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Alcohol Expectancies, Perceived Norms and Drinking Behavior among College Students: Examining the Reciprocal Determinism Hypothesis

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Abstract

Social learning mechanisms, such as descriptive norms for drinking behavior (norms) and positive alcohol expectancies (PAEs), play a major role in college student alcohol use. According to the principle of *reciprocal determinism* (Bandura, 1977), norms and PAEs should be reciprocally associated with alcohol use, each influencing one another over time. However, the nature of these prospective relationships for college students is in need of further investigation. This study provided the first examination of the unique reciprocal associations among norms, PAEs, and drinking together in a single model. PAEs become more stable with age, whereas norms are likely to be more dynamic upon college entry. Thus, we hypothesized that alcohol use would show stronger reciprocal associations with norms than with PAEs for college students. Students (N=557; 67% female) completed online measures of PAEs, norms and quantity and frequency of alcohol use in September of their first (T1), second (T2), and third (T3) years of college. Reciprocal associations were analyzed using a cross-lagged panel design. PAEs had unidirectional influences on frequency and quantity of alcohol use, with no prospective effects from alcohol use to PAEs. Reciprocal associations were observed between norms and alcohol use, but only for quantity and not frequency. Specifically, drinking quantity prospectively predicted quantity norms and quantity norms prospectively predicted drinking quantity. This effect was observed across both years in the model. These findings support the reciprocal determinism hypothesis for norms but not for PAEs in college students, and may help to inform norm-based interventions.

Introduction

Alcohol consumption in college is highly prevalent and is often associated with deleterious outcomes (Wechsler & Nelson, 2008). Social learning theory (SLT; Bandura, 1977) is a useful framework for studying alcohol use in college students, which is largely a social behavior (Borsari & Carey, 2001; Christiansen, Vik, & Jarchow, 2002). Perceptions and beliefs about socially normative drinking behavior (i.e., descriptive norms) and alcohol's positive effects (i.e., positive alcohol expectancies; PAEs) both are central cognitive constructs in SLT perspectives on drinking, which are believed to operate together to influence alcohol consumption. Descriptive norms (which we refer to simply as "norms") are beliefs about the level of alcohol consumption that is typical or normative in a given population. College students tend to overestimate the alcohol consumption of their peers (Baer, Stacy, & Larimer, 1991), which may lead them to drink more to conform to their perception of the norm (Larimer, Turner, Mallett, & Geisner, 2004; Park, Sher, & Krull, 2008). PAEs are beliefs about the likely rewarding outcomes of drinking alcohol. These beliefs typically pre-date the onset of drinking behavior (Christiansen, Goldman, & Inn,

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1982; Miller, Smith, & Goldman, 1990) and are strongly linked with alcohol use, including drinking in college (Goldman, Del Boca, & Darkes, 1999; Patel & Fromme, 2010).

According to the SLT principle of *reciprocal determinism* (Bandura, 1969), cognitions and behavior influence one another in a dynamic learning process. Thus, PAEs and norms should be reciprocally associated with alcohol use, both shaping and being shaped by drinking behavior over time. That is, PAEs and norms may lead to increases in drinking behavior, which in turn may reinforce and strengthen PAEs and norms. Yet, previous findings regarding such associations have been mixed. For example, although some studies have found reciprocal effects between PAEs and alcohol use in multi-wave panel studies (Aas, Leigh, Anderssen, & Jakobsen, 1998; Sher, Wood, Wood, & Raskin, 1996; Smith, Goldman, Greenbaum, & Christiansen, 1995), these associations have been weak. Other studies have not found reciprocal effects (Stacy, Newcomb, & Bentler, 1991). Research on the reciprocal associations among norms and drinking is similarly mixed, with both evidence for (Lee, Geisner, Patrick, & Neighbors, 2010; Neighbors, Dillard, Lewis, Bergstrom, & Neil, 2006) and against (Farrell, 1994; Read, Wood, & Capone, 2005) such associations.

As noted by Patel and Fromme (2010), a limitation of past research in this area is that no studies have examined the reciprocal influences of PAEs, norms, and alcohol use simultaneously in a single model. This is important because the nature of these associations in college may be different for PAEs and norms. PAEs form in childhood, well before initiation of alcohol use (Christiansen et al., 1982; Johnston, O'Malley, Bachman, & Schulenberg, 2011). Thus a great deal of PAE learning already has occurred before college, and PAEs may be relatively stable and less likely to change in response to fluctuations in drinking by this time. Most studies on the reciprocal relationships among PAEs and alcohol use have examined adolescents, and so more research in college students is needed to determine whether reciprocal processes continue to characterize this relationship into the college years. Unlike PAEs, norms are intricately linked with the social environment. Upon entering college and gaining first-hand experience with drinking in this new social environment, norms are likely to shift based on this experience (Pandina, Johnson, & White, 2010). Because norms and PAEs both represent beliefs about alcohol, there is considerable overlap among these constructs (Patel & Fromme, 2010). Thus, examining them together in a single model – thereby controlling for shared variance – is necessary to determine whether PAEs and norms differ with respect to their reciprocal relations with alcohol use in college.

Accordingly, in this study we modeled the unique reciprocal associations among PAEs, norms, and alcohol use in college students over a two-year span beginning at college matriculation. Consistent with the SLT concept of reciprocal determinism and with some past research, we hypothesized that alcohol use would have bidirectional, prospective associations with both PAEs and norms. However, because PAEs may be more stable in college students and norms are likely to be highly dynamic upon entry into the college social environment, we predicted that we would observe stronger reciprocal influences with alcohol use for norms than for PAEs.

Method

Participants

Participants were 557 (67% female) matriculating college students with a mean (*SD*) age of 18.11 (0.45) years. Seventy percent were Caucasian ($n = 392$), 12% were African American ($n = 67$), 9% were Asian ($n = 52$), 4% were Hispanic ($n = 24$), and 3% were multi-racial ($n = 19$). Three participants did not report ethnicity. Sixty percent reported drinking at least once in the past month. Most students lived either on campus ($n = 271$; 49%) or at home with

family (n = 258; 46%). Mean high school GPA was 3.60 (SD = 0.39), and median annual family income was $51,000 to $60,000.

Procedures

As part of a larger study investigating traumatic stress and substance use, all incoming students aged 18 to 24 at two mid-sized public U.S. universities (Site 1 in the Northeastern U.S. and Site 2 in the Southeastern U.S.) were invited to complete a web-based screening survey prior to their first semester. Detailed screening procedures and selection criteria have been reported elsewhere (Read et al., 2012). Of those who were targeted for longitudinal follow-up (n = 692), 81% (n=557) completed a baseline survey in September of their first year of college (T1). Of these participants, 91% also completed follow-up surveys in September of their 2nd (T2; n = 509) and 3rd (T3; n = 509) college years. Past month alcohol use, norms, and PAEs were assessed at all three time points. Each survey was launched one-week following the first day of classes in the fall semester, and participants were given one month to respond. Thus, the assessment captured alcohol use occurring in the weeks immediately prior to and immediately following the start of the Fall semester. Retail gift cards were provided as compensation. Perceived norms for quantity at T1 were higher for participants with any missing data (n = 65, M = 4.94, SD = 2.30) than for participants with no missing data (n = 492, M = 4.28, SD = 1.86), $t(555) = 2.58$, p = .010. Missing data was not associated with any other baseline or demographic variables (ps > .05).

Measures

Demographics questionnaire—Participants reported on gender, age, ethnicity, living situation, high school GPA, and family income.

Alcohol use—At each assessment, participants responded to two items assessing past month alcohol use from a measure used by Wood, Read, Palfai, and Stevenson (2001). The first item read, “In the past month when you had something to drink, how often have you had some kind of beverage containing alcohol?” Participants chose among categorical response options, which were coded to create a metric representing average monthly frequency of drinking. Responses ranged from “never in the past month” (coded as 0) to “every day” (coded as 30). The second item asked, “In the past month, when drinking alcohol, how many drinks did you usually have on one occasion?” Response options ranged from “none” (coded as 0) to “nine or more total drinks” (coded as 9). Participants were provided with a definition of a standard drink before responding.

Norms for alcohol use—Similarly, two items assessed participants’ norms for alcohol use over the past year (Wood et al., 2001). The first item asked, “In the past year, how often do you think the typical student of your gender at your college drank alcohol?” Consistent with the alcohol frequency question described above, responses were recoded to reflect perceived norms for typical monthly drinking frequency. Response options with drinking frequencies of less than once per month were coded as zero. The second item asked, “In the past year, how many drinks do you think that the typical student of your gender at your college had per drinking occasion?” Response options ranged from “none” or “less than one” (coded as 0) to “nine or more total drinks” (coded as 9).

Positive Alcohol Expectancies—Participants responded to 35 items assessing positive beliefs about drinking alcohol (Kushner, Sher, Wood, & Wood, 1994), such as tension reduction, social lubrication, and activity and performance enhancement beliefs. Participants responded to each item with a yes (1) or no (0). The proportion of PAEs endorsed was used in the analysis. Cronbach’s alphas were .94, .93, and .93 at T1, T2, and T3, respectively.

Results

Descriptives and Bivariate Correlations

See Table 1 for means, standard deviations, and correlations among all variables. Mean PAEs were similar across the 3 assessment points, with participants endorsing about 20% of the PAEs on average. Both mean frequency and quantity of drinking tended to increase slightly over time. Consistent with past research, average norms for quantity and frequency were notably higher than students' actual reported alcohol use (Table 1).

Analysis of Reciprocal Associations

To examine the reciprocal associations among PAEs, norms, and alcohol use, we specified a cross-lagged panel model with observed variables in Mplus version 5.2 (Muthen & Muthen, 2007). The model included PAEs, quantity and frequency of alcohol use, and quantity and frequency norms at each of the three time points. All stabilities and cross-lagged paths from T1 to T2 and from T2 to T3 were estimated. Cross-lagged paths between alcohol use and norms were dimension specific (e.g., we estimated a path from alcohol quantity at T1 to quantity norms at T2, but not from alcohol quantity at T1 to frequency norms at T2). We also estimated the within time-point covariances among all of the variables. Because gender differences have been reported with respect to PAEs, norms, and alcohol use, all variables were regressed on a dummy coded gender variable (females = 0, males = 1). Full information maximum likelihood estimation with robust standard errors was used to accommodate both non-normality in the alcohol use variables and missing data due to attrition (Muthen & Muthen, 2007). Model fit was considered good if the normed chi-square index (χ^2/df) < 3.0, Root Mean Square Error of Approximation (RMSEA) < .05, the Comparative Fit Index (CFI) > .95, and the Tucker-Lewis Index (TLI) > .95. (Hu & Bentler, 1999; Kline, 2005; Tucker & Lewis, 1973).

The model initially did not fit the data well, χ^2 (41) = 119.11, p <.001, χ^2/df = 2.91, RMSEA = .06, TLI=.89, CFI=.96. Modification indices suggested estimating the direct stability coefficients from T1 to T3 for quantity norms (modification index = 16.91), PAEs (modification index = 11.32), and alcohol quantity (modification index = 11.29). So, we re-specified the model to estimate these direct paths, and this revised model fit the data reasonably well, χ^2 (38) = 77.09, p <.001, χ^2/df = 2.03, RMSEA = .04, TLI=.94, CFI=.98.

Figure 1 shows the results of this model. PAEs at T1 had a reliable prospective effect on T2 alcohol use, suggesting that students high on PAEs tended to show increases in drinking over time. This effect also was observed from T2 to T3, although the influence of PAEs on alcohol use was limited to drinking frequency. However, we did not observe a prospective influence of alcohol use on PAEs. Thus, there was no evidence for reciprocal associations among PAEs and alcohol use. Also, PAEs at T2 was a marginally significant predictor of perceived norms for quantity at T3, but no other associations with norms were observed for PAEs.

There was evidence for reciprocal effects between perceived norms for quantity and alcohol quantity (Figure 1). Alcohol quantity at T1 predicted increased quantity norms at T2, which in turn predicted increased alcohol quantity at T3. In addition, quantity norms at T1 was a marginally significant predictor of alcohol quantity at T2, and alcohol quantity at T2 significantly predicted increases in quantity norms at T3. However, reciprocal associations were not observed among frequency norms and frequency of drinking. Indeed, frequency norms were not uniquely associated with any of the other variables in the model.

Discussion

This study contributes to the literature on the reciprocal associations between two important social learning constructs and alcohol use in college students. We found that, over a two-year period, quantity norms were associated reciprocally with drinking quantity, but PAEs had only unidirectional influences on drinking. This study is the first to our knowledge to combine both PAEs and norms into a single prospective model, thereby allowing for an examination of differences between the unique reciprocal associations among these variables. Thus, this study provides new insight into the reciprocal determinism hypothesis of SLT, and points to the potential importance of developmental processes and the college context for understanding the prospective relationships among PAEs, norms, and drinking behavior in the college population.

Though PAEs are posited to be an important proximal predictor of alcohol involvement, the literature examining the prospective effects of PAEs on drinking in college students is relatively small. Consistent with the handful of existing studies (Carey, 1995; Del Boca, Darkes, Greenbaum, & Goldman, 2004; Katz, Fromme, & D'Amico, 2000), we found some support for the hypothesis that PAEs have a prospective influence on alcohol use. We also found that PAEs had a weak prospective influence on quantity norms, an association that has rarely been examined. But, this effect was marginally significant and did not emerge across both years. So, the prospective relationships among PAEs and norms appear to be modest and in need of further investigation.

Although PAEs had a prospective effect on alcohol use, we did not find evidence for reciprocal effects between PAEs and drinking. These results diverge from studies of adolescents that support reciprocal associations (Aas et al., 1998; Smith et al., 1995), and may be a function of developmental differences with respect to PAE learning. PAEs generally form in childhood (Christiansen et al., 1982; Miller et al., 1990) and may become more solidified during adolescence when drinking initiation typically occurs (Dunn & Goldman, 1996). As such, where greater malleability of PAEs may be typical in younger adolescent samples, PAEs may already be relatively stable by the time of college entry and less easily influenced by changes in drinking behavior. This interpretation is consistent with a previous study examining college students, which found that reciprocal associations between PAEs and drinking were generally weak and several paths did not reach statistical significance (Sher et al., 1999).

Also, consistent with our hypothesis, we found that college students' norms for quantity and actual drinking quantity influenced one another over time in a reciprocal, feed-forward fashion. This finding is consistent with the reciprocal determinism principle of SLT, and can be understood by considering the social context of alcohol use in college. Whether living on campus or at home, students entering college typically find themselves in a new social environment. As such, the beliefs they hold about what is normal drinking behavior in college likely will be subject to change as they gain first-hand experience with drinking in this new environment (Pandina et al., 2010). Heavier drinking students may self-select into heavier drinking peer groups (Read et al., 2005), which could influence normative perceptions over time. Then, as perceived norms shift, students' own ongoing drinking behavior is likely to shift in kind, as students adjust their alcohol use to conform to what they perceive as "normal" drinking behavior.

The reciprocal influences that we observed between norms and alcohol use were limited to quantity, a finding that is consistent with past research (Neighbors et al., 2006). One possible explanation for the discrepancy between quantity and frequency may be related to the degree of individual variability in these dimensions. In our data, there was a somewhat

restricted range for drinking frequency. For example, of the students who endorsed drinking at T1 (n=335), 88% (n=295) reported a typical drinking frequency between once per month and once or twice per week. Few students fell into any of the higher frequency categories. Most drinking behavior among college students is confined to weekends (Del Boca et al., 2004), and so weekly frequency of drinking tends to be relatively stable in this population. Moreover, the categorical response options for the frequency items likely constrained the observed variability in responses, and this restriction of range may have attenuated cross-lagged associations. In contrast, the typical quantity of alcohol consumed on a given drinking occasion was more variable in our sample, and the distribution was more even across number of drinks. Future research that includes more frequent drinkers and more fine-grained assessment of drinking frequency is needed to further examine the reciprocal associations among frequency norms and frequency of drinking.

We must acknowledge some limitations of the present study, which highlight important directions for future research. First, in this study we used single item measures of norms and alcohol use. Such single item measures of quantity and frequency of alcohol use are widely used, and have been shown to correlate highly with reliable and valid assessment techniques (LaBrie, Pedersen, & Earleywine, 2005). Still, single item measures tend to contain more measurement error, which can attenuate associations among variables. Future research in this area should include a more extensive assessment of norms and alcohol use. Second, our variables were measured at only one time point each year, and alcohol use in college has been shown to fluctuate over the course of an academic year (Del Boca et al., 2004; Neighbors et al., 2011). Future studies with more frequent assessments of PAEs, norms, and alcohol use will shed more light on reciprocal processes. Third, the effect sizes of the reciprocal associations were small. This is not surprising given that there was strong autoregressivity in all of the variables, and the assessments were spaced a full year apart. Although small, these effects were statistically reliable and have implications for our theoretical understanding of the associations among PAEs, norms, and drinking over time in college students.

Despite these limitations, our findings may have implications for interventions. That norms for quantity were reciprocally associated with drinking suggest that – unlike PAEs – these norms may be amenable to change as a result of drinking experience. Thus, normative feedback interventions that target misperceptions about typical quantity of alcohol consumption may be particularly useful for matriculating college students. This notion is consistent with research by Borsari and Carey (2001), who found that changes in perceived norms – but not PAEs – mediated the effect of a brief intervention on student's subsequent alcohol use. As norms for quantity may be in flux during the transition into college, changes in drinking quantity as a result of normative feedback could in turn reinforce more realistic quantity norms in a reciprocal manner.

In conclusion, this study helps to clarify the prospective associations among PAEs, norms, and alcohol use in college students, and the findings have implications for the reciprocal determinism hypothesis of SLT. Because PAEs and norms were included in the same model, we were able to isolate their unique reciprocal associations with alcohol use. We found evidence that college students' typical drinking quantity and perceived norms for drinking quantity influence one another in a reciprocal fashion. The same was not true for PAEs, which had unidirectional influences on subsequent alcohol use.

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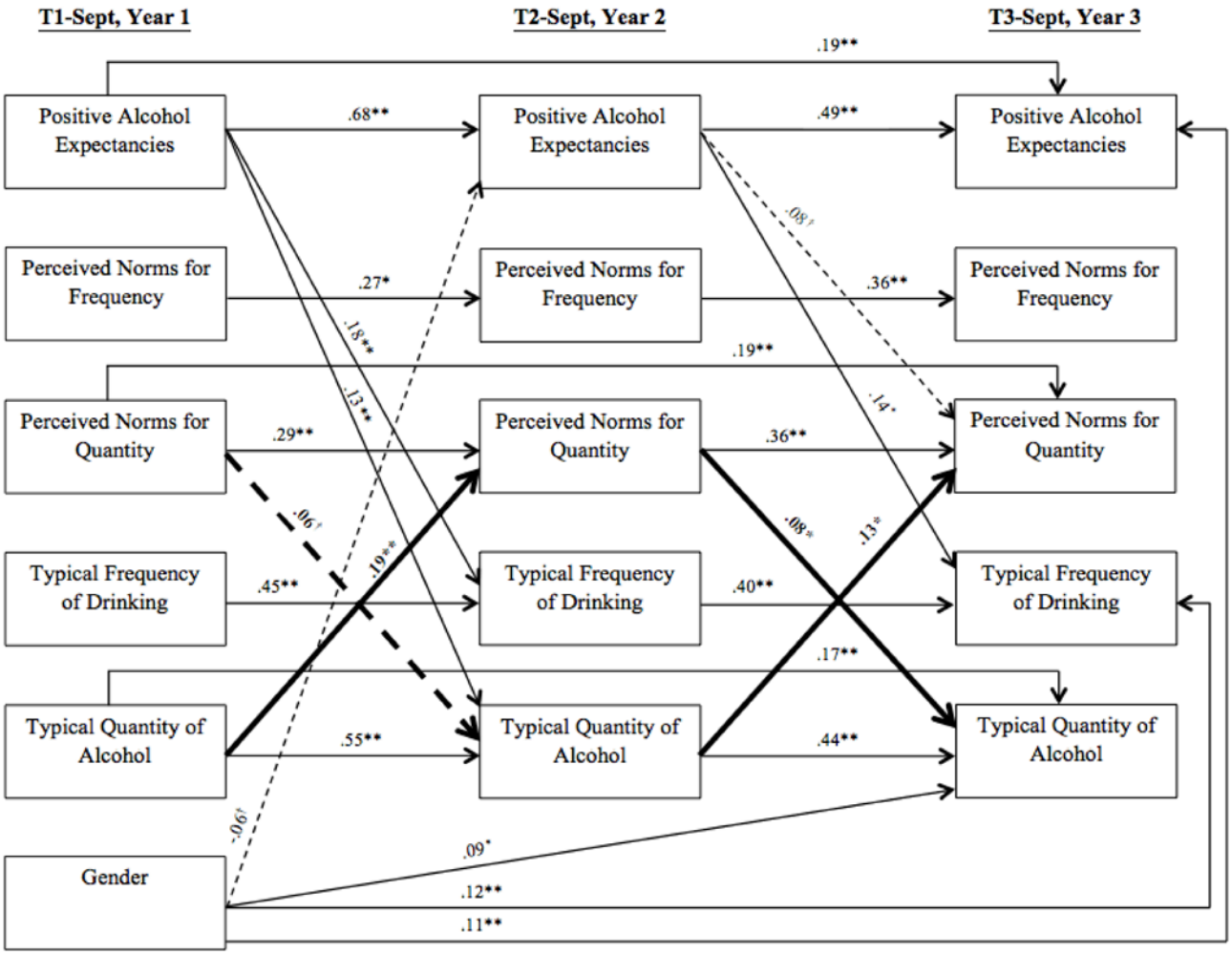

Figure 1.

Cross-lagged panel model of associations among PAEs, norms, and alcohol use. All cross-lagged paths between PAEs, norms, and alcohol use are estimated. Only paths with significant or marginally significant coefficients are shown. Standardized path coefficients are displayed. Solid lines indicate paths that are significant at the .05 level and dashed lines indicate paths that are marginally significant ($0.5 < p < .10$). Bolded lines indicate the presence of significant reciprocal influences

Table 1

Means, Standard Deviations, and Bivariate Associations among PAEs, Norms, and Alcohol Use at all Time Points

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	*M*	*SD*
1. T1-PAEs															0.22	0.22
2. T2-PAEs	.69**														0.21	0.21
3. T3-PAEs	.55**	.62**													0.23	0.21
4. T1-Norms Qua	.15**	.11*	.09*												4.36	1.93
5. T2-Norms Qua	.23**	.17**	.16**	.38**											4.26	1.86
6. T3-Norms Qua	.22**	.22**	.16**	.40**	.51**										4.41	1.90
7. T1-Norms Fre	.04	.06	.05	.40**	.23**	.20**									7.81	6.07
8. T2-Norms Fre	.08†	.06	.08†	.18**	.43**	.21**	.31**								7.35	5.55
9. T3- Norms Fre	.08†	.07	.12**	.14**	.24**	.40**	.22**	.37**							7.81	5.60
10. T1-Alc Qua	.63**	.45**	.34**	.29**	.31**	.28**	−.01	.04	.02						2.11	2.48
11. T2-Alc Qua	.48**	.54**	.39**	.25**	.39**	.36**	.01	.06	.04	.67**					2.31	2.60
12. T3-Alc Qua	.35**	.34**	.38**	.22**	.31**	.34**	.01	.09*	−.04	.54**	.63**				2.41	2.49
13. T1-Alc Fre	.57**	.41**	.35**	.15**	.17**	.19**	.07†	.03	.15**	.63**	.43**	.38**			2.86	4.23
14. T2-Alc Fre	.44**	.47**	.35**	.12**	.21**	.25**	.01	.16**	.11*	.46**	.59**	.44**	.56**		3.05	4.59
15. T3-Alc Fre	.34**	.33**	.39**	.12**	.15**	.18**	.07	.13**	.14**	.39**	.41**	.50**	.40**	.51**	3.37	4.80

Note: T1 = Time 1, T2 = Time 2, T3 = Time 3, PAEs = Positive alcohol expectancies, Norms = Perceived norms for alcohol use, Alc = Self-reported alcohol use, Qua = Quantity, Fre = Frequency,

† $p < .10$,

* $p < .05$,

** $p < .01$.