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A Diary Study of Implicit Self-esteem, Interpersonal Interactions and Alcohol Consumption in College Students

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Abstract

A 30-day daily diary study examined the relations among implicit self-esteem, interpersonal interactions, and alcohol consumption in college students. Multilevel analyses revealed that students with low implicit self-esteem drank more on days when they experienced more negative interpersonal interactions. In contrast, students with high implicit self-esteem drank more on days when they experienced more positive interpersonal interactions. Spending time with people who were drinking mediated both the low implicit self-esteem by negative interpersonal events interaction and the high implicit self-esteem by positive interpersonal events interaction. These findings suggest that people with low implicit self-esteem may unintentionally drink as a way to regulate unfulfilled needs for acceptance. On the other hand, people with high implicit self-esteem may drink as a way to enhance positive interpersonal experiences.

Keywords

implicit self-esteem; interpersonal interactions; feelings of acceptance; alcohol consumption

Many college students consume alcohol at levels that are typically associated with unhealthy physical and social functioning. The negative consequences of college binge drinking include school difficulties, injuries, unplanned and unprotected sex, arguments with friends, property damage, and driving under the influence of alcohol (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). Therefore, it is important to understand the factors that predict situations in which college students are more likely to engage in alcohol consumption.

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Understanding the situations or interactions that lead to increased drinking may help inform interventions that help target college students at risk for problematic drinking.

The need to belong and feel accepted is one of the most fundamental human motivations (Baumeister & Leary, 1995). Therefore, it is no surprise that people's interactions with their relationship partners play an important role in psychological and physical well-being. In fact, people seek out others following both negative and positive experiences (Langston, 1994; Maner, Dewall, Baumeister, & Schaller, 2007; Picket & Gardner, 2005). Thus, in an environment where a great deal of socializing involves drinking, both positive and negative interpersonal experiences may be associated with increased drinking for some college students.

Self-esteem and Interpersonal Interactions

One reason that interpersonal stressors may play a role in alcohol consumption is because these types of interactions pose a threat to the self and are related to how accepted people feel (Leary, Tambor, Terdal, & Downs, 1995; Murray, Holmes, & Griffin, 2000). In addition, feelings of rejection actually motivate people to seek positive social reconnection (e.g., Maner et al., 2007). However, different situations may elicit feelings of rejection for people with low versus high self-esteem. For example, the sociometer theory of self-esteem suggests that people with low self-esteem have repeatedly perceived interpersonal rejection. Conversely, most people with high self-esteem have experienced many subjectively successful or non-rejecting interpersonal interactions. As a result of these different types of experiences, people with high and low self-esteem differ in how they respond to potential threats of rejection (e.g., Leary et al., 1995; Vohs & Heatherton, 2001). For example, in response to perceived rejection, people with high self-esteem continue to feel accepted, whereas people with low self-esteem feel unaccepted. Consistent with this idea, research has demonstrated that in response to perceived rejection, people with low self-esteem seek interpersonal acceptance from others, presumably as a way to assuage feeling unaccepted (Vohs & Heatherton, 2001).

In contrast, positive interpersonal experiences are likely related to alcohol consumption because people tend to seek others to share their good fortune (Gable, Reis, Impett, & Asher, 2004). In fact, people who share positive events with others capitalize on their initial positive experiences, which increase the positive impact of the event (Langston, 1994). This is consistent with the idea that seeking others in response to positive events allows people to savor these experiences (Bryant, 1989). In addition, there is research suggesting that people with high and low self-esteem differ in how they savor positive affect (Bryant, 2003; Wood, Heimpel, & Michela, 2003). For example, Wood et al. found that participants with high self-esteem were more likely to savor their positive moods, whereas participants with low self-esteem were more likely to dampen their positive moods (i.e., calm themselves down or distract themselves). Therefore, people with high self-esteem may be more likely than their low esteem counterparts to seek others in response to positive events as a way to savor their positive experiences.

Drinking and Interpersonal Interactions

Motivational models of alcohol consumption posit that people drink for two distinct reasons: to regulate negative experiences (i.e., tension reduction) as well as to enhance positive experiences (Cooper, Frone, Russell & Mudar, 1995). Although people drink in response to both negative and positive events, according to Cooper et al. these different types of events represent different motivations for drinking, with distinct consequences. For example, drinking to cope with negative experiences (or emotions) is associated with the relative absence of other more adaptive coping skills and problematic drinking (Cooper, Russell, & George, 1988). On the other hand, drinking to enhance positive experiences is not associated with deficient coping skills or problematic drinking. In sum, coping motives directly predict drinking problems over

and above levels of alcohol consumption, whereas enhancement motives predict drinking problems only indirectly, through consumption levels.

One type of negative experience that appears to play an important role in alcohol consumption is negative interpersonal interactions (DeHart, Tennen, Armeli, Todd, & Affleck, 2008; Epstein & McCrady, 1998; Hussong, Hicks, Levy, & Curran, 2001; Marlatt, 1996; Mohr, Armeli, Tennen, Carney, Affleck, & Hromi, 2001; Mohr et al., 2005). In fact, previous research suggests that on days people experience more negative interpersonal experiences, they are more likely to drink alone. For example, Mohr et al. (2001) found that on days when people experienced more negative interpersonal interactions they drank more when they were alone compared with when they were in social settings. In addition, Mohr et al. (2005) found that on days when college students reported more negative interpersonal interactions they drank more at home when they spent less time with friends at home. These findings suggest that negative interpersonal experiences result in increased drinking alone (or less time drinking with friends). However, this research did not examine whether self-esteem moderated the relation between negative interpersonal experiences and alcohol consumption.

Positive interpersonal experiences also play an important role in alcohol consumption (e.g., DeHart et al., 2008; Mohr et al., 2001; 2005). As mentioned above, people also drink as a way to enhance positive experiences (Cooper et al., 1995). In contrast to negative interpersonal interactions, Mohr et al. (2001) found that on days when people experienced more positive interpersonal interactions they drank more in social settings (compared to alone). In addition, Mohr et al. (2005) found that on days when college students reported more positive interpersonal interactions they drank more away from home (presumably with others) and drank more at home when they spent more time with friends at home. However, this research did not examine whether self-esteem moderated the relation between positive interpersonal experiences and alcohol consumption.

Self-esteem and Drinking

Evidence suggests that low explicit self-esteem and an anxious-ambivalent attachment style (i.e., negative model of self) are associated with increased alcohol use (Brennan & Shaver, 1995; Cooper, Shaver, & Collins, 1998; McNally, Palfai, Levine & Moore, 2002). Consistent with this idea, DeHart et al. (2008) found that in a community sample of moderate drinkers, people with low explicit self-esteem drank more on days when they experienced more negative relationship interactions with their romantic partners. However, people with high explicit self-esteem showed no such effect. In addition, for participants with low explicit self-esteem, daily increases in state self-esteem buffered them from the desire to drink in response to negative interactions with their partners. These findings suggest that people with low explicit self-esteem may drink in response to feeling unaccepted.

Most of the research on self-esteem has focused on people's explicit (consciously considered and relatively controlled) self-evaluations. However, over the past few years a growing body of literature has focused on implicit (unconscious, over learned and automatic) self-esteem (e.g., Baccus, Baldwin, & Packer, 2004; Dijksterhuis, 2004; Koole, Dijksterhuis, & van Knippenberg, 2001; Shimizu & Pelham, 2004). Theory and research suggests that people's explicit and implicit beliefs about the self both develop based on their interactions with significant others (Bowlby, 1982; DeHart et al., 2006). For example, DeHart et al. (2006) found that mothers and adult children's reports of nurturance were positively (and independently) related to children's implicit and explicit self-esteem. However, reports of maternal overprotectiveness were negatively related only to children's implicit self-esteem.

Although both implicit and explicit self-esteem are formed based on interactions with significant others, the relation between people's explicit and implicit self-esteem is small at

best (e.g., Bosson, Swann, & Pennebaker, 2000; Hetts, Sakuma, & Pelham, 1999). Presumably, this has to do with differences in the nature of people's implicit and explicit beliefs (see DeHart et al., 2006 for a more detailed explanation; Epstein, 1994). People's implicit beliefs about the self are believed to develop earlier than their explicit beliefs, implicit self-esteem appears to change much more slowly compared with explicit self-esteem (Hetts et al., 1999), and the desire to see the self favorable may cause people to reinterpret negative social experiences on an explicit level, although leaving a clear mark on people's implicit self-esteem. Therefore, people's implicit (as well as their explicit) beliefs about the self may play an important role in interpersonal interactions.

Consistent with this idea, there are several lines of research suggesting that people's implicit beliefs about the self (independent of their explicit beliefs) may be related to alcohol consumption. First, the sociometer theory of self-esteem suggests that to successfully monitor one's connection to other people, the interpersonal monitoring system must function preconsciously and must motivate behavior to restore acceptance when threatened (Leary et al., 1995). In addition, there is research suggesting that people's implicit self-esteem plays an important role in self-regulation in response to negative events (e.g., DeHart & Pelham, 2007; Jones, Pelham, Mirenberg, & Hetts, 2002). It seems reasonable to assume that implicit self-esteem may also play a role in self-regulation in response to positive events. Moreover, research on alcohol expectancies suggests that people's implicit expectancies (independent of their explicit expectancies) of the effects of alcohol are associated with alcohol consumption (e.g., Stacy, 1997; Wiers, van Woerden, Smulders, & de Jong, 2002). Furthermore, a lab study found that participants with low implicit self-esteem drank more in response to a self-threat compared with people with high implicit self-esteem (McGregor, 2005). Therefore, given the interpersonal origin and functions of both explicit and implicit self-esteem, both people's implicit and explicit beliefs about the self may (independently) predict alcohol consumption in response to interpersonal interactions.

Summary of the Hypotheses

Based on previous research on self-esteem (e.g., Leary et al., 1995; Wood et al., 2003) and motivational models of drinking (e.g., Cooper et al., 1995) we generated two hypotheses (for both explicit and implicit self-esteem):

Hypothesis 1a

We predicted that people with low self-esteem would drink more in the evening on days when they experienced more (versus fewer) negative interpersonal interactions. We also assessed participants' daily intent to drink alcohol that evening because school and social constraints may at times interfere with drinking in response to negative interpersonal interactions (Armeli, Carney, Tennen, Affleck, & O'Neil, 2000).

Hypothesis 1b

Next, we predicted that people with low self-esteem would report spending more time interacting with friends and an increased probability of spending time with others who were drinking that evening on days they experienced more negative interpersonal interactions.

Hypothesis 1c

Finally, we predicted that being with others who were drinking would mediate the Self-esteem \times Negative Interpersonal Events interaction predicting alcohol consumption. Specifically, people with low self-esteem would drink more in the evening on days when they experienced more negative interpersonal interactions because they were more likely to be with people who were drinking.

Hypothesis 2a

We predicted that people with high self-esteem would drink more in the evening on days when they experienced more (versus fewer) positive interpersonal interactions. We also predicted that people with high self-esteem would report an increased intent to drink alcohol that evening. Hypothesis 2b: Next, we predicted that people with high explicit self-esteem would report spending more time interacting with friends, and an increased probability of spending time with others who were drinking that evening on days they experienced more positive interpersonal interactions.

Hypothesis 2c

Finally, we predicted that being with others who were drinking would mediate the Self-esteem × Positive Interpersonal Events interaction predicting alcohol consumption. Specifically, people with high self-esteem would drink more in the evenings on days when they experienced more positive interpersonal interactions because they were more likely to be with people who were drinking.

Method

Participants

Participants were 575 undergraduate students at a large northeastern university. Approximately 60% participated in the fall semester and 40% participated the following spring semester. We excluded data from 5 participants who did not complete the initial background questionnaire and 65 students who did not complete at least 15 daily surveys. The final sample of 505 students (265 female, 240 male) completed an average of 25.15 days (SD = 3.88) of the 30-day diary study. Participants completed the diary study on 12,702 days of the potential 15,150 (505 participants \times 30 days) reporting days (84%). The students' mean age was 18.8 years old (SD = 1.11), they were predominantly European American (86%), mostly living in coed dorms (88%), and one participant was married. The sample was made up of mostly freshmen (56%) and sophomores (34%). Participants received partial course credit and monetary compensation for participating. In addition, participants who completed 25 days or more of the daily surveys were entered into a lottery to receive a monetary prize.

Overview of Procedure

Participants were recruited to take part in a web-based Study of College Student Daily Life. At the beginning of the study, participants completed an online survey consisting of several background measures including implicit self-esteem and explicit self-esteem. Then, every day for 30 days, participants logged onto a secure (password protected) website to access the daily diary portion of the study to record how much alcohol they consumed the previous evening, whether they were with others who were drinking the previous evening, time spent interacting with others the previous evening, interpersonal interactions that occurred today, and their intent to drink alcohol that evening. Participants were allowed access to the website between 2:30 p.m. and 7:00 p.m. These times were selected so that students were completing the surveys between the end of their classes and before their evening's social activities. Participants were unable to log onto the website at other times unless they received a special password from study personnel that allowed them access from noon until 9:00 p.m. on a specific day.

¹The college students who were included in the analyses did not differ significantly from the students who were excluded from the analyses on the measures of implicit or explicit self-esteem.

Background Measures

Explicit self-esteem—We used Rosenberg's (1965) 10-item self-esteem scale that taps global self-evaluations (e.g., "I feel that I have a number of good qualities"). Participants responded using a 7-point scale (1 = strongly disagree, 7 = strongly agree). Negative items were reverse-scored, such that higher scores indicated higher self-esteem (= .91).

Implicit Self-esteem—Our measure of implicit self-esteem was based on research on the name-letter effect (Kitayama & Karasawa, 1997; Nuttin, 1987). Specifically, participants' implicit evaluation of their first and last initials was assessed by asking them to rate their preferences for all of the letters of the alphabet. Participants were instructed to "trust your intuitions, work quickly, and report your gut impressions" (emphasis in original). Participants reported their liking for every letter of the alphabet using a 9-point scale (1 = dislike very much, 9 = like very much). We computed a liking score that was the difference between each participant's rating of his or her first and last name initials and the mean liking for these two letters provided by people whose names did not include that letter (thus, more positive numbers would indicate higher name-letter preferences). Participants' name-letter preferences were computed by taking the average liking scores for their first and last name initials (for detailed information on scoring name-letter measures see Koole et al., 2001). This two-item indicator showed acceptable internal consistency (= .60). Previous research has found that name-letter preferences demonstrated good temporal stability over a 4–6 week period (Bosson et al., 2000; DeHart et al., 2006; Koole et al., 2001). Finally, previous research suggests that nameletter preferences are a valid indicator of self-esteem (see Koole & DeHart, 2007 for a review). Specifically, name-letter preferences have been linked to early childhood experiences (DeHart et al., 2006), reflect automatic self-evaluations (Koole et al., 2001), are conditioned by pairing self-related words with positively valenced words (Baccus et al., 2004; Dijksterhuis, 2004), fluctuate in response to daily negative events (DeHart & Pelham, 2007), are related to selfevaluation and not just mere exposure effects (Jones et al., 2002) and are related to physical health (Shimizu & Pelham, 2004).

Repeated Diary Measures

Alcohol Consumption—Participants reported the number of standard alcoholic drinks they consumed the previous evening (drinks they consumed after they completed the previous day's diary survey). They were instructed that "one drink equals one 12-oz. can or bottle of beer, one 4-oz. glass of wine, one 12-oz. wine cooler, or 1-oz. of liquor straight or in a mixed drink."

Daily interpersonal events—Each day participants completed a daily event checklist containing events that occur frequently in the lives of college students (adapted from Gable, Reis, & Elliot, 2000; Nezlek & Plesko, 2001). They were instructed to check any events that occurred that day and rated how desirable or undesirable the event was on a 7-point scale (1 = extremely undesirable, 7 = extremely desirable). We categorized 3 events as interpersonal ("Had a disagreement or conflict with friend(s), boyfriend/girlfriend, or family," "Sent or received a letter/e-mail/phone call from a friend, boyfriend/girlfriend, or family" and "Had an especially good interaction with friend(s), boyfriend/girlfriend, or family"). Negative interpersonal events were those events rated as 1, 2, or 3 and positive interpersonal events were those events rated as 5, 6, or 7. Positive interpersonal events were recoded so that slightly desirable was rated 1 and extremely desirable was rated 3. We computed positive and negative interpersonal events by separately summing the ratings for each event for each day and then we averaged the items.

With others drinking—Participants reported whether they were with other people who were drinking last night. This single item ("Were you with other people who were drinking last night") was assessed using a Yes/No response.

Time spent interacting with others—Participants were asked to report how many hours they spent interacting with friends or acquaintances last night. This was assessed using a scale ranging from 0 to 12, and greater than 12 (coded as 13).

Daily intent to drink—Participants reported their intent to drink alcohol that evening. This single item ("Do you intend to drink alcohol tonight") was assessed using a 7-point scale (1 = not at all, 7 = definitely).

Results

Descriptive Statistics

Participants drank an average of 1.2 (SD = 1.34) standard drinks per evening across the 30 days. They consumed at least one alcoholic beverage on 18.8% of the evenings, and on evenings they drank participants consumed an average of 5.92 (SD = 4.00) standard drinks (the scores ranged from 1 - 16 drink per drinking evening, Md = 5). Not surprisingly, students drank more on weekend days (M = 6.54, SD = 4.02) than they did during the week (M = 5.12, SD = 3.82).

Table 1 contains the descriptive statistics and the correlations for the between-person and aggregate (average level across the 30 days) daily variables. Women reported more daily positive interpersonal events, a lower average intent to drink that evening, a lower average drinking level, and were less likely to be with others drinking compared with men. Implicit self-esteem was weakly correlated with explicit self-esteem (r = .21), which is consistent with previous research (e.g., Bosson et al., 2000; DeHart et al., 2006). Participants with higher implicit self-esteem reported more positive interpersonal events and reported spending more time with friends. Individuals with higher explicit self-esteem reported fewer negative interpersonal events and more positive interpersonal events on average. Participants who reported more negative interpersonal events reported fewer positive interpersonal events, and those who reported more positive interpersonal events on average reported spending more time interacting with friends. Daily reports of intent to drink that evening were positively correlated with nightly alcohol consumption, being with others who were drinking, and time spent interacting with friends. Nightly alcohol consumption was positively correlated with being with others who were drinking and time spent interacting with friends. Finally, being with others who were drinking was positively associated with time spent interacting with friends.

Multilevel Regression Analyses

We conducted multilevel regression analyses using PROC MIXED within SAS v9.0 (SAS Institute, 2002). Multilevel regression models allow for the independent estimation of within-person and between-person effects (Kenny, Bolger, & Kashy, 1998; Nezlek, 2001). Our daily diary design contains two levels of data in which the repeated assessments of drinking, interpersonal interactions, drinking with others, time spent with others, and drinking intentions (Level 1) are nested within participants (Level 2). Specifically, we examined the within-person intercept and slope coefficients between negative and positive interpersonal interactions and alcohol consumption (Level 1). In addition, we can predict variability in the within-person intercepts and slopes from Level 2 predictors (e.g., implicit self-esteem and explicit self-esteem). For example, our hypothesis that people with high and low self-esteem (a Level 2 variable) differ in how much they drink in response to negative interpersonal interactions (Level 1 variables) postulates a cross-level interaction.

Do people with high and low self-esteem differ in how much they drink in response to negative interpersonal interactions? To test this hypothesis, alcohol consumption was predicted from equation 1:

 $\begin{aligned} & \text{Drink}_{ij} = _{00} +_{10} (\text{negative interpersonal interactions}) +_{20} (\text{positive interpersonal interactions}) +_{01} (\text{implicit self-esteem}) +_{02} (\text{explicit self-esteem}) +_{11} (\text{implicit self-esteem}) \times \text{negative interpersonal interactions}) +_{12} (\text{explicit self-esteem} \times \text{negative interpersonal interactions}) +_{0i} +_{0i}$

(1)

Where $\operatorname{Drink}_{ij}$ refers to participant j's alcohol consumption on day i, 00 refers to that participants average alcohol consumption across the 30 days (adjusted for predictors in the model), and the terms 10 and 20 in the first row of the equation represent the within person effects of daily negative and positive interpersonal interactions on daily drinking, respectively. Daily-level negative and positive interpersonal event scores were person mean-centered (i.e., centered around each participant's average event rating across the 30 days) to eliminate the effects of individual differences in the reporting of events. Therefore, a participant's coefficients for daily events describe the relation between increases or decreases from that person's average event scores and increases or decreases from that person's average level of drinking. The terms 01 and 02 in the second row of the equation refers to the effects of the person-level variables implicit and explicit self-esteem on person j's average level of drinking. Person-level predictors were grand-mean centered (i.e., centered around the sample average). The terms 01 in the equation refer to the coefficients for the cross-level Implicit Self-esteem \times Negative Relationship Events interactions.

Because we were primarily interested in the association between drinking and interpersonal events and how these associations varied as a function of person-level variables (i.e., self-esteem), we modeled the Level 1 interpersonal event slopes as random effects in our models. We followed Snijders and Bosker's (1999) advice for fitting parsimonious models and estimated the covariates as fixed effects. In addition, there was a significant decrease in alcohol consumption over the course of the study that we controlled for in all of our drinking analyses.

In our repeated measurements design, observations that are closer in time to one another may be more highly correlated than observations that are farther apart in time (West & Hepworth, 1991). This may result in autocorrelations among observations. We compared the fit of models specifying AR(1), compound symmetry (CS), and unstructured patterns of dependency among the Level 1 residuals predicting drinking. The AR(1) and CS structures did not significantly increase model fit, so we used the more parsimonious unstructured covariance structure in the models reported here. Because we were predicting evening drinking (which was reported the next day) from events that occurred during the day, participants had to have consecutive days of data—skipping one day resulted in losing two days of data for these analyses.

Negative Interpersonal Interactions and Drinking

We examined whether self-esteem (both implicit and explicit) moderated the strength of the within-person association between daytime negative interpersonal interactions and evening alcohol consumption. The results are presented in Table 2. Participants' implicit and explicit self-esteem were unrelated to their average level of drinking. In addition, neither negative nor positive interpersonal interactions were related to alcohol consumption. Implicit self-esteem did moderate the within-person relation between daily negative interpersonal interactions and daily drinking. However, the Explicit Self-esteem \times Negative Interpersonal Events interaction was not significant. Therefore, the Explicit Self-esteem \times Negative Interpersonal Events term was dropped from the model (which did not change any of the analyses presented). Next, we

²We ran all of our primary analyses controlling for gender and also seeing if gender moderated any of our effects. There is a significant main effect of gender (men tend to drink more than women). All of our results were similar controlling for gender and there were no 3-way interactions with gender across all of our analyses.

examined the nature of the significant Implicit Self-esteem \times Negative Interpersonal Events interaction by using the procedures outlined by Aiken and West (1991). Specifically, two variables were calculated to represent participants one standard deviation above (i.e., high implicit self-esteem) and one standard deviation below (i.e., low implicit self-esteem) the mean on implicit self-esteem. Then, analyses were run in which the newly computed high and low implicit self-esteem variables were separately entered into equation 1 replacing the original implicit self-esteem variable.

As suggested by the regression lines depicted in Figure 1, the simple slopes test revealed that the within-person slope between negative interpersonal interactions and evening drinking was significant for students with low implicit self-esteem, b=.09, p=.05, indicating that they drank more in the evening on days they experienced relatively more negative interpersonal interactions. ³ However, for those with high implicit self-esteem, the within-person slope between negative interpersonal interactions and daily drinking was not significant, b=-.05, p=.22. In other words, whether negative interpersonal interactions during the day predicted drinking in the evening depended on participants' level of implicit self-esteem. ⁴

Seeking Acceptance in Response to Negative Interpersonal Interactions

We predicted whether participants were with people who were drinking that evening from the same predictors in equation 1. Because drinking with others is a dichotomous variable, we used multilevel logistic regression (binomial sampling model, logit-link function) with overdispersion (see Bryk, Raudenbush, & Congdon, 1996, p. 121–123). Consistent with our expectations, there was a significant Implicit Self-esteem \times Negative Interpersonal Events cross level interaction predicting whether people were with others who were drinking (b = -. 06, p < .01). As depicted in Figure 2, students with low implicit self-esteem were more likely to be with people who were drinking on days when they experienced more negative interpersonal interactions (b = .12, p < .01) compared with days they experienced fewer negative interpersonal interactions. Conversely, students with high implicit self-esteem were less likely to be with people that were drinking on days they experienced more (versus fewer) negative interpersonal interactions (b = -.10, p = .02). These findings are consistent with the idea that people with low implicit self-esteem seek out acceptance from others, and as a result end up spending time with people who are drinking, on days when they experience more negative interpersonal interactions.

We wanted to determine whether drinking with others mediated the Implicit Self-esteem \times Negative Interpersonal Events cross-level interaction effect on alcohol consumption. That is, do people with low implicit self-esteem drink more on days when they experienced more negative interpersonal interactions because they spent time with people who were drinking? To test our mediated moderation prediction we used the conditions outlined by Muller, Judd, and Yzerbyt (2005). Specifically, we re-ran our Implicit Self-esteem \times Negative Interpersonal Events model predicting drinking with our With Others Who Were Drinking variable entered into the model as a covariate and also entered the With Others Who Were Drinking \times Implicit Self-esteem interaction (see Figure 3 for coefficients). The Implicit Self-esteem \times Negative Interpersonal Events interaction term was no longer significant, b = - .02, p = .35. We also tested the significance of the indirect path (and thus tested for mediation), using the Sobel method (Baron and Kenny, 1986). However, because our mediator was a binary variable, we followed the procedure outlined in MacKinnon and Dwyer (1993) and Kenny (2007) for

³Because the number of standard drinks is a count variable, we compared the results of the linear analyses with those using a Poisson sampling model with a log-link function and overdispersion (see Bryk, Raudenbush, & Congdon, 1996, p. 121–123). The pattern of findings for the Poisson distribution was identical to those presented.

⁴The Implicit Self-esteem × Explicit Self-esteem × Negative Interpersonal Events interaction and the Implicit Self-esteem × Explicit Self-esteem × Positive Interpersonal Events 3-way interactions were not significant.

standardizing the scale to be equivalent across the models being run in the mediation analysis. 6 This method revealed that the indirect path between the Implicit Self-esteem x Negative Interpersonal Events interaction and drinking through being with others who were drinking was highly significant, z=-3.82, p<.01. In short, part of the relation between low implicit self-esteem and drinking is explained by students being with people who were drinking that evening. 7

These results are consistent with the idea that people with low implicit self-esteem seek acceptance from others on days when they experience more negative interpersonal interactions. However, it is not clear whether people with low implicit self-esteem seek others for acceptance, and as an unintended consequence end up drinking, or whether they intend to drink and as a consequence spend more time with people who are drinking. To shed light on this issue, we predicted participants' intention to drink that evening (as reported in that day's diary) from the Implicit Self-esteem \times Negative Interpersonal events cross-level interaction. Neither Implicit Self-esteem \times Negative Interpersonal Events (b = -.01, p = .41), nor the Implicit Self-esteem \times Negative Interpersonal events cross-level interaction (b =-.01, p = .19) were related to participants' intention to drink alcohol that evening. These findings suggest that participants with low implicit self-esteem did not intend to drink more in the evening on days when they experienced more negative interpersonal interactions.

Next, we predicted the amount of time participants spent interacting with friends or acquaintances that evening from the Implicit Self-esteem \times Negative Interpersonal Events cross-level interaction. Implicit Self-esteem (b = .09, p = .04) but not Negative Interpersonal Events (b = .03, p = .25) was related to how much time participants spent interacting with others. However, the Implicit Self-esteem \times Negative Interpersonal Events cross-level interaction was significant (b = -.04, p = .02). Students with low implicit self-esteem spent more time interacting with friends and acquaintances in the evening on days when they experienced more (versus fewer) negative interpersonal interactions (b = .09, p = .02). In contrast, time spent interacting with friends was unrelated to changes in negative interpersonal interactions among students with high implicit self-esteem (b = -.03, p = .39). These findings are consistent with the idea that college students with low implicit self-esteem seek others for acceptance in the evening on days when they experience more negative interpersonal interactions, and as an unintended consequence, consume more alcohol on those days.

Positive Interpersonal Interactions and Drinking

Did implicit self-esteem also moderate the within-person slope between positive interpersonal interactions and alcohol consumption? As summarized in Table 3, implicit self-esteem did moderate the within-person relation between positive interpersonal events and drinking. However, explicit self-esteem did not and was dropped from the model (which did not change any of the analyses presented). As depicted in Figure 4, students with high implicit self-esteem reported drinking more in the evening on days when they experienced more (versus fewer) positive interpersonal interactions (b = .07, p < .01). In contrast, students with low implicit self-esteem showed a decrease in their nightly alcohol consumption on days when they reported

⁵The Sobel method provides a formula for calculating the standard error for the indirect path. To determine the significance of the indirect path, we computed a z-score by multiplying the unstandardized coefficients of the two indirect paths and dividing by the standard error of the indirect path.

⁶When a variable is used as a predictor in logistic regression, it has a different scale than when it is used as an outcome variable. Therefore,

⁶When a variable is used as a predictor in logistic regression, it has a different scale than when it is used as an outcome variable. Therefore, we standardized the path when out mediator was the outcome by multiplying the coefficient by the standard deviation of the predictor variable and dividing by the standard deviation of the outcome variable. To our knowledge no one has laid out the procedures for computing an indirect effect when the level 1 mediator is binary in the multilevel context. However, using this method allows us to make a strong case for mediation (personal communication, David Kenny, August 10, 2007).

The Implicit Self-esteem × Negative Interpersonal Events interaction did not significantly predict daily negative affect (b = .003, p = .

The Implicit Self-esteem \times Negative Interpersonal Events interaction did not significantly predict daily negative affect (b = .003, p = .31) and the Implicit Self-esteem \times Positive Interpersonal Events interaction did not predict daily positive affect (b = .00, p = .66). Therefore, affect was not pursued as a mediator of our findings.

more positive interpersonal interactions (b = -.05, p = .06), although this effect was only marginally significant. Consistent with our findings for negative interpersonal events, explicit self-esteem did not moderate the within-person relation between positive interpersonal interactions and drinking (b = .01, p = .40).

Drinking to enhance positive interpersonal experiences

Was there a significant Implicit Self-esteem \times Positive Interpersonal Events cross level interaction predicting the probability of whether people were with others who were drinking that evening? Consistent with our expectations there was a significant Implicit Self-esteem \times Positive Interpersonal Events interaction predicting whether people were with others who were drinking (b = .03, p = .02). As depicted in Figure 5, students with high implicit self-esteem were more likely to be with people who were drinking that evening on days when they experienced more positive interpersonal interactions (b = .08, p = .01) compared with days when they experienced fewer positive interpersonal interactions. Conversely, students with low implicit self-esteem did not differ in how likely they were to be with people that were drinking that evening on days when they experienced more (versus fewer) positive interpersonal interactions (b = -.03, p = .43). These findings are consistent with the idea that people with high implicit self-esteem drink as a way to enhance positive interpersonal interactions.

We wanted to determine whether being with others who were drinking mediated the Implicit Self-esteem \times Positive Interpersonal Events interaction effect on alcohol consumption. That is, do people with high implicit self-esteem drink more on days when they experience more positive interpersonal interactions because they spend time with people who are drinking? Similar to above, we re-ran our Implicit Self-esteem \times Positive Interpersonal Events model predicting drinking with our With Others Who Were Drinking variable entered into the model as a covariate (see Figure 6 for coefficients). The Implicit Self-esteem \times Positive Interpersonal Events interaction term was still significant, b = .02, p = .02, although smaller than it was originally. The indirect path between the Implicit Self-esteem \times Positive Interpersonal Events interaction and drinking through being with others who were drinking was significant, z = 2.85, p = .02. In short, part of the relation between high implicit self-esteem and drinking is explained by students being with people who were drinking that evening.

Next, we predicted people's intent to drink that evening (as reported in that day's survey) from the Implicit Self-esteem \times Positive Interpersonal events cross-level interaction. Neither Implicit Self-esteem (b = .03, p = .33) nor Positive Interpersonal Events (b = .01, p = .47) were related to participants' intent to drink alcohol that evening. However, the Implicit Self-esteem \times Positive Interpersonal events interaction was significant (b = .02, p = .01). Students with high implicit self-esteem reported an increased intention to drink alcohol that evening on days when they experienced more positive interpersonal interactions (b = .03, p = .02). Students with low implicit self-esteem did not report an increased intention to drink alcohol that evening on days they experienced more positive interpersonal interactions (b = -.02, p = .24). These findings suggest that people with high implicit self-esteem consciously intend to drink more on days when they experience more positive interpersonal interactions.

Finally, we predicted the amount of time participants spent interacting with friends or acquaintances that evening from the Implicit Self-esteem \times Positive Interpersonal Events cross-level interaction. Implicit Self-esteem (b = .09, p = .04) and Positive Interpersonal Events (b = .04, p = .02) were both related to how much time people spent interacting with others that evening. However, the Implicit Self-esteem \times Positive Interpersonal Events cross-level interaction was not significant (b = .01, p = .48). These findings suggest that people with high implicit self-esteem do not spend more time interacting with their friends and acquaintances (in non drinking settings) on evenings when they experience more positive interpersonal

interactions during the day. However, people with high implicit self-esteem are more likely to drink with others on evenings when they experience more positive interpersonal interactions during the day.

Discussion

The current diary study examined the relations among self-esteem, interpersonal interactions, and alcohol consumption in college students. Specifically, we found that on days when college students with high implicit self-esteem reported more (versus fewer) positive interpersonal interactions, they drank more that evening. College students with low implicit self-esteem did not differ in the amount they reported drinking on days when they reported more (versus fewer) positive interpersonal interactions. College students with high implicit self-esteem were more likely to drink with others in the evening on days when they reported more (versus fewer) positive interpersonal interactions. In contrast, on days when students with low implicit self-esteem experienced more (versus fewer) negative interpersonal interactions they drank more and were more likely to drink with others that evening. However, for people with low implicit self-esteem, these drinking episodes appeared to be a consequence of spending more time interacting with friends and acquaintances. Finally, students' reports of their explicit self-esteem did not moderate the relation between positive or negative interpersonal interactions and alcohol consumption.

To our knowledge, this is the first longitudinal study linking implicit self-esteem to real-life behavior. A majority of the research that has been done on implicit self-esteem has been conducted in the laboratory (cf. Conner & Feldman Barrett, 2005; DeHart & Pelham, 2007; Shimuzu & Pelham, 2004). Therefore, a major contribution of the current research is demonstrating the relation between implicit self-esteem and alcohol consumption in college students' daily lives. The relation between implicit self-esteem and alcohol consumption was found independent of any effects of explicit self-esteem. This study contributes to a growing body of literature validating implicit self-esteem and highlights the importance of examining both implicit and explicit self-esteem.

The findings for implicit self-esteem and negative interpersonal interactions are consistent with sociometer theory which suggests the interpersonal monitoring system functions preconsciously to restore acceptance when threatened (Leary at al., 1995). In addition, these findings are consistent with research by Maner et al., (2007) which demonstrated across several studies that the threat of social rejection motivated interpersonal reconnection with other people (also see research on the social monitoring system, Picket & Gardner, 2005). In other words, participants who perceived interpersonal rejection (i.e., low implicit self-esteem) sought interpersonal connections with others (and as a consequence were more likely to consume alcohol). These findings are consistent with research demonstrating that people with low explicit self-esteem seek acceptance from others after feeling rejected (Vohs & Heatherton, 2001).

The findings for implicit self-esteem and positive interpersonal experiences are consistent with research demonstrating that implicit self-esteem plays a role in self-regulation in response to negative events (i.e., DeHart & Pelham, 2007; Jones et al., 2002). In addition, previous research has demonstrated that people with high explicit self-esteem are more likely than their low self-esteem counterparts to savor their positive moods. One way to accomplish this goal is by sharing positive experiences with other people (e.g., Gable et al., 2004; Langston, 1994). Students in our study with high implicit self-esteem were more likely to interact with others who were drinking on days when they experienced more positive interpersonal interactions as a way to share their positive experiences with others, and to maintain or enhance their initial positive experiences. In contrast, students with low implicit self-esteem were not more likely

to interact with others who were drinking on days when they experienced more positive interpersonal interactions.

Although the current findings are consistent with previous experimental research on explicit self-esteem and the need to belong, participants' explicit beliefs about the self did not moderate the relation between interpersonal experiences (a combination of friend, family, and relationship) and drinking behavior. It is possible that the level of perceived rejection that the college students' were experiencing in the evening after experiencing negative interpersonal interactions earlier that day had diminished compared with immediately after the rejecting interaction. It is also possible that the levels of rejection people were experiencing in the current study was dramatically lower than the levels of rejection that have been induced in laboratory studies—which is assessed immediately after the rejecting interaction (e.g., Leary et al., 1995; Vohs & Heatherton, 2001). Therefore, the effects of explicit self-esteem may be more evident immediately after the rejecting interaction. Previous research using correlational and repeated assessment naturalistic designs—which have assessed negative events and experiences a while after they have occurred-- have also found that self-regulation processes have been evident on implicit (but not explicit) measures (DeHart & Pelham, 2007; see DeHart, Pelham, & Murray, 2004 for similar findings regarding implicit dependency regulation processes). One possibility is that the implicit sociometer is more sensitive to the kind of small, mundane interpersonal rejections (or positive interpersonal events) that are a ubiquitous part of people's daily lives. On the other hand, the explicit sociometer may become activated in response to higher levels of rejection or immediately after interpersonal rejection or positive interpersonal experiences (e.g., laboratory manipulations).

Previous research on a community sample found that participants with low explicit self-esteem were more likely to consume alcohol on days they experienced more negative interactions with their romantic partners (DeHart et al., 2008). Negative interactions with romantic partners play an especially important role in people's lives because of the high degree of interdependence and the importance this relationship has to people's sense of self (Aron, Aron, Tudor, & Nelson, 1991). A majority (70%) of these participants were married and living with their romantic partners. Perhaps the degree of interdependence of these cohabitating romantic relationship partners was much higher (and the rejection more painful) than the degree of interdependence between college students and their friends, family, and romantic relationship partners. Future research should examine different types of relationship interactions and their importance to people's feelings of acceptance and perhaps their drinking behavior during college.

Future research should also examine when and how the explicit versus implicit sociometer monitors social acceptance and activates social reconnection. The sociometer theory of self-esteem suggests that self-esteem functions to continuously (i.e., preconsciously) monitor people's acceptance by others (Leary et al., 1995). In addition, Pickett and Gardner (2005) suggest that rejection activates a social monitoring system that notices and quickly processes information about social acceptance, and motivates social reconnection (Maner et al., 2007). The implicit sociometer may automatically activate the affiliation goal and motivate behaviors to fulfill that goal completely outside of awareness (e.g., Lakin & Chartrand, 2003; Ferguson, 2008). In other words, the implicit sociometer may preconsciously monitor for signs of rejection and automatically activate behaviors to restore social connection. As mentioned above, the implicit sociometer may have evolved to automatically defend the self against the kind of small, mundane interpersonal rejections that are a ubiquitous part of people's daily lives.

The current findings are also consistent with research on motivational models of alcohol consumption (e.g., Cooper et al., 1995). Participants in our study with high implicit self-esteem drank more on days when they experienced more positive interpersonal interactions,

presumably as a way to enhance their positive experiences. In contrast, participants with low implicit self-esteem drank more on days when they experienced more negative interpersonal interactions, presumably as a way to seek acceptance from others. Although both low and high implicit self-esteem participants are drinking more in response to different experiences, only drinking in response to negative interpersonal experiences is associated with problematic drinking (e.g., Cooper et al., 1988). Therefore, people with low implicit self-esteem are drinking more in response to experiences that might put them at risk for problematic drinking. Future research should examine whether drinking in response to negative interpersonal events puts college students with low implicit self-esteem at risk for problematic drinking.

Limitations and Future Directions

Although our findings provide several insights into the relations among implicit self-esteem, interpersonal interactions and drinking behavior, they also raise at least five questions. A first issue is whether people with low implicit self-esteem experience more negative interpersonal interactions compared with people with high implicit self-esteem. This may help explain why they drink more in response to negative interactions. In the current study people with high and low implicit self-esteem did not differ in their average ratings of their negative relationship interactions (for similar findings regarding explicit self-esteem see DeHart et al., 2008; Campbell, Chew, & Scratchley, 1991). Therefore, it seems that our results reflect the differential reactivity and not the exposure of people with low self-esteem to more negative relationship interactions.

Second, future research should evaluate other potential mediators of the relation between implicit self-esteem, interpersonal interactions, and alcohol consumption. In the current study we found that spending time with others who were drinking mediated the relation between implicit self-esteem, interpersonal interactions (both positive and negative) and drinking. Future research may want to examine whether state self-esteem (implicit and explicit) or feelings of acceptance (or rejection) mediate the relation between implicit self-esteem, positive (or negative) relationship interactions and drinking. Examining other daily self-regulatory behaviors, such as savoring or dampening, may also help to more fully explore the mediating processes of these interpersonal dynamics and drinking. Future research should also try to disentangle the causal relation between spending time with others who are drinking and alcohol consumption (which we are unable to do in the current study).

A third issue is whether these findings would extend to other measures of implicit self-esteem. The current research relied on name-letter preferences (e.g., Bosson et al., 2000; Koole et al., 2001) assessed at the beginning of the 30-day diary study. In fact, different measures of implicit self-esteem are often weakly correlated with one another (as are different measures of implicit memory, Buchner & Wippich, 2000; Perruchet & Baveux, 1989). However, recent research has observed similar effects on different measures of implicit self-esteem that are typically uncorrelated with one another (Baccus et al., 2004; Dijksterhuis, 2004; Pelham et al., 2005). Therefore, there is some evidence to suggest, albeit indirectly, that our results may extend to other measures of implicit self-esteem. Nonetheless, future research should extend the current findings to other implicit measures.

A fourth important issue is whether name-letter preferences are in fact assessing people's unconscious beliefs about the self. Several investigators have noted that it is difficult to know whether measures of implicit self-esteem assess unconscious beliefs or assess conscious beliefs in an indirect way (Fazio & Olson, 2003; Olson, Fazio, & Hermann, 2007; Pelham et al., 2005). Although we do not claim to have a simple answer to this question, we do know that the available evidence suggests that people's name-letter ratings reflect their automatic beliefs about the self (Koole et al., 2001). For example, people who were asked to think deliberately about their responses to the name-letter measure showed a disruption in name-letter biases. In

addition, research shows that mildly threatening situations appear to activate positive implicit associations for people high in explicit self-esteem (Dodgson & Wood, 1998; Jones et al., 2002). That is, some associations may lay dormant until people experience threatening situations that activate these beliefs (Bowlby, 1982; Pelham et al., 2005). Finally, research suggests that implicit beliefs are sensitive to at least some experiences that remain completely out of awareness (Dijksterhuis, 2004).

Finally, a limitation of the current research was that our sample was relatively homogeneous in terms of ethnicity and age. Specifically, our participants were mostly Caucasian and mostly freshman or sophomores in college. Future research should determine whether these same dynamics extend to more advanced college students and students from diverse backgrounds. In addition, because college provides an environment in which a lot of socializing includes drinking, we may not see these same dynamics beyond a college setting.

These findings underscore the importance of assessing both implicit and explicit self-esteem to determine how people's self-evaluations impact physical and psychological functioning. In addition, these findings suggest that the influence of early experiences (i.e., implicit self-esteem) on behavior may only be evident when people are asked to spontaneously report their behavior or feelings. For example, people's retrospective reports of negative affect are unrelated to implicit self-esteem, but associated with explicit self-esteem. However, people's spontaneous reports of negative affect using an experience sampling methodology is related to their implicit self-esteem (independent of their explicit self-esteem; Conner & Feldman Barrett, 2005). Therefore, diary methodologies that repeatedly capture people's in situ behaviors as well as within-person contingencies between different situations and behavior may be well suited to assess the impact of implicit self-esteem on psychological functioning and health.

These results, combined with previous research on people's implicit expectancies of the effects of alcohol on alcohol consumption (e.g., Stacy, 1997; Wiers et al., 2002), underscore the importance of people's unconscious beliefs in alcohol consumption. Although people with high and low implicit self-esteem did not differ in how much they drank overall in the current study, people with low implicit self-esteem drank more in situations that may be associated with problematic drinking (Cooper et al., 1995). The current findings provide some interesting insight into why some students (i.e., those with low implicit self-esteem) consume more alcohol on days when they experience more negative interpersonal interactions. Presumably, students in our study with low implicit self-esteem drank more in the evening on days when they experienced more negative interpersonal interactions as a consequence of trying to secure interpersonal reconnection. Future research that examines the situations that elicit the activation of people's implicit beliefs and how they are related to alcohol consumption may help inform interventions targeted to reduce drinking. These interventions may offer alternatives to finding acceptance other than by drinking with other students.

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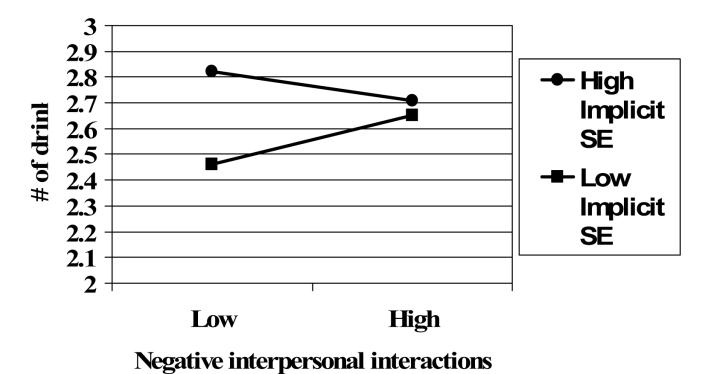


Figure 1. Predicting alcohol consumption from implicit self-esteem and negative interpersonal interactions.

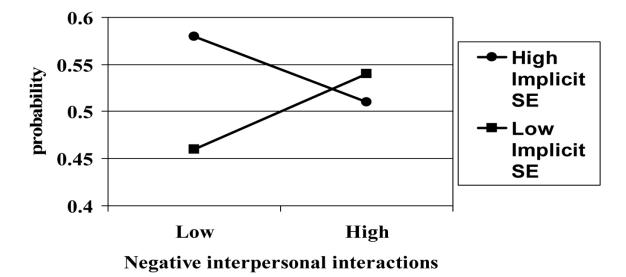


Figure 2. Probability of being with others drinking from implicit self-esteem and negative interpersonal interactions.

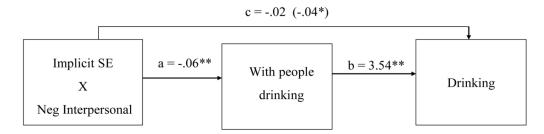


Figure 3. The role of being with people drinking in mediating the implicit self-esteem X negative interpersonal events interaction predicting drinking.

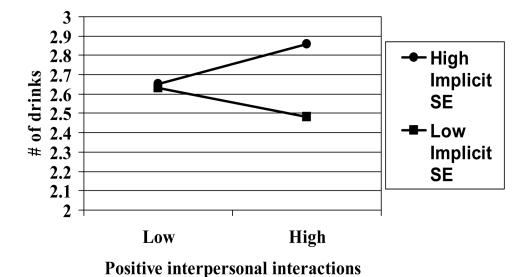


Figure 4. Predicting alcohol consumption from implicit self-esteem and positive interpersonal interactions.

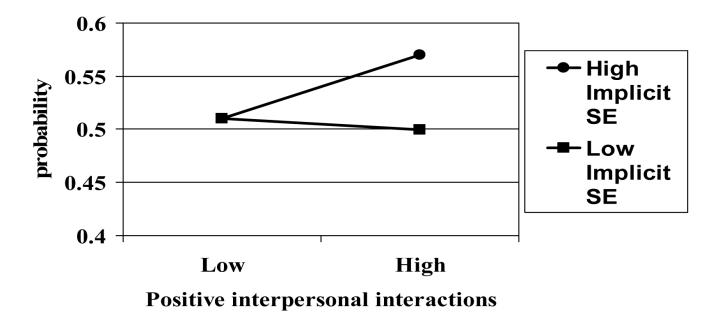


Figure 5. Probability of being with others drinking from implicit self-esteem and positive interpersonal interactions.

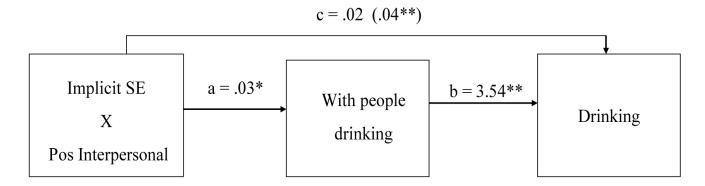


Figure 6. The role of being with people drinking in mediating the implicit self-esteem X positive interpersonal events interaction predicting drinking.

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Table 1

Descriptive statistics and correlations for the between-person and the aggregate daily variables.

Variable	M	SD	1	7	8	4	w	9	7	œ	6
1. Gender	1.52	.50	1								
2. Implicit Self-esteem	1.54	1.54 1.7301	01								
3. Explicit Self-esteem	5.21	1.09	03	.21**	I						
4. Daily Negative Interpersonal Events	.65	.78	80.	.05	19**	1					
5. Daily Positive Interpersonal Events	2.76	2.76 1.36	.27**	**41.	.17**	*60	1				
6. Daily Intent to Drink that evening	2.29	.93	22**	.00	.03	90.	90	1			
7. Nightly Alcohol Consumption	1.20	1.20 1.34	35**02	02	.02	.02	07	.71**			
8. With Others Drinking	.23	.15	20** .02	.02	.00	90.	.01	.63**	.64**	1	
9. Time Spent with Friends	3.97	3.97 1.61 .05	.05	*01.	.05	.01	.17**	32**	.29**	.32**	-

Note. N = 505. Gender was coded such that 1 = male, 2 = female; thus, positive correlations denote higher values for women relative to men.

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* p <.05. ** p<.01.

Table 2

Multilevel Regression Results for Negative Interpersonal Interactions and Nighttime Drinking as Moderated by Implicit Self-esteem.

	Drinking at N	light (DV)
	b	SE
Negative Interpersonal Interactions		
Intercept	2.59**	.098
Implicit Self-esteem	.051	.039
Explicit Self-esteem	.020	.062
Positive Interpersonal Interactions	.015	.019
Negative Interpersonal Interactions	.019	.033
$Implicit \ Self-esteem \times Negative \ Interpersonal$	044*	.020
Explicit Self-esteem × Negative Interpersonal	.004	.031

Note. Unstandardized regression coefficients and standard errors are presented. Degrees of freedom for the intercept and implicit self-esteem = 487. Degrees of freedom for negative interpersonal interactions, as well as all the interaction term = 6636 for the nighttime drinking analyses.

[†]p<.10.

^{*} p <.05

^{**} p<.01.

Table 3

Multilevel Regression Results for Positive Interpersonal Interactions and Nighttime Drinking as Moderated by Implicit Self-esteem.

	Drinking at Night (DV)	
	b	SE
Positive Interpersonal Interactions		
Intercept	2.58**	.098
Implicit Self-esteem	.051	.039
Explicit Self-esteem	.019	.062
Negative Interpersonal Interactions	.004	.027
Positive Interpersonal Interactions	.012	.018
$Implicit \ Self-esteem \times Positive \ Interpersonal$.037**	.011
Explicit Self-esteem \times Positive Interpersonal	003	.017

Note. Unstandardized regression coefficients and standard errors are presented. Degrees of freedom for the intercept and implicit self-esteem = 487. Degrees of freedom for negative interpersonal interactions, as well as all the interaction term = 6636 for the nighttime drinking analyses.

[†]p<.10.

^{*} n < 05

^{**} p<.01.