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## Alcohol-Related Infractions among College Students: Associations with Subsequent Drinking as a Function of Sensitivity to Punishment

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### Abstract

Problematic alcohol use on college campuses is a significant concern. Violations of campus alcohol policies can lead to disciplinary action from the university. These and other alcohol-related legal infractions may be a sign of significant alcohol-related problems. However, few studies have focused on determining predictors of alcohol-related infractions among college students. Likewise, the role of infractions in reducing future use is unclear. The present study tested whether alcohol-related infractions were associated with decreased alcohol use, and whether the effect of the infraction varied as a function of initial drinking levels, sensitivity to punishment (SP), and sensitivity to reward (SR) in a 6-month prospective design. Alcohol use, grade point average, and SR were significantly associated with receiving an alcohol-related infraction. For heavier drinkers, receiving an infraction was associated with decreased drinking at follow-up, and this decrease was most pronounced among those with higher sensitivity to punishment. SP appeared to increase responsiveness to the infraction, resulting in greater attenuation of drinking at follow-up.

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Heavy episodic drinking is prevalent on college campuses (SAMHSA, 2010; Wechsler, Kuo, Lee, & Dowdall, 2000). Nearly 42% of college students have engaged in heavy episodic drinking in the last two weeks (Johnston, O'Malley, Bachman, & Schullenberg, 2005). High levels of use have been linked to a variety of negative consequences, including accidents and injuries (Shults, Elder, Hungerford, Strife, & Ryan, 2009), aggression and violence (Giancola, 2002; Marcus & Reio, 2002), risky sexual behavior (Cooper, 2002; Neal & Fromme, 2007), and declines in academic performance (Wood, Sher, & McGowan, 2000). Alcohol use and behaviors occurring while intoxicated comprise the most common source of university-administered disciplinary measures on campuses (Anderson & Gadaletto, 2001; Bergen-Cico, 2000).

Presumably, alcohol use is strongly associated with these violations, so that the students with the highest levels of use would be most likely to receive an alcohol-related infraction. However, only a few studies have investigated the relationship between level of alcohol use and likelihood of receiving an infraction. Fromme and Corbin (2004) showed that those receiving a campus violation drank at higher levels and had lower grade point averages than those who did not. In addition, La Brie and colleagues (2006) found that men receiving

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alcohol-related campus violations reported higher levels of alcohol use compared with men who had not. These results suggest that higher levels of use are related to the likelihood of an infraction.

Alcohol-related infractions can reduce drinking either via punishment, by serving as a signal to the individual that their alcohol use is problematic, or by being used as a method of referring affected individuals to treatment. Many college campuses have implemented mandatory interventions for students receiving alcohol infractions (Barnett & Read, 2005; Bergen-Cico, 2000), and several studies have suggested that such interventions are effective (Fromme & Corbin, 2004; Roberts, Neal, Kivlahan, Baer, & Marlatt, 2000; White, Mun, & Morgan, 2008). However, reductions in drinking may also be associated with the “incident” of receiving the infraction itself. Here, such “naturalistic change” based on critical incidents may reveal the extent to which “getting caught” itself contributes to reductions in alcohol use. Some evidence suggests that students may reduce drinking after receiving an infraction, but before receiving an intervention (Barnett, Goldstein, Murphy, Colby, & Monti, 2006; White, et al., 2008).

Previous research has indicated that, while controlling for alcohol use level, individuals with higher GPAs are less likely to receive an infraction (Barnett, et al., 2004). This indicates that receiving an infraction may be a function of not just absolute drinking level but other individual differences. Sensitivity to punishment and sensitivity to reward are two constructs that may also be associated with the likelihood of receiving an alcohol infraction and predict an individual’s response to an infraction. Sensitivity to punishment (SP) refers to an individual’s tendency to inhibit behavior when in the presence of potentially aversive or novel cues and to be sensitive to the threat of punishment or non-reward (Torrubia, Ávila, Molina, & Caseras, 2001). Thus, individuals who are highly sensitive to punishment should be quicker to extinguish behavior in the presence of punishment cues. Sensitivity to reward (SR) reflects an individual’s tendency to approach stimuli that are potentially rewarding (O’Connor, Colder, & Hawk, 2004; Torrubia, et al., 2001). Some evidence has suggested that those who are high in sensitivity to reward show a reduced ability to inhibit responses (Ávila, 2001). SP and SR are presumed to reflect two neurobiological systems that guide approach and avoidance behavior (Gray, 1987, 1990; McNaughton & Gray, 2000). As such, differences in SP and SR have been associated with trait anxiety and disinhibition, respectively (Carver & White, 1994; Gray, 1987).

Sensitivity to reward is positively associated with increased legal violations (Castella & Perez, 2004), alcohol use and problems (Franken & Muris, 2006; Jorm, et al., 1999; Loxton & Dawe, 2001; O’Connor, et al., 2004), problematic patterns of alcohol use (O’Connor & Colder, 2005), and an increased risk of developing an alcohol-use disorder (Johnson, Turner, & Iwata, 2003, 2004; Jorm, et al., 1999). Associations between SP and alcohol use have been less consistent, though some research indicates negative associations between SP and alcohol and other substance use and problems (Franken & Muris, 2006; Pardo, Aguilar, Molinuevo, & Torrubia, 2007; Simons & Arens, 2007; Simons, Dvorak, & Lau-Barraco, 2009). SP may be expected to moderate responses to an infraction, resulting in heightened efforts to stop the behavior that led to the punishment or negative consequence (Simons, Dvorak, et al., 2009).

This 6-month prospective study tested whether alcohol use, grade point average (GPA), SR, and SP were associated with the likelihood of receiving an alcohol-related infraction and whether alcohol-related infractions were associated with decreases in students’ future alcohol use. We hypothesized that (1) both alcohol use and SR would be positively associated with alcohol-related infractions, while (2) GPA would be negatively associated with infractions. Though a nonspecific indicator, GPA likely reflects characteristics such as

intelligence, self-control, and achievement motivation that may contribute to a decreased likelihood of receiving an infraction (Farsides & Woodfield, 2003). (3) Receiving an infraction was expected to attenuate the association between T1 and T2 drinking, resulting in lower drinking at T2 for heavier drinkers. Effects of an infraction for light drinkers were expected to be minimal as they were already drinking at low levels. Finally, (4) sensitivity to punishment was hypothesized to increase the effect of an infraction on subsequent drinking for heavier drinkers.

## Methods

### Participants

Participants were 2,270 college students. Participants were recruited through email, fliers, and newspaper advertisements for a study of emotions, personal goals, alcohol, and other risk behavior. All undergraduates were eligible for recruitment. Eighty-seven percent of participants returned for follow-up at 6-months, and 94% of these were successfully matched to their baseline data (for information on attrition, see Simons, Carey, & Wills, 2009). At T1, 88.2% ( $n = 2,004$ ) reported drinking alcohol in the past 6 months. The analytic sample includes 1,599 participants who had complete data and reported drinking on at least one occasion in the past 6 months at T1. However, some individuals reported consuming zero drinks during a *typical* week in the last six months, and as such, the range for the primary alcohol use variable includes “0.” The analytic sample ranged in age from 18–25 years ( $M = 19.61$ ,  $SD = 1.49$ ). Women comprised 65% of the sample. Ninety-six percent of the participants were White, 1% Black, 1% Asian, 1% Native American/Alaskan Native, and 2% were other or did not respond. Ninety-eight percent of the sample was non-Hispanic. Forty percent were first-year students, 22% were second-year, 16% were third-year, and 21% were fourth-year and beyond. Two articles have been published from this dataset (Simons, Carey, & Wills, 2009; Simons, Dvorak, & Batien, 2008).

### Procedure

Participants completed online questionnaires under the supervision of a research assistant with adequate space to ensure their privacy. The questionnaires took approximately 45 minutes to complete. Participants provided informed consent and the study was approved by the institutional review board. A unique code was generated by each participant during their completion of the baseline questionnaires, ensuring their anonymity. Participants received \$20 for completing the baseline assessment and \$30 for completing the 6-month follow-up assessment. The average time interval between assessments was 203 days ( $SD = 50.35$ ).

### Measures

**Demographics**—Participants’ age, gender, years of education, and grade point averages (GPAs) were assessed using single items. GPA from the T2 assessment was used, since some incoming freshmen at T1 did not yet have a GPA. In addition, GPA at T2 reflects a longer period of study and, hence, should be a more reliable estimate of academic performance.

*Alcohol consumption* was assessed using the Modified Daily Drinking Questionnaire (DDQ-M; Dimeff, Baer, Kivlahan, & Marlatt, 1999), and a frequency rating scale. On the DDQ-M, participants indicated the number of drinks on each day that were typical of their use over the last six months. Frequency of alcohol use in the past 6 months was assessed by a 9-point rating scale. Alcohol consumption was the number of drinks per week over the last six months.

*Alcohol-related infractions* were assessed by individual items indicating whether the following infractions had been received over the past six months: Minor in possession of alcohol (MIP), minor in consumption of alcohol (MIC), driving while intoxicated/driving under the influence (DUI), operating while under the influence (OWI), reckless driving (RD), and alcohol documentation (violation of university alcohol policies). Given the low base rates of each type of infraction, the infractions variable was dichotomized (no infraction = 0, infraction = 1).

*Sensitivity to reward/sensitivity to punishment* was assessed using the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ; Torrubia, et al., 2001). This measure consists of 48 dichotomous items. The factor solution used by O'Connor and colleagues (O'Connor, et al., 2004) was used in the current study. Thus, the Sensitivity to Reward scale consisted of 17 items ( $\alpha = .78$ ) and the Sensitivity to Punishment scale consisted of 18 items ( $\alpha = .85$ ). Previous research supports the validity of the scales (Torrubia, et al., 2001).

## Results

### Descriptive statistics

Participants reported drinking approximately 14.96 ( $SD = 13.61$ ) drinks per week at Time 1 (T1) and approximately 14.35 ( $SD = 13.28$ ) drinks per week at Time 2 (T2). At T1, 230 participants (14.38% of the analysis sample) reported receiving an alcohol-related infraction in the past six months, and 67 of these (4.19% of the sample) received two infractions. 145 participants received MICs at T1 (9.07% of the sample), 78 received alcohol documentations (4.88%), 58 received MIPs (3.63%), 21 received DUIs (1.31%), 7 received OWIs (0.44%), and 7 received RD citations (0.44%). Likewise, at T2, 242 participants (15.13% of the analysis sample) reported receiving an alcohol-related infraction in the past six months, and 74 of these (4.63% of the sample) received two infractions during the assessment period. Ninety-four participants (5.88% of the analysis sample) reported receiving an infraction at both T1 and T2. Relative to those individuals not receiving an infraction, those participants receiving an infraction at T1 drank more frequently at T1 ( $M = 3.76$ ,  $SD = 0.96$  vs.  $M = 3.08$ ,  $SD = 1.22$ ;  $t(1597) = 8.12$ ,  $p < .001$ , Cohen's  $d = 0.56$ ) and consumed more drinks per week at T1 ( $M = 23.44$ ,  $SD = 16.93$  vs.  $M = 13.58$ ,  $SD = 12.42$ ;  $t(1597) = 10.56$ ,  $p < .001$ , Cohen's  $d = 0.72$ ). Those receiving infractions at T1 were also younger ( $M = 19.40$ ,  $SD = 1.10$  vs.  $M = 19.64$ ,  $SD = 1.55$ ,  $t(1597) = -2.99$ ,  $p < .002$ , Cohen's  $d = -0.16$ ), had lower grade point averages (GPAs;  $M = 3.03$ ,  $SD = 0.56$  vs.  $M = 3.17$ ,  $SD = 0.53$ ,  $t(1597) = -3.81$ ,  $p < .001$ , Cohen's  $d = -0.26$ ), had higher sensitivity to reward ( $M = 9.69$ ,  $SD = 3.43$  vs.  $M = 8.56$ ,  $SD = 3.69$ ;  $t(1597) = 4.33$ ,  $p < .001$ , Cohen's  $d = 0.31$ ), and lower sensitivity to punishment ( $M = 8.03$ ,  $SD = 4.48$  vs.  $M = 8.89$ ,  $SD = 4.50$ ;  $t(1597) = 2.71$ ,  $p = .006$ , Cohen's  $d = -0.19$ ). Males were more likely to receive an infraction at T1 than females (29.98% vs. 20.25%;  $\chi^2(1, n = 1,599) = 17.39$ ,  $p < .001$ ). Descriptive statistics are in Table 1.

### Cross-sectional analyses – Time 1 infractions

Associations between alcohol infractions at T1 and the predictors were examined using logistic regression. T1 infractions were regressed on gender, T1 alcohol consumption, GPA, sensitivity to reward, and sensitivity to punishment,  $\chi^2(5, N = 1,599) = 97.30$ ,  $p < .001$ , Cragg-Uhler  $R^2 = .11$ . Both alcohol use ( $OR = 1.04$ ,  $p < .001$ ) and sensitivity to reward ( $OR = 1.05$ ,  $p = .031$ ) were positively associated with receiving an infraction at Time 1. GPA ( $OR = 0.73$ ,  $p = .043$ ) was negatively associated with infractions. See Table 2.

## Regression analyses – Time 2 alcohol consumption

Associations between alcohol consumption at T2, the predictors, and hypothesized interactions were examined with a zero-inflated negative binomial (ZINB) model, which is suitable for models using count variables as outcomes that are non-normal and have an excessive number of zeros. Variables were centered at their mean prior to analysis (Aiken & West, 1991). A Vuong test (Vuong, 1989) indicated that a ZINB model was a better fit to the data than a negative binomial model ( $z = 5.92, p < .001$ ). In the count portion of the model, T2 alcohol consumption was regressed on gender, GPA, SP, SR, T1 infraction, and T1 alcohol consumption. The model included 2-way and 3-way interactions between SP, T1 alcohol consumption, and T1 infractions and comparable 2- and 3- way interactions between SR, T1 alcohol consumption, and T1 infractions. The full,  $\chi^2(20, N = 1,599) = 1,119.95, p < .001$ , Cragg-Uhler  $R^2 = .50$ , as well as the count portion of the model were significant,  $\chi^2(13, N = 1,491) = 889.89, p < .001$ . In the count model, the hypothesized 3-way SP×T1 alcohol consumption×T1 infraction interaction was significant ( $b = -0.01, p = .018$ ), as was the 2-way SR×T1 alcohol consumption interaction ( $b = -0.01, p < .001$ ). The form of the 3-way interaction was consistent with hypothesis. That is, for heavier drinkers at T1, receiving an infraction at T1 was associated with decreased alcohol consumption at T2. This effect was strongest among individuals high in SP. Individuals who were high in SP and received an alcohol infraction at T1 drank the least at T2 and individuals low in SP who did not receive an infraction drank the most at follow-up. Among individuals who did not receive an infraction at T1, SP exhibited little association with T2 drinking. However, for heavier drinkers receiving an infraction, there was a marked inverse association between T2 drinking and SP (see Figure 1). For example, an individual drinking 35.38 drinks per week at T1 (i.e.,  $M + 1.5 SD$ ) who received an infraction is predicted to drink 28.25 vs. 23.23 drinks per week as a function of SP ( $-/+ 1 SD$ , respectively), whereas in the absence of an infraction the prediction is 28.90 vs. 27.40 drinks per week as a function of SP ( $-/+ 1 SD$ , respectively). The form of the SR×T1 alcohol consumption is puzzling. SR was associated with a decreased association between T1 and T2 alcohol consumption. This finding is unexpected, given that SR represents an individual's tendency to approach stimuli that may be potentially rewarding (O'Connor, et al., 2004; Torrubia, et al., 2001). We examined whether this may be due to a suppression effect, however, we found that the relationship held at the most basic levels of the model. Perhaps SR, given its association with disinhibition, is associated with less consistency in behavior over time. The zero-inflated portion of the model was significant,  $\chi^2(6) = 129.47, p < .001$ . In the zero-inflated portion of the model, T1 alcohol consumption decreased the likelihood of being in the zero alcohol use group at Time 2 ( $b = -0.63, p < .001$ ). See Table 3.

## Discussion

This study examined factors associated with the likelihood of receiving an alcohol infraction and moderators of the association between receiving an infraction and subsequent drinking. Those using alcohol at higher levels and those high in SR were more likely to have received an alcohol infraction, while those with higher GPAs were less likely to have received an infraction. Among heavier drinkers at baseline, receiving an infraction was associated with lower drinking at follow-up, and this effect was most pronounced among those with high SP.

### Likelihood of infractions at Time 1

Higher levels of alcohol use increased the likelihood of receiving an alcohol-related infraction. Thus, the receipt of an alcohol infraction may provide important information about alcohol-related risk and need for additional screening and/or intervention. Controlling for alcohol consumption, GPA was inversely, and SR positively associated with the



likelihood of receiving an infraction. The association between GPA and alcohol infractions is consistent with previous research (Fromme & Corbin, 2004). The behavior, manner of drinking, or environmental context of individuals high in SR may place them at increased risk for receiving an infraction.

## Alcohol consumption at Time 2

For light drinkers at baseline, receipt of an alcohol-related infraction had little impact on future drinking. These individuals are already drinking at low levels and receipt of an infraction may not serve as a signal to the individual that behavior change is needed. However, among heavier baseline drinkers, the receipt of an infraction was associated with less alcohol consumption at follow-up. This is consistent with previous findings suggesting that many individuals report the intention to change their behavior after receiving an alcohol-related infraction (Barnett, et al., 2006). SP moderated this effect, such that the association between T1 and T2 drinking was attenuated the most among heavier drinkers receiving an infraction at T1 who were high in SP. Whether observed differences in T2 behavior are a reflection of the infraction itself, associated negative consequences, or receipt of subsequent alcohol assessment, education, or intervention cannot be determined by the data. Regardless, the infraction at T1 is an event marker that is associated with lower levels of drinking at follow-up for some individuals. SP appeared to moderate this effect, such that the most pronounced reductions in drinking were observed among those who were high in SP. Though the analysis does not examine “reductions” in drinking per se, among heavier drinkers, the receipt of an infraction, combined with high levels of SP, is associated with lower levels of drinking at T2 relative to comparable drinkers at baseline who did not receive an infraction or who exhibited lower levels of SP.

Several limitations should be noted. First, alcohol-related infractions of varying severity were grouped together due to low base rates. As such, university violations (e.g., alcohol documentation) and legal infractions (e.g., driving under the influence) were analyzed together. Second, T1 infractions and T1 alcohol use were assessed concurrently, and so, typical alcohol consumption at baseline could reflect use following an infraction early in the T1 assessment period. However, the ambiguity in the timing of the T1 alcohol consumption and infraction assessments would be expected to weaken the hypothesized associations. The design does not permit a close examination of changes in drinking following an infraction and thus may underestimate the effect of infractions. Third, information on alcohol-related infractions was collected via self-report, and as such, may be inaccurate or under-reported. Fourth, the absence of an association between T1 infractions and T2 alcohol use among lighter drinkers may represent a “floor effect.” That is, T1 infractions, as well as SP, may also be negatively associated with T2 use among lighter drinkers as well, but this relationship is difficult to observe, given that these individuals were already drinking at low levels. Fifth, the consequences for infractions (e.g., fine, community service, mandatory treatment) is unknown as the university evaluates each case on an individual basis.

In summary, results from the study indicate that drinking at higher levels, SR, and GPA are associated with receiving an alcohol-related infraction, and that receipt of these infractions combined with high SP, was associated with lower levels of alcohol use at follow-up. Receiving an alcohol-related infraction may contribute to the substantial number of college students who engage in problem drinking to “spontaneously” begin to moderate their drinking (Sobell, Sobell, Toneatto, & Leo, 1993; Steinman, 2003). Individual differences may play an important role in both the likelihood of incurring negative alcohol-related consequences as well as determining the extent to which these negative experiences contribute to reductions in alcohol use. The pattern of associations supports current theory on SP/SR. That is, the tendency of individuals high in SR to approach novel and rewarding stimuli may explain both the higher levels of use and their higher probability of receiving an

alcohol-related infraction. In contrast, SP was specifically associated with the likelihood of responding to alcohol-related infractions by inhibiting or attenuating alcohol use behavior. Whereas infractions may promote positive behavioral change in individuals with high SP, interventions that emphasize alternative reinforcers and goals incompatible with heavy drinking may be beneficial for individuals high in SR. Future research should focus on identifying other such experiences that may contribute to the “naturalistic change” observed in young adults during the college experience, as well as other relevant individual differences that may moderate this process.

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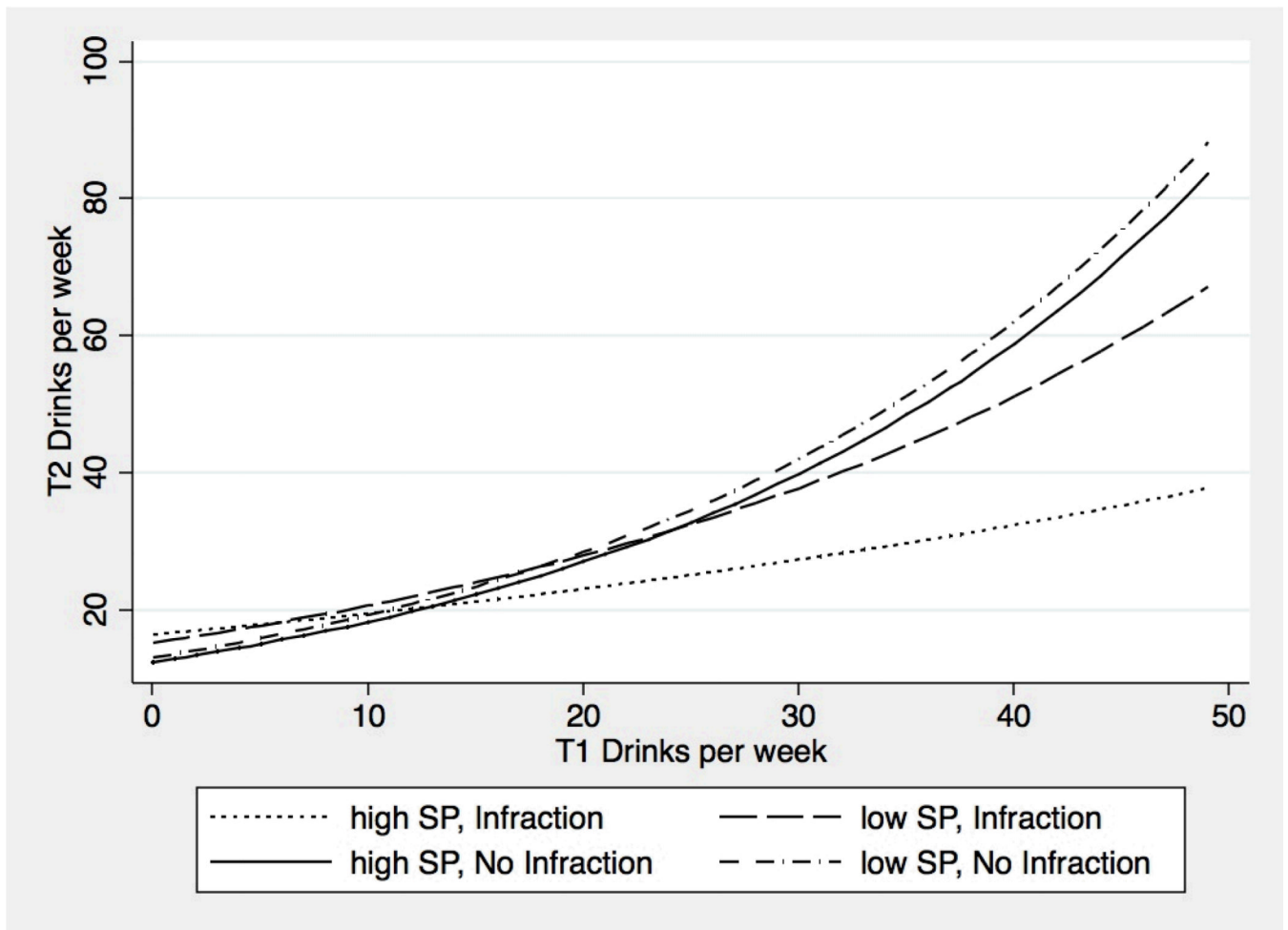
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**Figure 1.**

Zero-inflated negative binomial model ( $N = 1,599$ ). Association between alcohol use at Time 1 and alcohol use at Time 2 as a function of sensitivity to punishment (SP) and receipt of an alcohol-related infraction at Time 1. T1 alcohol use ( $M = 14.96$ ,  $SD = 13.61$ ), T2 alcohol use ( $M = 14.35$ ,  $SD = 13.27$ ), and SP ( $M = 8.77$ ,  $SD = 4.50$ ) are centered at the mean.

Table 1

## Descriptive Statistics

Variables	Range	Mean	SD	1	2	3	4	5	6
1. Gender	0 – 1	0.35	0.48						
2. Alcohol-related infractions at Time 1	0 – 1	0.14	0.35	0.10*					
3. Grade point average at Time 2	0.8 – 4	3.15	0.54	-0.09*	-0.09*				
4. Sensitivity to reward	0 – 17	8.72	3.67	0.22*	0.11*	-0.02			
5. Sensitivity to punishment	0 – 18	8.77	4.50	-0.17*	-0.07*	0.03	0.05		
6. Alcohol use (drinks per week) at Time 1	0 – 100	14.96	13.61	0.34*	0.26*	-0.21*	0.27*	-0.15*	
7. Alcohol use (drinks per week) at Time 2	0 – 121	14.35	13.28	0.37*	0.25*	-0.15*	0.24*	-0.14*	0.69*

Note. Gender was coded 1= male, 0=female. Alcohol-related infractions is coded 1 = infraction, 0 = no infraction.

\*  $p < .01$ .

**Table 2**

Logistic Regression of Alcohol-Related Infractions (N = 1,599)

Variable	Odds ratio	SE	P
Gender	1.06	0.17	.724
Alcohol use (drinks per week) at Time 1	1.04	0.01	<.001
GPA	0.76	0.10	.043
Sensitivity to punishment	0.98	0.02	.157
Sensitivity to reward	1.05	0.02	.031

Note.  $\chi^2(5, N = 1,599) = 97.30, p < .001$ , Cragg-Uhler  $R^2 = .11$ . Gender is coded 1 = male, 0 = female.

**Table 3**

Zero-Inflated Negative Binomial Regression of Alcohol Use at Time 2 (N = 1,599)

Model and variable	Coefficient	SE	P
Count			
Alcohol-related infraction at Time 1 (Infraction)	0.22	0.05	<.001
Gender	0.23	0.04	<.001
Alcohol use (drinks per week) at Time 1	0.39	0.00	<.001
GPA	-0.06	0.03	.059
Sensitivity to punishment (SP)	-0.01	0.00	.147
Sensitivity to reward (SR)	0.02	0.01	<.001
Infraction x T1 alcohol use	-0.02	0.00	<.001
T1 alcohol use x SP	0.01	0.01	.003
Infraction x SP	0.01	0.00	.207
T1 alcohol use x Infraction x SP	-0.01	0.00	.039
T1 alcohol use x SR	-0.00	0.00	<.001
Infraction x SR	-0.11	0.01	.460
T1 alcohol use x Infraction x SR	0.00	0.00	.189
Zero-inflated			
Alcohol-related infraction at Time 1	-0.97	1.22	.425
Gender	0.27	0.36	.453
Alcohol use (drinks per week) at Time 1	-0.63	0.13	<.001
GPA	-0.30	0.28	.289
Sensitivity to punishment	0.04	0.03	.174
Sensitivity to reward	-0.04	0.04	.411

Note.  $\chi^2(20, N = 1,599) = 1,119.95, p < .001$ , Cragg-Uhler  $R^2 = .50$ . Gender is coded 1 = male, 0 = female. Alcohol-related infractions is coded 1 = infraction, 0 = no infraction.