School Investment, Drinking Motives, and High-Risk, High-Reward Partying Decisions Mediate the Relationship Between Trait Self-Control and Alcohol Consumption Among College Drinkers

TIM BOGG, PH.D.,^{a,*} LEANNE LASECKI, B.A.,^a & PHUONG T. VO, B.A.^a

^a*Department of Psychology, Wayne State University, Detroit, Michigan*

ABSTRACT. Objective: Research has shown trait self-control, neuroticism, and coping and enhancement drinking motives to be predictors of alcohol consumption among college students. Recent research also provides evidence for the effects of role investment and role-based alcohol consumption–decision making (i.e., partying decisions). The goal of the present study was to clarify the organization and contributions of these multifarious influences on college student drinking. **Method:** College students ($N = 355$; 51.8% female) with a heterogeneous prevalence of alcohol dependence completed measures of trait self-control; neuroticism; coping and enhancement drinking motives; subjective college student role investment, satisfaction, and stress; role-based partying scenarios; and a typical weekly alcohol consumption interview. Internal and comparative fit indices for alternative path models were evaluated and bootstrapping procedures were used to examine indirect effects.

Results: Modeling results favored a more stratified organization, where (a) the association between trait self-control and consumption was mediated by drinking motives and partying decisions, (b) the association between neuroticism and consumption was mediated by coping motives, and (c) the association between role investment and consumption was mediated by partying decisions. The associations between motives and consumption were not mediated by partying decisions. **Conclusions:** The results provide support for disinhibitory and distress pathways to college student drinking, where impulsive and anxious students are more likely to drink excessively because of more frequent mood-affecting drinking goals, less academic involvement, and/or more frequent decisions to attend parties where negative academic consequences are likely but where perceived rewarding alcohol-related and social features are present. (*J. Stud. Alcohol Drugs*, 77, 133–142, 2016)

THE CONSTRUCT OF SELF-CONTROL—which is variously conceptualized as stable trait tendencies related to impulsivity, conscientiousness, and disinhibition; differences in preferences for smaller immediate rewards versus larger delayed rewards; and emotional and cognitive self-regulatory abilities, including executive function and willpower—has recently received increased research attention owing to its associations with public health outcomes, including alcohol consumption (cf. Moffitt et al., 2011). Similarly, the personality trait of neuroticism (worrying, moody, and nervous vs. emotionally stable) also has been cited as an important individual difference factor related to public health, generally, and alcohol consumption, specifically (cf. Lahey, 2009).

Among young adults, research shows measures of impulsivity, conscientiousness, disinhibition—i.e., self-control–related traits (being careful and cautious vs. being impulsive and spontaneous)—and neuroticism are cross-sectionally and prospectively associated with alcohol consumption,

abuse, and dependence (e.g., Bogg, 2011; Bogg & Roberts, 2004; Littlefield et al., 2009; McCormick et al., 1998; Zimmerman et al., 2003). Beyond measures of self-control and neuroticism, ample research attention has demonstrated the importance of enhancement drinking motives (for positive affect and to experience hedonic effects) and coping drinking motives (to alleviate or reduce negative affect) as predictors of excessive alcohol consumption and related problems (Carey, 1993; Cooper et al., 2008; Kuntsche et al., 2005).

Recently, the trait and drinking motives lines of research have been integrated to model their simultaneous influences on alcohol involvement. These studies have shown self-control–related traits to be negatively associated with enhancement motives and neuroticism to be positively associated with coping motives in college-aged samples (Kuntsche et al., 2006, 2008; Mezquita et al., 2010). Moreover, patterns of changes in self-control–related traits and neuroticism have been shown to be associated with changes in enhancement and coping motives, respectively (Littlefield et al., 2010).

Separate lines of research investigating normative social investment and related decision making have demonstrated the importance of role-related influences in excessive alcohol consumption. Consistent with the social investment hypothesis (Roberts & Caspi, 2003), longitudinal research using a sample of college students with a heterogeneous prevalence of lifetime alcohol dependence showed that, when initial levels of trait self-control and alcohol con-

Received: May 26, 2015. Revision: July 30, 2015.

This research was supported by National Institute on Alcohol Abuse and Alcoholism Grant R00 AA017877 (to Tim Bogg). The authors thank Christina L. DeAngelis, Heather Doherty, Laura Renaud, Kathryn Krupsky, Michelle R. Marshbanks, and Jillian Rhind for their assistance with the data collection.

*Correspondence may be sent to Tim Bogg at the Department of Psychology, Wayne State University, 5057 Woodward Ave., 7th Floor, Detroit, MI 48202, or via email at: tdbogg@gmail.com.

sumption were controlled for, greater initial subjective college student role investment (i.e., feeling committed to and involved in the educational/vocational aspects of being a college student) predicted greater trait self-control and lower alcohol consumption 12 months later (Bogg et al., 2012). A related line of research showed that varying magnitudes of rewarding and punishing college role- and alcohol-related information in hypothetical drinking scenarios (i.e., partying decisions) provided a significant increment in the prediction of alcohol problems, above and beyond weekly alcohol consumption, trait impulsivity, and fun-seeking tendencies (Bogg & Finn, 2009). Taken together, these findings suggest the importance of subjective college student role investment and partying decision making as important identity and situational factors for college student drinking.

Despite the links among trait self-control and neuroticism and drinking motives, as well as among trait self-control and normative social investment and partying decision making, there has been no systematic integration of these factors in models of college student drinking. Informed by past research and recent theorizing, the following sections describe two alternative conceptualizations of these influences on college student drinking.

Alternative models of trait, role, motive, and situational effects on college student drinking

The first model—a direct trait, role, and motive effects model—posits a comparatively parsimonious arrangement, in which all influences on alcohol consumption, including trait influences, are hypothesized to be direct (Figure 1, Panel A). This arrangement is consistent with findings from past research that showed self-control-related traits and neuroticism retained direct effects on alcohol problems and consumption despite the inclusion of intervening drinking motives, as well as with research showing direct prospective predictions from both trait self-control and subjective college student role investment to alcohol consumption (Bogg et al., 2012; Kuntsche et al., 2008; Mezquita et al., 2010). Moreover, this model is consistent with prior work delineating the direct and proximal role drinking motives play in the prediction of alcohol consumption and related problems (e.g., Cronin, 1997; Kuntsche et al., 2005).

In the first model, trait self-control and neuroticism were expected to show direct effects on party attendance decision making and alcohol consumption. Moreover, the effects of drinking motives and role factors were expected to be direct upon party attendance decision making and alcohol consumption. It should be noted that mediated effects for trait self-control and neuroticism (via drinking motives), as well as for drinking motives and role factors (via party attendance decision making), were expected as well, although the predictive primacy afforded all of the

disparate influences in this model (i.e., direct effects) informed the expectation that indirect effects were likely to be sparse and limited.

In contrast to the above arrangement, the second model—an indirect trait and role effects and direct motive effects model—posits a comparatively hierarchical arrangement, where trait influences on alcohol consumption were hypothesized to be entirely indirect via role factors, drinking motives, and party attendance decision making (Figure 1, Panel B). The hierarchical structure of the second model is consistent with the Theory of Current Concerns (Cox et al., 2015), which postulates several distinct but interrelated cognitive-motivational influences on attentional biases for alcohol consumption. According to this perspective, lower levels of trait self-control and higher levels of neuroticism would increase the perceived desirability of drinking alcohol, owing to a general tendency to discount delayed negative consequences—more specifically, those consequences related to affect regulation via alcohol-related means.

Moreover, the perceived desirability of drinking alcohol would be further increased to the extent that satisfaction with other goal pursuits has been hindered or is otherwise limited. In the present study, the alternative goal pursuit is embedded in the college student role. Finally, to the extent trait standing and other goal pursuits foster a perception of alcohol delivering desired effects, then a “current concern” for alcohol consumption (i.e., chronic motivation for drinking) would foster an increased attentional bias for alcohol-related cues and a discounting of potentially aversive consequences.

In the second model, direct effects from traits to role factors, drinking motives, and party attendance decision making were expected as well, but these relationships were hypothesized to be the instrumental means by which trait standing would be associated with alcohol consumption. In contrast to the first model, no direct predictions between traits and alcohol consumption were hypothesized. Moreover, role factors were hypothesized to be antecedent to drinking motives, informing the expectation that the effects of role factors on party attendance decision making and alcohol consumption would be mediated, at least in part, by drinking motives. In turn, the relationships between drinking motives and alcohol consumption would be mediated, at least in part, by party attendance decision making.

Present study

Using a large sample of college students with a heterogeneous prevalence of alcohol dependence, the present study tested alternative models of trait, identity, motivational, and situational effects on typical weekly alcohol consumption. Both of the models also controlled for the effects of age at first drink, an established risk factor for the development of

FIGURE 1. Alternative conceptual models of personality trait influences on college student alcohol consumption via identity and motivational influences. Panel A depicts direct effects for trait, role, and motive influences, where student role investment, satisfaction, and stress, as well as enhancement and coping drinking motives, were expected to directly predict partying decision making and alcohol consumption. The model of Panel A also shows that the personality traits of self-control and neuroticism were expected to retain direct effects on alcohol consumption (darker, thicker lines denote stronger expected direct effects). Panel B depicts indirect trait and role effects and direct motive effects, where student role investment, satisfaction, and stress were expected to indirectly predict alcohol consumption via enhancement and coping drinking motives and partying decision making. The model of Panel B also shows that the effects of the personality traits of self-control and neuroticism on alcohol consumption were predicted to be entirely indirect via student role investment, satisfaction, and stress as well as enhancement and coping drinking motives and partying decision making.

alcohol consumption and related problems (Hingson et al., 2006). Contemporary renderings of alcohol consumption in adolescence posit age at first drink as a risk factor for poor development of self-regulation (and the accompanying expression of self-control-related traits) and (under)involvement in social roles (Brown et al., 2008). As such, early age at first drink appears to be an antecedent for a broader pattern of behavioral disinhibition and poor control, including excessive alcohol consumption, and warrants inclusion in an integrative account of psychological influences on college student drinking.

Given the continued deleterious impact of excessive alcohol consumption across U.S. college campuses (Hingson et al., 2009), the integrative approach and testing of alternative models of the present study offer the potential to identify additional prevention/intervention pathways for at-risk and problematic college student drinkers.

Method

Participants

The recruitment goal was to acquire a sample of 18- to 23-year-old college students from Wayne State University that varied in its expression of alcohol consumption. Flyers posted around the university, advertisements in the student newspaper, and postings to a Web-based university notice system targeted a range of drinking behaviors and disinhibited tendencies (e.g., “drink modest amounts of alcohol and who do not take drugs” vs. “heavy drinker”; “adventurous” and “impulsive” vs. “introverted” and “reserved”). This strategy is effective in recruiting participants who vary in alcohol use and disinhibited tendencies (Bauer & Hesselbrock, 1993; Finn et al., 2002). These approaches resulted in the screening of 625 respondents. Respondents were excluded if they (a)

were not 18–23 years old, (b) could not read and/or speak English, (c) had never consumed alcohol, (d) reported serious head injuries, (e) had a history of psychosis, and (f) were not enrolled in university classes.

At the beginning of an assessment session, participants reported any substance use in the past 12 hours, the number of hours of sleep during the previous night, and the most recent meal and were given a breath alcohol test using an Alco-Sensor IV (Intoximeters, Inc., St. Louis, MO). Participants were rescheduled if their breath alcohol level was greater than .000%; if they consumed any drug within the past 12 hours; if they felt hung over; if they reported or appeared to be impaired, high, or overly sleepy; or if they were unable to answer questions. All participants were paid \$10 per hour, plus a \$10 on-time bonus, averaging \$32.50.

The sample ($N = 355$) was sex balanced (51.8% women) and primarily European American/White (42.8%) and African American (24.5%), with a mean age of 20.45 years ($SD = 1.55$ years). A total of 35.8% of the sample (66 men, 61 women) met lifetime alcohol dependence diagnostic criteria using the Semi-Structured Assessment for the Genetics of Alcoholism (Bucholz et al., 1994), which uses criteria from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 1994).

Assessment materials

Age at first drink. Age at first drink was assessed with a single item (“How old were you the first time you drank more than just a sip of alcohol?”).

Trait self-control. The Control subscale of the Multidimensional Personality Questionnaire was used to assess self-control (Tellegen, 1982). The control scale comprises 24 items (e.g., “When faced with a decision I usually take time to consider and weigh all aspects.”) using a dichotomous response scale (true or false; $\alpha = .86$).

Neuroticism. The neuroticism scale of the Big Five Inventory was used to assess emotional (in)stability (John et al., 1991, 2008). The neuroticism scale comprises eight items (e.g., “is depressed, blue”) using a 5-point scale (1 = *disagree strongly*, 5 = *agree strongly*; $\alpha = .82$).

Drinking motives. Two five-item subscales from the Drinking Motives Questionnaire were used to assess coping and enhancement drinking motives (Cooper, 1994). The coping (e.g., “because it helps you when you feel depressed or nervous”) and enhancement (e.g., “because it gives you a pleasant feeling”) subscales used a 5-point scale (1 = *never/almost never*, 5 = *always/almost always*; coping motives subscale, $\alpha = .85$; enhancement motives subscale, $\alpha = .87$).

Subjective college student role investment. Subjective educational investment was assessed with five items adapted from a measure of family involvement (Misra et al., 1990) and two items developed by Lodi-Smith (2007). The seven-

item scale assessed involvement in education and the student role (e.g., “I like to be absorbed in school most of the time,” “I feel a strong sense of responsibility for my education”) using a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*; $\alpha = .85$).

College student role satisfaction and stress. One item assessed college student role satisfaction (e.g., “I am satisfied with my schooling/education”), and one item assessed college student role stress (e.g., “My schooling/education is very stressful”), rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). These items were included as a possible means of disambiguating the effects of role (de) investment from the effects of role (dis)satisfaction and/or role stress.

Decisions-to-drink scenarios. Four hypothetical scenarios that presented rewarding and punishing student role- and alcohol-related information assessed decisions to attend social gatherings where alcohol would be available for consumption (Bogg & Finn, 2009). In prior validation research, alcohol-dependent students were more likely to attend scenarios with combinations of both highly rewarding alcohol-related information and highly punishing student role-related information (Bogg & Finn, 2009). This finding guided the selection of scenarios for the present study, in which only two of the four scenarios were analyzed to examine the effects of the reward-high/punishment-high combinations of information. After reading each scenario, participants indicated whether they would attend the gathering. The exact wording of the two scenarios appears below (information manipulations appear in brackets).

Reward high/punishment high in near and long term. “It’s Thursday and a friend calls and tells you that there is a party going on right now. You have a test first thing in the morning after the party. You will have to wake up around 7:30 A.M. to start the day [near-term punishment magnitude: high]. You need to get a good grade in this class; otherwise you may not get into an academic program you want [long-term punishment magnitude: high]. The get-together is sure to be fun. It will be a major party event. There will be people there whom you really like and other party activities that you will really enjoy. There will be lots of alcohol and you do not have to pay for your drinks [reward magnitude: high].”

Reward high/punishment high in near term, low in long term. “It’s Thursday and a friend calls and tells you that there is a party going on right now. The get-together is sure to be fun. It will be a major party event. There will be people there whom you really like and other party activities that you really enjoy. There will be lots of alcohol and you do not have to pay for your drinks [reward magnitude: high]. You have a test first thing in the morning after the party. You will have to wake up around 7:30 A.M. to start the day [near-term punishment magnitude: high]. Course policy allows you to drop one exam from your overall final grade [long-term punishment magnitude: low].”

The responses for the attendance decisions were summed (scores ranging from 0 to 2), producing a single reward-high/punishment-high party attendance score.

Typical weekly alcohol consumption interview. Typical weekly quantity and frequency of consumption were assessed using a brief interview. Because of a minor modification in interview materials (for other research purposes), two temporal time referents were used for typical weekly consumption. One group of participants ($n = 174$) was asked to report typical weekly consumption for the past month, whereas a second group of participants ($n = 181$) was asked to report typical weekly consumption for the past 3 months. For all participants, *typical* was defined as being “more than half of the [day of week].” For example, if a participant drank on more than half of Mondays, then this would be defined as typical. Two sets of independent samples t tests comparing the alcohol-dependent participants across the groups and the non-alcohol-dependent participants across the groups did not show significant differences in typical weekly consumption, i.e., using a 1-month versus 3-month temporal referent did not affect reports of typical weekly consumption.

In subsequent path analyses, a latent variable of alcohol consumption was created from the assessments of quantity and frequency.

Analyses

Correlational analyses were used to assess the magnitude and direction of effects. Path models were then analyzed (using Amos 22) using the arrangement of relationships for the two models described above, with the additional criterion of showing a statistically significant ($p < .05$) bivariate relationship in the correlational analyses. Indirect effects were tested by examining whether the bootstrapped ($k = 20,000$) 95% confidence intervals (CIs) around the estimates of indirect effects included zero (Cheong & MacKinnon, 2012; Hancock & Liu, 2012; MacKinnon et al., 2007).

Internal model fit was assessed using the root mean square error of approximation (RMSEA) and the comparative fit index (CFI). RMSEA is used to quantify the closeness of fit of a model in relation to its degrees of freedom (Browne & Cudeck, 1993). Values close to zero indicate good internal fit. Browne and Cudeck (1993) advised that a RMSEA value of approximately .05 indicates a reasonable error of approximation. CFI scores range from 0 to 1, where a score of .80, for example, means that 80% of the covariation in the data is reproduced by a given model (Bentler, 1990). A CFI score above .90 suggests adequate fit.

Assuming both models showed good internal fit, they were compared using the Bayesian information criterion (BIC) and the Akaike information criterion (AIC). The BIC and AIC help identify which model reproduces the observed variances and covariances using the fewest parameters.

The BIC is interpreted as an odds ratio, where a lower BIC value indicates better comparative fit (Raftery, 1995). For example, if two models show a difference of 10 points, this indicates the odds are approximately 150:1 that the model with the lower BIC value provides a better fit (Raftery, 1995). Although not interpreted as odds, lower AIC values also indicate better comparative fit (Akaike, 1987). The calculation of BIC incorporates a weighting that results in a comparatively strong penalty for greater model complexity, whereas the calculation of the AIC does not overweight for model complexity.

Results

Descriptive statistics and correlations

Table 1 displays the descriptive statistics and correlations among the study variables—most of which were consistent with expectations. However, neuroticism and student role stress were not significantly associated with quantity and frequency of typical weekly alcohol consumption. Neuroticism also was not significantly associated with trait self-control or subjective college student role investment. Age at first drink was not significantly correlated with neuroticism, coping drinking motives, student role stress, or reward-high/punishment-high party attendance. Coping and enhancement drinking motives were not significantly associated with subjective college student role investment. In addition, enhancement motives were not significantly associated with student role stress or student role satisfaction.

Comparing the direct trait, role, and motive effects model to the indirect trait and role effects and direct motive effects model

For the model depicted in Figure 1, Panel A, all paths were specified as shown, with the exclusion of the following paths: neuroticism and college student role stress to reward-high/punishment-high party attendance and alcohol consumption, trait self-control to college student role stress, and neuroticism to enhancement drinking motives and school investment. These paths were excluded because of the absence of significant associations among these pairs of variables (Table 1). Also, for the model depicted in Panel A, error terms were allowed to freely covary for the enhancement and coping drinking motives, coping drinking motives and college student role satisfaction and stress, and subjective college student role investment and college student role satisfaction and stress.

For the model depicted in Figure 1, Panel B, all paths were specified as shown, with the exclusion of the following paths: neuroticism and college student role stress to reward-high/punishment-high party attendance, college student role satisfaction and stress to alcohol consumption,

TABLE 1. Descriptive statistics and correlations among study variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Age at first drink	—										
2. Trait self-control	.15*	—									
3. Neuroticism	-.08	-.04	—								
4. Coping drinking motives	-.09	-.23*	.33*	—							
5. Enhancement drinking motives	-.21*	-.22*	.07	.41*	—						
6. Student role investment	.10*	.26*	.05	-.06	-.05	—					
7. Student role satisfaction	.13*	.19*	-.13*	-.18*	-.08	.39*	—				
8. Student role stress	-.09	-.09	.37*	.23*	.04	.14*	-.07	—			
9. Reward-high/punishment-high party attendance	-.10	-.26*	-.04	.19*	.18*	-.27*	-.15*	-.04	—		
10. Drink quantity	-.22*	-.18*	.02	.34*	.44*	-.15*	-.16*	.00	.33*	—	
11. Drink frequency	-.25*	-.20*	.03	.31*	.36*	-.07	-.07	.03	.34*	.71*	—
<i>M</i>	16.27	16.38	2.67	2.11	2.98	4.02	3.74	3.77	0.79	14.31	2.28
<i>(SD)</i>	(2.35)	(5.27)	(0.79)	(0.94)	(1.06)	(0.73)	(1.18)	(1.15)	(0.87)	(15.69)	(1.65)

* $p < .05$.

trait self-control to college student role stress, neuroticism to enhancement drinking motives and school investment, subjective college student role investment to enhancement and coping motives, and college student role satisfaction and stress to enhancement drinking motives. These paths were excluded because of the absence of significant associations among these pairs of variables (Table 1). Also, for the model depicted in Panel B, error terms were allowed to freely covary for the enhancement and coping drinking motives and subjective college student role investment and college student role satisfaction and stress.

In both models, predictive paths from age at first drink to trait self-control, subjective college student role investment, enhancement drinking motives, and alcohol consumption were specified. In addition, sex (men = 0, women = 1) was included in both models because men reported significantly greater typical weekly alcohol consumption ($p < .05$; Cohen's $d = .42$).

Table 2 displays the internal and comparative model fit statistics. As indicated by the RMSEA scores ($<.05$) and CFI scores ($>.95$), both models showed good internal fit, indicating that in relation to each model's degrees of freedom, there was a reasonable error of approximation and a high percentage of the data was reproduced by the given model. By contrast, p values for the chi-square tests were

statistically significant, suggesting differences between the model-predicted variances and covariances and the observed variances and covariances. However, less consideration was given to the chi-square results for these differences given the chi-square test's established sensitivity to small (and possibly trivial) model differences in larger samples with greater statistical power, such as that of the present work (cf. Tabachnick & Fidell, 1996).

As indicated by the lower BIC and AIC scores, the indirect trait and role effects and direct motive effects model showed better comparative fit than the direct trait, role, and motive effects model.

Direct and indirect effects of trait self-control, neuroticism, subjective college student role investment, and drinking motives on reward-high/punishment-high party attendance and alcohol consumption

Figure 2 shows the path model for the indirect trait and role effects and direct motive effects model. Consistent with expectations, individuals with greater trait self-control reported less frequent coping and enhancement drinking motives, greater subjective student role investment and satisfaction, and were less likely to decide to attend the reward-high/punishment-high party scenarios. Individuals with greater

TABLE 2. Fit statistics for alternative models of trait, identity, motivational, and situational influences on college drinking

Variable	Internal fit indices						Comparative fit indices	
	χ^2	<i>df</i>	<i>p</i>	RMSEA	CFI	r^2	BIC	AIC
Direct trait, role, and motive effects model	57.391	36	.013	.041	.972	.40	304.020	141.391
Indirect trait and role effects and direct motive effects model	57.637	39	.028	.037	.975	.40	286.650	135.637

Notes: RMSEA = Root mean square error of approximation; CFI = comparative fit index; BIC = Bayesian information criterion; AIC = Akaike information criterion. Lower RMSEA indicates better closeness of fit for each model in relation to its own degrees of freedom (*df*). CFI above .90 indicates good fit (i.e., covariation in the data is reproduced by the model). Lower BIC scores and lower AIC scores indicate better comparative fit.

FIGURE 2. Standardized direct and correlated effects for model of indirect trait and role effects and direct motive effects on partying decisions and typical weekly alcohol consumption among college students. **Bold** effects are statistically significant ($p < .05$).

levels of neuroticism reported less college student role satisfaction, greater college student role stress, and more frequent coping drinking motives. Individuals who reported greater subjective student role investment were less likely to decide to attend the reward-high/punishment-high party scenarios. Individuals with less college student role satisfaction and greater college student role stress reported more

frequent coping drinking motives. Individuals who reported more frequent enhancement drinking motives also reported greater alcohol consumption. Individuals who reported more frequent coping drinking motives were more likely to report greater alcohol consumption. Finally, individuals who reported decisions to attend the reward-high/punishment-high party scenarios were more likely to report greater alcohol

consumption. The model also showed that individuals who first drank at a later age had greater trait self-control, reported less frequent enhancement drinking motives, and consumed less alcohol; sex (male) also was associated with greater alcohol consumption.

Consistent with expectations for the indirect trait and role effects and direct motive effects model, trait self-control ($\beta = -.17$, $SE = .03$; 95% CI $[-.23, -.11]$) and neuroticism ($\beta = .07$, $SE = .02$; 95% CI $[.03, .13]$) showed significant indirect effects to alcohol consumption. Moreover, subjective college student role investment also showed a small indirect effect to alcohol consumption ($\beta = -.06$, $SE = .02$; 95% CI $[-.10, -.03]$). However, coping and enhancement drinking motives did not show indirect effects to alcohol consumption. In addition, college student stress ($\beta = .02$, $SE = .01$; 95% CI $[.00, .06]$) and college student role satisfaction ($\beta = -.03$, $SE = .02$; 95% CI $[-.07, .01]$) showed marginal and nonsignificant indirect effects to alcohol consumption, respectively.

Discussion

The goal of the present study was to examine alternative models of the influences of personality traits, drinking motives, role-based factors, and partying decision making on alcohol consumption in a large sample of college students with a heterogeneous prevalence of alcohol dependence. Comparative model fit indices showed the indirect trait and role effects and direct motive effects model was a better fit to the data than the direct trait, motive, and role effects model. Aside from providing support for the indirect trait and role effects and direct motivation effects model, this is the first study to demonstrate the unique predictive utility of subjective college student role investment and partying decision making in the same analytic framework as more established predictors and correlates of college student drinking.

Evidence for the role of psychological maturity in college student drinking

The findings from the present study suggest both disinhibitory and distressed psychological pathways to excessive college student drinking. Extending prior research, the results showed individuals with lower trait self-control reported greater consumption by virtue of motivational, identity, and situational factors, including (a) more frequent motives for the hedonic (i.e., enhancement) and negative-affect-modulating (i.e., coping) effects of alcohol, (b) lower levels of engagement and commitment to the educational and vocational aspects of being a college student, and (c) more frequent decisions to attend parties where negative academic outcomes were likely but where rewarding alcohol-related and social features were present. Moreover, individuals with greater neuroticism reported greater consumption by virtue of more frequent motives for the negative-affect-regulating

(i.e., coping) effects of alcohol, although the mediated effect for neuroticism was less than half as large as the mediated effect for trait self-control.

Interestingly—and contrary to expectations for either model—college student role satisfaction and stress were not meaningful predictors of consumption. In addition, subjective college student role investment and drinking motives were not significantly associated, suggesting independent effects on partying decision making and consumption from these identity and motivational influences—a finding somewhat at odds with the Theory of Current Concerns, which suggests that other goal pursuits should offset motives for drinking alcohol (cf. Cox et al., 2015).

The findings of the present study speak to the intersection of developmental trends for psychological maturity and alcohol consumption during the college years. Research on patterns of trait development shows increases in markers of psychological maturity during late adolescence and young adulthood, especially the Big Five traits of conscientiousness (represented by trait self-control in the present study) and emotional stability (Lüdtke et al., 2011; Roberts et al., 2006). Research on patterns of alcohol consumption during late adolescence and young adulthood shows a pattern of “maturing out” for many problematic drinkers (Bachman et al., 2002; Littlefield et al., 2009). Moreover, the social investment hypothesis suggests the transition to adult roles and activities contributes to an increase in consequential contingencies tied to the continued expression of disinhibited and/or distressed tendencies (cf. Roberts & Caspi, 2003).

As it relates to the findings of the present study, lower psychological maturity—especially in the form of less trait self-control—was associated with less investment in the educational/vocational aspects of the college student role, more frequent decisions to attend parties that were likely to be associated with serious academic consequences, and greater endorsement of motives related to the disinhibitory effects of alcohol. These relationships provide further clarification for the ways by which trait self-control—a broad indicator of psychological maturity—is associated with excessive alcohol consumption—a potentially role- (and health-) damaging behavior.

Limitations, implications, and conclusions

Although the present study represents a step forward by providing a novel integration of the multifarious psychological influences on college drinking, it is not without limitations. Primary among them is the mostly self-report-based and cross-sectional design. Although the temporal precedence of age at first drink is clear (i.e., age at first drink occurred before study participation), the modeling of the other study constructs relied on the conceptualizations of the influences as depicted in Figure 1. Future research

should use informant reports and examine longitudinal designs, which would provide an account of temporally (rather than concurrently) intervening effects as well as possible evocative/transactive processes. Future research also should explore the utility of recent revisions to the coping motives construct, which suggest separable coping-anxiety and coping-depression motives (Grant et al., 2007).

Although the bivariate results reported herein are largely consistent with past research, the present study differs from past research in that there was an overrepresentation of lifetime alcohol dependence diagnoses. Although not often reported, it is probably safe to assume that prior studies using large samples of college students did not have comparable alcohol dependence rates (e.g., Mezquita et al., 2010). This makes direct comparison of effect sizes among studies somewhat more difficult, as does the inclusion of nondrinkers in some prior work (e.g., Kuntsche et al., 2008). Moreover, direct comparisons of model weights across studies are also affected by the present work's inclusion of a greater number of variables. Regardless, the recruitment and psychodiagnostic assessment approaches of the present study provided an account of effects within the context of specified pathological representation (as defined by DSM-IV), whereas such an account has not been discernible in other studies.

Informed by the findings of the present study, complementary prevention/intervention modalities could be developed that focus on normative enhancement for problematic college drinkers. Specifically, students could complete a brief (interviewer-guided) goal-scaffolding exercise designed to aid in the articulation of broad (e.g., graduate) and narrow (e.g., pass a course) goals as well as formulate plans designed to enable the achievement of those goals (e.g., discuss a plan of work with an advisor, request resources from an instructor, join a study group, work with a tutor). Such approaches could be included as separate modules in motivational interviewing-based interventions, such as the Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff et al., 1999), which was not designed to address levels of investment in the college student role, but rather drinking patterns, blood alcohol levels, alcohol-related expectancies, norms, perceived risk, and related problems.

Moreover, scenario training—beyond drink-refusal training—that emphasizes recognizing and attending to high-magnitude punishing academic-related information, especially in the same context as highly rewarding partying information, appears to be a fruitful addition to harm-reduction interventions (cf. Marlatt, 1998). Such a training approach also is consistent with recent interventions aimed at disrupting cognitive-motivational biases for alcohol consumption (e.g., Wiers et al., 2011). Role-based and partying decision-making modules may represent viable means of accelerating the “maturing out” of problematic drinking.

References

- Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, 52, 317–332. doi:10.1007/BF02294359.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Bachman, J. G., O'Malley, P. M., Schulenberg, J. E., Johnston, L. D., Bryant, A. L., & Merline, A. C. (2002). *The decline of substance use in young adulthood: Changes in social activities, roles, and beliefs*. Mahwah, NJ: Erlbaum.
- Bauer, L. O., & Hesselbrock, V. M. (1993). EEG, autonomic and subjective correlates of the risk for alcoholism. *Journal of Studies on Alcohol*, 54, 577–589. doi:10.15288/jsa.1993.54.577.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107, 238–246. doi:10.1037/0033-2909.107.2.238.
- Bogg, T. (2011). Investigating drinking via the social investment hypothesis: Committed relationship status moderates the association between educational investment and excessive alcohol consumption among college students. *Personality and Individual Differences*, 50, 1104–1109. doi:10.1016/j.paid.2011.01.035.
- Bogg, T., & Finn, P. R. (2009). An ecologically based model of alcohol-consumption decision making: Evidence for the discriminative and predictive role of contextual reward and punishment information. *Journal of Studies on Alcohol and Drugs*, 70, 446–457. doi:10.15288/jsad.2009.70.446.
- Bogg, T., Finn, P. R., & Monsey, K. E. (2012). A year in the college life: Evidence for the social investment hypothesis via trait self-control and alcohol consumption. *Journal of Research in Personality*, 46, 694–699. doi:10.1016/j.jrp.2012.08.004.
- Bogg, T., & Roberts, B. W. (2004). Conscientiousness and health-related behaviors: A meta-analysis of the leading behavioral contributors to mortality. *Psychological Bulletin*, 130, 887–919. doi:10.1037/0033-2909.130.6.887.
- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.
- Brown, S. A., McGue, M., Maggs, J., Schulenberg, J., Hingson, R., Swartzwelder, S., . . . Murphy, S. (2008). A developmental perspective on alcohol and youths 16 to 20 years of age. *Pediatrics*, 121, Supplement 4, S290–S310. doi:10.1542/peds.2007-2243D.
- Bucholz, K. K., Cadoret, R., Cloninger, C. R., Dinwiddie, S. H., Hesselbrock, V. M., Nurnberger, J. I., . . . Schuckit, M. A. (1994). A new, semistructured psychiatric interview for use in genetic linkage studies: A report on the reliability of the SSAGA. *Journal of Studies on Alcohol*, 55, 149–158. doi:10.15288/jsa.1994.55.149.
- Carey, K. B. (1993). Situational determinants of heavy drinking among college students. *Journal of Counseling Psychology*, 40, 217–220. doi:10.1037/0022-0167.40.2.217.
- Cheong, J., & MacKinnon, D. P. (2012). Mediation/indirect effects in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 417–435). New York, NY: Guilford Press.
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment*, 6, 117–128. doi:10.1037/1040-3590.6.2.117.
- Cooper, M. L., Krull, J. L., Agocha, V. B., Flanagan, M. E., Orcutt, H. K., Grabe, S., . . . Jackson, M. (2008). Motivational pathways to alcohol use and abuse among Black and White adolescents. *Journal of Abnormal Psychology*, 117, 485–501. doi:10.1037/a0012592.
- Cox, W. M., Klinger, E., & Fadardi, J. S. (2015). The motivational basis of cognitive determinants of addictive behaviors. *Addictive Behaviors*, 44, 16–22. doi:10.1016/j.addbeh.2014.11.019.
- Cronin, C. (1997). Reasons for drinking versus outcome expectancies in the prediction of college student drinking. *Substance Use & Misuse*, 32, 1287–1311. doi:10.3109/10826089709039379.

- Dimeff, L. A., Baer, J. S., Kivlahan, D. R., & Marlatt, G. A. (1999). *Brief alcohol screening and intervention for college students: A harm reduction approach*. New York, NY: Guilford Press.
- Finn, P. R., Mazas, C. A., Justus, A. N., & Steinmetz, J. (2002). Early-onset alcoholism with conduct disorder: Go/no go learning deficits, working memory capacity, and personality. *Alcoholism: Clinical and Experimental Research*, 26, 186–206. doi:10.1111/j.1530-0277.2002.tb02524.x.
- Grant, V. V., Stewart, S. H., O'Connor, R. M., Blackwell, E., & Conrod, P. J. (2007). Psychometric evaluation of the five-factor Modified Drinking Motives Questionnaire-Revised in undergraduates. *Addictive Behaviors*, 32, 2611–2632. doi:10.1016/j.addbeh.2007.07.004.
- Hancock, G. R., & Liu, M. (2012). Bootstrapping standard errors and data-model fit statistics in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 296–306). New York, NY: Guilford Press.
- Hingson, R. W., Heeren, T., & Winter, M. R. (2006). Age at drinking onset and alcohol dependence: Age at onset, duration, and severity. *Archives of Pediatrics & Adolescent Medicine*, 160, 739–746. doi:10.1001/archpedi.160.7.739.
- Hingson, R. W., Zha, W., & Weitzman, E. R. (2009). Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005. *Journal of Studies on Alcohol and Drugs, Supplement 16*, 12–20. doi:10.15288/jsads.2009.s16.12.
- John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory – Versions 4a and 54*. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.
- John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big-Five trait taxonomy: History, measurement, and conceptual issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 114–158). New York, NY: Guilford Press.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2005). Why do young people drink? A review of drinking motives. *Clinical Psychology Review*, 25, 841–861. doi:10.1016/j.cpr.2005.06.002.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2006). Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behaviors*, 31, 1844–1857. doi:10.1016/j.addbeh.2005.12.028.
- Kuntsche, E., von Fischer, M., & Gmel, G. (2008). Personality factors and alcohol use: A mediator analysis of drinking motives. *Personality and Individual Differences*, 45, 796–800. doi:10.1016/j.paid.2008.08.009.
- Lahey, B. B. (2009). Public health significance of neuroticism. *American Psychologist*, 64, 241–256. doi:10.1037/a0015309.
- Littlefield, A. K., Sher, K. J., & Wood, P. K. (2009). Is “maturing out” of problematic alcohol involvement related to personality change? *Journal of Abnormal Psychology*, 118, 360–374. doi:10.1037/a0015125.
- Littlefield, A. K., Sher, K. J., & Wood, P. K. (2010). Do changes in drinking motives mediate the relation between personality change and “maturing out” of problem drinking? *Journal of Abnormal Psychology*, 119, 93–105. doi:10.1037/a0017512.
- Lodi-Smith, J. (2007). *Examining the social investment hypothesis: The relationship of social role investment and personality trait development in adulthood*. Unpublished doctoral dissertation, University of Illinois, Urbana-Champaign, Illinois.
- Lüdtke, O., Roberts, B. W., Trautwein, U., & Nagy, G. (2011). A random walk down university avenue: Life paths, life events, and personality trait change at the transition to university life. *Journal of Personality and Social Psychology*, 101, 620–637. doi:10.1037/a0023743.
- MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology*, 58, 593–614. doi:10.1146/annurev.psych.58.110405.085542.
- Marlatt, G. A. (1998). *Harm reduction: Pragmatic strategies for managing high-risk behaviors*. New York, NY: Guilford Press.
- McCormick, R. A., Dowd, E. T., Quirk, S., & Zegarra, J. H. (1998). The relationship of NEO-PI performance to coping styles, patterns of use, and triggers for use among substance abusers. *Addictive Behaviors*, 23, 497–507. doi:10.1016/S0306-4603(98)00005-7.
- Mezquita, L., Stewart, S. H., & Ruipérez, M. A. (2010). Big-five personality domains predict internal drinking motives in young adults. *Personality and Individual Differences*, 49, 240–245. doi:10.1016/j.paid.2010.03.043.
- Misra, S., Ghosh, R., & Kanungo, R. N. (1990). Measurement of family involvement: A cross-national study of managers. *Journal of Cross-Cultural Psychology*, 21, 232–248. doi:10.1177/0022022190212006.
- Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., . . . Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences of the United States of America*, 108, 2693–2698. doi:10.1073/pnas.1010076108.
- Raftery, A. E. (1995). Bayesian model selection in social research. *Sociological Methodology*, 25, 111–163. doi:10.2307/271063.
- Roberts, B. W., & Caspi, A. (2003). The cumulative continuity model of personality development: Striking a balance between continuity and change in personality traits across the life course. In R. M. Staudinger & U. Lindenberger (Eds.), *Understanding human development: Lifespan psychology in exchange with other disciplines* (pp. 183–214). Dordrecht, NL: Kluwer Academic Publishers.
- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin*, 132, 1–25. doi:10.1037/0033-2909.132.1.1.
- Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.). New York, NY: HarperCollins.
- Tellegen, A. (1982). *Brief manual of the Multidimensional Personality Questionnaire*. Unpublished manuscript, University of Minnesota.
- Wiers, R. W., Eberl, C., Rinck, M., Becker, E. S., & Lindenmeyer, J. (2011). Retraining automatic action tendencies changes alcoholic patients' approach bias for alcohol and improves treatment outcome. *Psychological Science*, 22, 490–497. doi:10.1177/0956797611400615.
- Zimmermann, P., Wittchen, H. U., Höfler, M., Pfister, H., Kessler, R. C., & Lieb, R. (2003). Primary anxiety disorders and the development of subsequent alcohol use disorders: A 4-year community study of adolescents and young adults. *Psychological Medicine*, 33, 1211–1222. doi:10.1017/S0033291703008158.