, SE = 0.007, $p < .10$). Negative life events explained 7.7% of the variance of sadness, 3.8% of anger, and 1.4% of fear. In turn, sadness was significantly and positively associated with alcohol use ($b = 3.54,$
SE = 1.16, p < .01) and guilt and anger were significantly and negatively associated with alcohol use (b = −1.53, SE = 0.78, p < .05 and b = −1.59, SE = 0.78, p < .05). Negative affect components collectively explained 4.3% of the variance of alcohol use. Mediation analysis showed that sadness was a mediator of the association between negative life events and alcohol use (mediated effect = 0.12, SE = 0.05, 95% CI: 0.04, 0.22), with negative life events associated with greater sadness and sadness, in turn, predicting higher levels of alcohol use. Anger was also a mediator of the pathway from negative life events to alcohol use (mediated effect = −0.03, SE = 0.02, 95% CI: −0.08, −0.001). Specifically, negative life events were related to higher levels of anger and anger, in turn, was related to less alcohol use. Test for mediation via guilt was not significant (mediated effect = −0.02, SE = 0.01, 95% CI: −0.05, 0.002).

**Moderate Approach-Moderate Avoidant Coping Subgroup**

Negative life events in the past 12 months were significantly and positively associated with sadness (b = 0.03, SE = 0.01, p < .001), guilt (b = 0.04, SE = 0.02, p < .05), and fear (b = 0.06, SE = 0.02, p < .01). Negative life events explained 2.9% of the variance of fear, 6.8% of guilt, and 1.1% of sadness. In turn, guilt, but not sadness and fear, was significantly and positively associated with alcohol use (b = 0.99, SE = 0.43, p < .05). Negative affect components collectively explained 5.6% of the variance of alcohol use. The mediation pathway from negative life events to guilt to alcohol use was significant (mediated effect = 0.04, SE = 0.03, 95% CI: 0.003, 0.10), such that negative life events were related to higher levels of guilt and guilt, in turn, was related to higher levels of alcohol use.

**Mean Comparisons Between the Two-Coping Subgroup**

The mean levels of all the model variables were compared between the two coping groups using t-tests (Table 1). The moderate approach-moderate avoidant group reported significantly more negative life events, negative affect, and alcohol use than the high approach-low avoidant group. The two coping groups were similar on all demographic variables except for age, with individuals in the high approach-low avoidant group being older by approximately 2 years.

**Discussion**

In order to investigate the relation between stress-induced affect and alcohol use, the mediating role of components of negative affect among individuals who use different patterns of coping strategies were examined in an adult sample. The results indicate that adults may drink due to stress-induced negative affect and that the pathways of stress-related drinking differ by individual’s coping style. As expected, negative life events were positively associated with levels of most components of negative affect in both coping groups; however, the two coping groups showed different responses to the components of negative affect. Specifically, for adults who primarily use approach coping strategies, negative life events were associated with a higher level of sadness, which, in turn, was associated with greater alcohol use. The mediating effect of sadness was consistent with a previous study in which sadness predicted alcohol use after controlling for the effects of fear and anger (Hussong & Chassin, 1994). The relative importance of sadness among individuals who rely heavily on approach coping strategies

<table>
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<th>TABLE 1. Means and standard deviations of model variables within each study across coping style</th>
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*Note.* Values in the cells represent the average value of each variable for the study subsamples with either approach or avoidant coping styles. For the latent variables (i.e., sadness, fear, anger, guilt, and alcohol use), the values of the indicators for each latent variable were averaged in SPSS to create observed variables for these comparisons. The indicators for each latent variable are provided in the measures sections.

*a*Group differences were significant at the Bonferroni corrected alpha value (α = 0.004), which was used to account for alpha inflation due to multiple comparisons.

*b*Group differences were significant at the Bonferroni corrected alpha value (α = 0.005).
may be due to sadness often occurring when an individual appraises himself/herself helpless in a situation and believes he/she has low approach coping potential (Smith & Lazarus, 1993). Thus, those who typically rely heavily on approach coping strategies may drink alcohol to ameliorate sadness following stressors because of their perceived inability to deal with their current situation using their typical approach coping strategies.

Negative life events were also associated with a higher level of anger; however, unlike sadness, a higher level of anger was associated with a lower level of alcohol use. The role of anger in the high approach-low avoidant group was inconsistent with previous research of adolescents that did not support anger as a unique contributor to alcohol use (Hussong & Chassin, 1994). Among adults, anger may correspond with decreased drinking because anger motivates individuals to enact approach coping strategies in order to resolve their anger and handle the situation (Carver & Harmon-Jones, 2009). Thus, individuals who rely on approach coping strategies may decrease their alcohol use as they mobilize their coping strategies to resolve the anger, especially if drinking alcohol could impede their ability to enact the coping strategies. The relative importance of anger in the present study as opposed to previous research may be due to developmental differences of the experiences of and reactions to anger. Specifically, adults tend to find anger more aversive and are more likely to use direct strategies to address anger than adolescents (Blanchard-Fields & Coats, 2008), which may account for the significant relations between anger and alcohol use among adults but the lack of relations in previous research of adolescents (Hussong & Chassin, 1994).

In the moderate approach-moderate avoidant group, guilt was the only mediator intervening in the association between negative life events and alcohol use such that negative life events were associated with higher level of guilt, which, in turn, was associated with greater alcohol use. The finding is novel as guilt has not been examined as a mediator in previous research. Guilt occurs when an individual holds himself or herself accountable for a negative stressor (Smith & Lazarus, 1993). It is possible that individuals in this coping subgroup have particular difficulty coping with guilt because individuals using avoidant coping strategies tend to blame themselves for the stressor rather than actively working on the stressor. As a result, they may primarily drink alcohol in order to alleviate guilt, as opposed to other components of negative affect.

The results should be considered in light of some limitations. In Study I, participants retrospectively reported negative life events, negative affect, and drinking patterns over the same 12-month period. In addition, the primary negative affect measure was a trait negative affect measure assessing to what extent the participants experienced each emotion in general. The relations between negative life events and affect may be stronger if state measures are used. Another limitation was that the negative affect measure did not thoroughly assess sadness. The scale was supplemented with items from a depression scale in order to have enough indicators to create latent variables. The limitation is partially resolved by representing the components of negative affect using latent variables, which removes error variance due to measurement from the model. Most of these limitations were addressed by improved methodology of Study II. Furthermore, Study II provided an opportunity to replicate the findings of Study I in different developmental sample of college students.

STUDY II: COLLEGE STUDENT SAMPLE

Study I revealed that adult stress-related negative affect predicts adult alcohol use. Furthermore, the relations between components of negative affect and alcohol use differed based on an individual’s predominant coping style. The purpose of Study II was to address some of the methodological limitations of Study I to improve confidence of the findings. Specifically, a state measure of negative affect was used and negative life events and alcohol use were examined in different timeframes to approximate a longitudinal design. All constructs were also assessed in a shorter time interval than Study I, 1–3 months as opposed to 12 months, in order to improve reliability of retrospective reporting. Furthermore, Study II provided an opportunity to examine if the results of Study I could be replicated in a sample of college students recruited from introductory classes for the current study. As college students tend to report drinking for enhancement and social reasons, rather than drinking to cope with stress, it is expected that the stress-negative affect model will not predict alcohol use as strongly among college students as the adult sample (Kuntsche et al., 2005; Perkins, 1999).

Method

Respondents

A total of 402 undergraduate college students (n = 402) in a northeastern university participated in the current study. The data collection procedures were approved by the Institutional Review Board and survey data were collected from groups of 10–30 students at a time. Only participants who reported any alcohol use in the past year (87.56%, n = 352) were included in the analyses. The sample reported high levels of alcohol use with 16.8% of the drinking sample reporting drinking 10 or more times per month, 25.6% reporting binge drinking at least six times per month, and 31.4% reporting becoming drunk at least six times per month. The participants included in the analyses were predominantly of European American descent (81.3%), under the legal drinking age of 21 years old (89.5%; M = 19.07, SD = 1.08, range: 18–27 years), and males (51.4%).

Measures

Negative Life Events. Participants completed the 66-item Life Experiences Survey (LES), which included 10 life events unique to college life (Sarason, Johnson, & Siegel, 1978). The questionnaire was chosen over the Study I checklist because it included additional stressors relevant...
to college student life (e.g., academic stressors, student loans). Unlike Study I, participants in Study II used a timeline to indicate when each event occurred and its frequency. The events experienced during the past 3 months that were rated as negative events were summed for the final life event variable.

Negative Affect. Participants indicated the extent they felt each emotion in a given time period using the 60-item PANAS-X (Watson & Clark, 1994). The measure is more comprehensive than the abbreviated measure used in Study I and includes several indicators for each component of negative affect: Six items measured fear, five items for anger, four items for sadness, and six items for guilt (Watson & Clark, 1994). Items that measured emotions during the past 3 months were used in the current study to correspond to the 3-month time frame of the negative life events.

Alcohol Use. Participants responded to alcohol use questions based on the Monitoring the Future study (Johnston, O’Malley, Bachman, & Schulenberg, 2009). Three items measured frequency of alcohol use, drunkenness, and binge drinking in the past month and were chosen as indicators for an alcohol use latent variable. The three questions had seven response options (0 = 0 times and 6 = more than 21 times).

Coping Style. Participants completed the same brief COPE questionnaire described in Study I ($\alpha = 0.75$) (Carver, 1997).

Covariates. The same demographic covariates as Study I were assessed. A shorter personality inventory than Study I was used called the 44-item Big Five Inventory (John, Donahue, & Kentle, 1991). The inventory has the same five subscales as the NEO Personality Inventory. The Cronbach’s alphas for the subscales ranged from 0.67 to 0.88.

Analytic Overview
The analytic methods described in Study I were repeated using Study II data. The primary difference between the two studies was the measures used and the timeframes examined. Negative life events during the past 3 months were modeled to be related to four components of negative affect experienced during the past 3 months, which, in turn, were modeled to be related to alcohol use during the past month.

Preliminary Analyses
Coping Style Latent Profile Analysis. The EFA results from Study I were used to create approach and avoidant scores for the Study II sample. Using the approach and avoidant coping scores, the latent profile analysis methods were carried out to identify subgroups of individuals based on their relative use of approach and avoidant coping strategies. The two-group solution fit the data best (entropy = 0.74, AIC = 835.30, BIC = 896.98). Class 1 ($n = 86; 24.64\%$) showed a moderate level of avoidant coping and a moderate level of approach coping, while Class 2 ($n = 263; 75.36\%$) showed a low level of avoidant coping and high level of approach coping (Table 1). Class 1 was named moderate approach-moderate avoidant group and Class 2 was named high approach-low avoidant group. The coping groups are comparable to those identified in Study I. The average latent profile probabilities for most likely class membership were 0.90 for the moderate approach-moderate avoidant group and 0.93 for the high approach-low avoidant group. Neuroticism ($b = 3.02, SE = 0.62, p < .001$) was significantly related to Class I membership, indicating that the moderate approach-moderate avoidant group was higher on neuroticism compared to the high approach-low avoidant group.

Measurement Models. The negative affect indicators were also chosen based on specific affect scales derived by Watson and Clark (1994) and included fear: scared, nervous, shaky, jittery, afraid, frightened; guilt: dissatisfied with self, disgusted with self, guilty, blameworthy, angry at self, and ashamed; anger: angry, irritable, hostile, loathing, and scornful; and sadness: lonely, alone, downhearted, and sad. The indicators in the factor analytic study that were significantly loaded onto only one factor were used as indicators in this study. The measurement model demonstrated partial measurement invariance with acceptable model fit, $\chi^2 (398) = 600.195, p < .001; RMSEA = 0.055; CFI = 0.92$.

The three indicators for the alcohol use model are described in the measures section. The model demonstrated strong measurement invariance, with good model fit, $\chi^2 (6) = 270.66, p < .001; RMSEA = 0.049; CFI = 0.99$.

Results
The final multiple-group mediation model was also analyzed with the complete measurement invariance and partial measurement invariance of the negative affect measurement model and the pattern of findings was equivalent across the models. Thus, only the results from the final model with the partial lambda invariance are reported. The final multiple-group mediation model fit the data adequately, $\chi^2 (711) = 1,026.92, p < .001; RMSEA = 0.05; CFI = 0.91$. The final model is shown in Figure 1 with standardized path coefficients. The omega reliability coefficients were adequate. The reliabilities for sadness, fear, anger, and guilt were 0.76, 0.74, 0.76, and 0.81 for the high approach-low avoidant group and 0.71, 0.79, 0.75, and 0.85 for the moderate approach-moderate avoidant group. The omega reliability coefficients for alcohol use were 0.93 for the high approach-low avoidant group and 0.84 for the moderate approach-moderate avoidant group.

High Approach-low Avoidant Coping Subgroup
Negative life events in the past 3 months were positively associated with all components of negative affect: sadness ($b = 0.10, SE = 0.03, p < .001$), guilt ($b = 0.12, SE = 0.03, p < .001$), anger ($b = 0.08, SE = 0.03, p < .01$), and fear ($b = 0.14, SE = 0.03, p < .001$). Negative life events explained 5.5% of the variance of sadness, 14.8% of fear, 6.4% of anger, and 10.4% of guilt. However, none of these negative affect components were significantly related to alcohol use. Sadness was marginally associated
with decreased alcohol use ($b = -0.39$, $SE = 0.21$, $p < .10$) and guilt was marginally associated with increased alcohol use ($b = 0.36$, $SE = 0.20$, $p < .10$). Negative affect as a whole explained 3.2% of the variance of alcohol use. Mediation pathways were not supported.

### Moderate Approach-Moderate Avoidant Coping Subgroup

Negative life events in the past 3 months were significantly and positively associated with sadness ($b = 0.10$, $SE = 0.03$, $p < .001$), guilt ($b = 0.12$, $SE = 0.03$, $p < .001$), and fear ($b = 0.14$, $SE = 0.03$, $p < .001$). Negative life events explained 8.0% of the variance of sadness, 10.1% of fear, and 10.6% of guilt. In turn, sadness was marginally associated with alcohol use ($b = 0.28$, $SE = 0.16$, $p < .10$). Negative affect as a whole explained 8.8% of the variance of alcohol use. However, sadness was not a significant mediator (mediated effect $= 0.03$, $SE = 0.02$, 95% CI: $-0.002$, $0.07$).

### Mean Comparisons Between the Two Coping Subgroups

The moderate approach-moderate avoidant group in the college sample reported significantly more negative events, sadness, fear, anger, and guilt than the high approach-low avoidant group (Table 1). The coping groups were demographically similar and reported similar drinking levels.

### Discussion

Stress-induced components of negative affect did not predict alcohol use in the college student sample, regardless of coping style. The null findings are consistent with select studies that have not detected relations between stressors and alcohol use among adolescents and young adults (McCreary & Sadava, 2000; Robertson, Xu, & Stripling, 2010). The results suggest that stress-related drinking may be rare among college students, especially in response to components of negative affect. The pattern of findings is consistent with research of drinking motives of college-aged individuals (Kuntsche et al., 2005). In particular, college students often report drinking to celebrate or because they enjoy the taste of alcohol rather than drinking to cope with negative affect (Kuntsche et al., 2005). As a result, heavy alcohol use among college students may be closely tied to celebrations and social gatherings as opposed to alleviation of negative affect. Alternative alcohol use models focusing on drinking associated with positive affect may be more informative when explaining normative college students’ alcohol use.

A limitation of Study II was the relatively small sample size of the moderate approach-moderate avoidant group ($n = 86; 24.64\%$). Given the complexity of the models examined, the small sample size may have reduced power to detect stress-related drinking in the moderate approach-moderate avoidant group. Simpler mean differences testing, however, did not detect significant mean differences of drinking levels between the coping groups. Future research may benefit from a larger sample size to confirm that stress is not a predictor of heavy drinking among college students who rely heavily on avoidant coping strategies.

### GENERAL DISCUSSION

Previous research has provided mixed support for the stress-negative affect model. The current two studies evaluated the stress-negative affect model and took into account specific components of negative affect and coping style. We expected that having more specificity in the model concerning types of affective responses to stressors and individual coping styles would shed light on the mixed research literature. As a whole, Study I and Study II highlight the importance of components of negative affect, different coping styles, and developmental stage of populations when determining if stress-related drinking will occur. Despite the weak support for the stress-negative affect model to date, it appears that the stress-negative affect model predicts heavy alcohol use among adults. Depending on the type of negative affect the individual experiences, it may lead to increased or decreased alcohol use or may not lead to alcohol use at all, which may account for inconsistent findings of previous research that use different operationalizations of negative affect.

Study II was designed to replicate the findings of Study I with improved methods in a sample of college students; however, stress-related drinking was not observed. The different findings by the two studies could be due to developmental differences of drinking motives. Research has shown that college students report primarily drinking to celebrate as opposed to drinking to cope with negative affect (Kuntsche et al., 2005). As college students enter adulthood, opportunities for social drinking may be limited due to their day-to-day work schedules and increased family demands making alcohol use in response to stress-induced negative affect more pronounced. In fact, college graduates are more likely to report drinking predominantly for stress-related reasons compared to undergraduate students (Perkins, 1999). It needs to be noted, however, that the two studies differed in several ways outside of the developmental stage of the samples. While Study II was designed to address some of the limitations of Study I, the different measures and time frames used for each study prevent direct comparisons from being made between the studies. Despite these differences, the current study was carried out with a more comprehensive approach to evaluate the validity of the stress-negative affect model for alcohol use.

While it was not the focus of the series of studies, it was interesting that the same coping subgroups were identified in both samples. Latent profile analysis identified two coping groups, the high approach-low avoidant and moderate approach-moderate avoidant coping groups, in both samples with similar proportions of occurrence. The pattern of findings suggests that the coping groups identified in the current study are robust and may persist from late...
adolescence to adulthood. Furthermore, neuroticism was positively related to membership in the moderate approach-moderate avoidant coping group for both samples. The group characteristics highlight that individuals tend to use a combination of coping strategies and it may be the relative use of strategies that put individuals at risk for negative outcomes. This finding is consistent with previous research that has found that lower levels of approach coping strategies as well as higher levels of avoidant strategies may increase risk for negative health outcomes (Billings & Moos, 1981; Cooper et al., 1992; Folkman & Lazarus, 1988; Veenstra et al., 2007). Future research of health disparities should consider the relative use of coping strategies as a risk factor.

While the series of studies shed light on the complexity of the relations between negative life events and alcohol use, the research findings should be considered with some limitations in mind. The cross-sectional and retrospective research design limits certainty of the directionality of the relations among the study variables. It is possible that individuals who drink heavily experience more negative events and, in turn, experience high levels of negative affect such as guilt or sadness due to their drinking. The limitation was partially addressed by the research design of Study II, because stress and drinking were assessed in different time frames. Furthermore, the alternative model with alcohol use contributing to negative life events was not supported by posthoc analyses, as alcohol use did not predict the occurrence of negative life events. Nonetheless, future research should examine the relations prospectively to confirm that stress is not a robust predictor of heavy drinking among college students but is associated with alcohol use during adulthood.

In sum, the results of the research studies highlight the importance of components of negative affect and their interplay with different coping styles. Among adults, the relation between stressors and alcohol use appears to operate through components of negative affect, such as sadness, anger, and guilt; however, the patterns differ depending on the individuals coping strategies. Understanding these processes can help delineate contexts in which stress-related alcohol use may occur and can further inform efforts to tailor interventions to the mechanism underlying heavy drinking. Among adults, it may be important to provide alternative coping strategies to sadness and guilt in order to deter individuals from resorting to drinking in order to cope with these components of negative affect.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

RÉSUMÉ

Une évaluation du modèle affectif sur le stress négatif pour expliquer la consommation d’alcool: le rôle des éléments constitutifs de l’affect négatif et le style d’adaptation


RESUMEN

Evaluación del modelo afectivo de estres-negativo al explicar el consumo de alcohol: el papel de los componentes afectivos negativos y el estilo de enfrentamiento

Se examinó el modelo afectivo de estrés-negativo para el consumo de alcohol. Se estudiaron los papeles mediadores de los diferentes componentes del afecto negativo en el contexto de estrategias de manejo y control. Se examinaron por separado los datos obtenidos a partir de 1,057 adultos consumidores de alcohol (M_{âge} = 44.45) y de 352 estudiantes universitarios consumidores de alcohol. Los participantes registraron personalmente las medidas de consumo de alcohol, las estrategias de manejo y control, los eventos vitales negativos, y el afecto negativo. Un marco estructural de un modelo de ecuación detectó el consumo relacionado con el estrés sólo en el segmento de los adultos. Los mediadores más significativos fueron tristeza, enojo, y culpa y las diferentes vías significativas variaban según las estrategias de manejo y control. Se discuten las implicaciones y limitaciones del estudio.

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**GLOSSARY**

**Approach Coping Strategies:** Behavioral and cognitive efforts directed at actively resolving distressful situations or acquiring resources to help deal with a stressor.

**Avoidant Coping Strategies:** Behavioral or cognitive efforts that prevent individuals from directly addressing stressful events, such as behavioral disengagement, self-distraction, or self-blame.

**Mediator Variable:** A third variable that specifies the underlying mechanism of the relation between an independent variable and a dependent variable.

**Self-Medication:** A behavior attempting to deal with underlying problems that have not been adequately treated, such as stress and negative affect, through consuming alcohol or using other substance.

**REFERENCES**


