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# Groupdrink: An Examination of the Social Facilitation of Reward Evaluation and Alcohol-Related Behavior

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

## Abstract

Emerging adults- youth between the ages of 18-25- experience high rates of alcohol use and drinking-related consequences, yet risky drinking in this group seems to occur in the context of adaptive developmental processes. Such risk-taking behavior is thought to result from neurobehavioral changes impacting personality, cognitive development, and social functioning beginning in early adolescence. Youth seek out stimulation that, while objectively dangerous, may provide opportunity for evolutionary pay-offs. Social environmental cues signaling such pay-offs may facilitate risky behavior. This study aimed to manipulate social context, subsequent drinking-related behavior, and related shifts in risk and reward evaluation. Participants participated in a "focus group" and taste test of placebo beer (ad libitum drinking session) alone (Solo; SF condition) or in groups that either interacted in the focus group session (Social Facilitation; SF condition) or did not (Mere Presence; MP condition). Participants in the MP and SF conditions reported greater desire to drink and poured and drank more during the taste test than those in the S condition. SF participants reported the highest levels of post-manipulation affect valence, arousal, and positive group experience. Expected differences between conditions in risk/reward evaluation were not observed. Results indicate that despite differences in affective and social experiences between the group conditions, the simple presence of others had as strong an impact on drinking behavior as the social facilitation manipulation. Results underscore the complexity of social influences on human behavior.

**Evaluation of Risk and Reward and Drinking in a Social Context**

Alcohol use and abuse result in significant costs to society in the United States. Over 18 billion dollars in medical spending goes to treating alcohol-related physical and psychological health problems annually (Harwood, Fountain, & Livermore, 1998), while about 17,000 deaths due to traffic accidents alone are attributed to alcohol in the United States per year (Yi, Chen, & Williams, 2006). In addition, alcohol use has been linked to significant mental health problems such as depression and anxiety (Dawson, Grant, Stinson, & Chou, 2005) and additional economic loss via decreased productivity (Harwood et al., 1998). Americans from childhood to old age experience problems with alcohol, but young adults aged 18-25 are most frequently affected. More young adults aged 21-25 identify themselves as current drinkers, defined as having consumed alcohol within the past 30 days (68.3%), than those in any other age group (compared to 50.7% of youth aged 18-20 and 63.2% among adults aged 26-29; SAMHSA, 2008).

Not only do more young adults in this age range drink than younger adolescents and older adults, they also tend to drink more riskily. Binge drinking is defined as the consumption of enough alcohol per occasion to lead to a blood alcohol level (BAL) of .08 or greater, or the consumption of 5 or more drinks for men or 4 or more drinks for women per 2 hour occasion (NIAAA, 2004). 45.9% of adults aged 21-25 report having binge drunk on at least one occasion within the previous 30 days, compared to 35.7% of those aged 18-20 and 35.1% of adults aged 26-34. It has been estimated that about 40%

of adults in the 21-25 age range have engaged in a binge drinking session at least once in the past two weeks (Wechsler, Lee, Kuo, & Lee, 2000). In addition, more individuals within this age group drink heavily, or binge drink 5 or more times per month, than those within any other age group. In this age range, 15.9% are classified as heavy drinkers compared to 13% of those aged 18-20 and 10.5% of those 26-29 (SAMHSA, 2008). Furthermore, young adults have the highest density of diagnosable alcohol use disorders than any other age group, with an estimated 6.53-6.95% of adults between 18-29 meeting criteria for alcohol abuse and another 9.24-9.4% meeting criteria for alcohol dependence (Grant, Dawson, Stinson, Chou, Dufour, & Pickering, 2004; Johnston, O'Malley, Bachman, & Schulenberg, 2008). These statistics demand greater understanding of the processes leading to the heightened risk faced by emerging adults. In recent years, researchers have aimed to better understand what sets emerging adulthood- the period of life that roughly covers the ages of 18-25 (Arnett, 2000; 2005) - apart from other developmental periods, as well as factors that place these youth at greater risk for alcohol problems and ways in which problematic substance use and its negative consequences can be prevented in this population (NIAAA, 2002).

The present study examined one potential acute risk factor for problematic drinking that is ubiquitous for emerging adults: the social environment. This research was conducted with the belief that differential exposure to an immediate social environment would impact drinking-related behavior. Because social situations provide opportunity for immediate rewards- alliance building, status gain, or mating- I expected that young adults in a social context would shift their focus away from future consequences and toward these potential immediate rewards. I examined the effects of two different levels

of social context- the mere presence of others or facilitated social interaction- on shifts in mood, evaluation of risk and reward, and subsequent consumption of placebo beer in an ad libitum drinking session.

The expectation that these social manipulations might impact affect, cognition, and risk-taking (e.g. drinking) is based on what is known regarding social influence and maturational processes in adolescence and early adulthood. Neurobehavioral and social changes that occur during adolescence and emerging adulthood may heighten reward sensitivity, including sensitivity to social reward. Social forces have been shown to affect cognitive processes and behavior in general, and also specifically alcohol-related behavior. Alcohol-related cognition is also evidenced to mediate between environmental cues and alcohol consumption.

**Social Context**

Social context can be defined in countless ways. Often this refers to *macrosetting*, or elements of an individual's larger environment (McCarty, 1985). In this way, it may include neighborhood, school environment, family life, or who an individual's friends are. Used in this sense, the term *social context* is vague and loosely defined. Social context may also refer to the linkage between individuals and their immediate environment, or *microsetting* (McCarty, 1985). In this sense, it refers to specific aspects of the present physical environment, such as where and with whom drinkers are when they consume alcohol.

The goal of this study was to focus on the immediate setting, as opposed to the general social environment in which one lives, as many studies have established a link between the present company of peers and the commission of risky behaviors. Initiation

of alcohol and drug use, including cigarette use, is more likely to occur in the presence of peers than when a youth is alone. Additionally, youth tend to drink engage in more risky behaviors and suffer greater behavioral consequences, such as getting into more accidents while driving, when with peers than when alone.

**Developmental Risk**

Developmental changes throughout the lifespan impact risk for alcohol use problems and disorders. Two major developmental periods associated with increased risk for alcohol-related problems are adolescence- which occurs roughly from the age of 12 to the age of 17- and emerging adulthood- roughly ages 18-25 (Throughout this paper, the term "youth" is used to refer to this extended period of risks ranging across adolescence and early adulthood). While adolescence is sometimes considered to end around the time legal adulthood is reached, neurobiological development that begins in early adolescence does not have a definitive endpoint and continues into the period known as emerging adulthood (Bennett & Baird, 2006; Spear, 2000a; Giedd et al., 1999). Adolescence is also often loosely defined as the period between childhood and adulthood (Blakemore, 2008; Spear, 2000a), which covers the entire period from commencement of puberty until the time at which adult roles are fulfilled; thus both the beginning and end of this developmental period may vary between individuals. As fulfillment of adult roles (e.g. marriage and childrearing) has been occurring progressively later over the past few generations (Arnett, 2000), the period between childhood and adulthood has been elongated and includes the years commonly considered as emerging adulthood between legal adulthood (18 years) to the mid-20s. Though developmental period of adolescence

and emerging adulthood are indistinct, they are typically characterized by separate developmental processes in the extant literature.

**Adolescence.** Dahl (2004) describes two paradoxes of adolescence. The first is that although adolescents are the healthiest of any age group, mortality and morbidity rates in this population is higher than they are in any other age group. Second, while adolescents experience a great improvement in their cognitive functioning and reasoning abilities, the increased rates of death and accidents they experience are the result of errors of judgment, or poor decision-making. These paradoxes reflect how major social and neurobiological changes in adolescence contribute to risk for substance use problems.

***Neurobiological change.*** Beginning with the onset of puberty, human adolescents undergo a series of neurobiological changes which do not resolve until as late as 25 years (Bennett & Baird, 2006; Spear, 2000a; Giedd et al., 1999). The behavioral characteristics that result from this neurobiological transition include increased impulsivity, sensation-seeking, risk-taking (Gullo & Dawe, 2008), and sensitivity to reward in general, including the reinforcing effects of alcohol (Spear, 2000a). Synaptic pruning occurs throughout the human brain during adolescence, resulting in decreases in volume in many areas of the brain. Specifically, the prefrontal cortex (PFC) and other regions of the limbic system undergo significant reorganization following the loss of receptors and synapses resulting from pruning (Spear, 2000a; Lenroot & Giedd, 2006). Elimination of unused synapses and receptors ultimately help the human brain to act more efficiently, but this reorganization is thought to initially result in disrupted coordination between brain functions. This disruption is held to lead to the oft-observed teenage phenomenon of hyper-emotionality and hypo-rationality, behavioral tendencies that have been

hypothesized to be directly related to maturation of the PFC (Clark, Thatcher, & Tapert, 2008). Psychological regulation- the ability to regulate and coordinate attention, emotion, and behavior- is thought to be driven by maturation of the PFC and related structures, and so may be disrupted by PFC reorganization in adolescence (Clark et al., 2008).

Transformations in the structure and function of the PFC and other limbic regions are also tied to changes in motivation, or consequence expectations and evaluation of risk and reward. This may result in higher levels of impulsivity during adolescence relative to childhood and later adulthood. The increased impulsivity seen in adolescence is thought to result from underdevelopment of reward, motivation, and decision-making pathways, which are considered to be characteristic of adolescence (Chambers, Taylor, & Potenza, 2003). Further, neurological pathways associated with affective response to social stimuli are particularly active during adolescence and include prefrontal and limbic regions undergoing transformation during this time (Insel & Fernald, 2004; Crone & Westenberg, 2009; Nelson, Leibenluft, McClure, & Pine, 2005). Thus neurological restructuring during adolescence results in increased emotional sensitivity, most notably to social cues, and decreased control over behavioral responses.

In addition to synaptic pruning, the adolescent brain also undergoes significant myelination. White matter throughout the brain increases into the third decade (Lenroot & Giedd, 2006). Myelination is tied to increases in response inhibition (Clark et al., 2008) and seems to facilitate coordination of messages from across the brain. In other words, the sparser myelination is, the less able individuals are to recruit feedback from all relevant faculties and inhibit inappropriate behavioral responses. This also appears to

contribute to high levels of impulsivity seen in adolescents and emerging adults relative to older adults.

Changes to several neurotransmitter cycles related to reinforcement and motivation take place during adolescence as well. With pruning, fewer dopaminergic receptors are present in primary dopamine pathways to receive signals, but overall levels of dopamine increase throughout the PFC and limbic system. This is thought to be tied to adolescents' oversensitivity to reward (Spear, 2000a, 2000b). In addition to these dopaminergic changes, shifts in the structure and function of several other key neurotransmitter systems (including GABA, glutamate, and serotonin) also appear to be related to the enhanced experience of the reinforcing effects of alcohol and social stimuli as well as to changes in personality and the enhanced experience of emotion (Spear, 2000a, 2000b).

In summary, ontogenetic changes occurring during adolescence appear related to increased sensitivity to reward, most notably to reward associated with social cues and psychoactive substances. Adolescents also experience impaired coordination of cognitive resources and behavioral control. The result is an increased tendency to engage in risky behavior and a deficient capacity to appropriately monitor this behavior, despite possessing objective logic abilities commensurate with those of older adults (Dahl, 2004).

***Social transitions.*** Preteens and teens begin to focus less on their parents as primary social outlets and confidants and to place increased emphasis on their peers for these purposes. Less time is spent with families and more with peers during this period (Larson & Richards, 1991). Youth are increasingly concerned with social status and susceptible to the forces of peer modeling and conformity. Many adolescents engage in

*false behavior*: behavior that may be inconsistent with one's "true self," but allows youth to adapt to new social roles (Harter, Marold, Whitesell, & Cobbs, 1996). Thus new exploratory risks that may otherwise violate a youth's personal identity are taken to explore social consequences. Indeed experimentation with alcohol, something many younger children qualify as "bad," is normative during adolescence (Spear, 2000b).

**Emerging adulthood.** Emerging adulthood is characterized by identity exploration, which also takes place in adolescence but is better facilitated by the freedoms of legal adulthood (Arnett, 2000). Those under the age of 18 are usually financially dependent on their parents, live at home, and are expected to attend school. While some youths may have reached sexual maturity many years before their 18$^{th}$ birthdays, their social role is still largely that of a child. Through the age of 17 individuals need parental consent to engage in most institutionalized activity (e.g. school-based activities, receipt of medical care, financial activity, etc.) and are legally unable to move or travel at will. In contrast, once youth reach the age of 18, they are legally recognized as adults and are therefore free to engage in activities commensurate with that role (e.g. voting, investing financially, signing apartment leases, etc.). This is the age at which many leave their parents' homes and begin to attend university, join the military or social service organizations, seek employment full time, or some combination of these.

The characteristics of emerging adulthood identified in the past two decades have been attributed to changes that have occurred in wealthy post-industrial societies. The period between18-25 is now a time when youth discover who they are. The age at which Americans become a spouse or parent is now much later than it was for past generations. It is increasingly common for adults in their late teens or early twenties to "take time off"

from education and begin careers or higher education later than they have in past generations. This is a time marked by fast and significant change (Arnett, 2000; 2005). Youth in this age group rapidly switch jobs, living situations, and romantic partners. Thus emerging adulthood in the United States today is characterized by less responsibility and more freedom. Not surprisingly, more freedom and less responsibility have been found related to elevated levels of alcohol abuse. Young adults have the freedom to experiment with drugs and alcohol for longer periods of time with fewer consequences than members of past generations who may have begun families and careers by their early 20s.

**Social Influences on Cognition and Behavior**

Humans are inherently social beings. At any age, we rely upon one another for entertainment, emotional support, and survival. One of the primary ways in which skills, including language, are transmitted from generation to generation is through modeling (Horner, Whiten, Flynn, & de Waal, 2006). Neurobiologically, we are wired for processing of social information. The mirror neuron system responds to the actions of others in the same way they respond to our own actions, thus mirroring those actions. This neurological response to others' actions is imperative to our ability to generate the same actions (Rizzolatti & Craighero, 2004) and appears to be necessary for the experience of empathy (Iacoboni, 2009). In addition, the neuroendocrine system is responsive to social presence and tied to decision-making about social behaviors such as mating and competition. That the presence of others can trigger changes in us at a molecular level, changing our experiences and perceptions, demonstrates that humans are designed to function in a social environment. It thus follows that the interaction between social forces and individuals' functioning is constant and complex.

**Social influences on memory and cognition.** Multiple lines of research have examined the effects of social influence on human cognition. Perhaps most famous is social conformity and compliance research that was conducted after World War II. These studies demonstrated how easily individuals may be manipulated to engage in behavior that would otherwise be inconsistent with their beliefs, even if it involves the perceived harm of others. Under manipulative social influence, individuals are willing to stifle cognitions that contradict their behavior or to alter cognitive processes in order to rationalize their behavior. Participants have been willing to administer shocks to false study partners in the context of pressure from authorities, a finding that demonstrated cognitive as well as behavioral conformity (the belief that one "*must* go on," Milgram, 1963).

While such behavior may clearly be the result of *public demand*; the tendency for individuals intentionally submit to social pressure and knowingly give false reports or change their preferred behavior in order to conform to group expectations. There is also notable evidence that social pressure may result in *private conformity*, or the tendency for beliefs or memories of individuals to also change; individuals come to internalize their false reports or behavior and report it to be consistent with their true experiences or intentions. Thus behavioral changes resulting from social influence may not merely be the result of consciously perceived behavioral demands, but actual changes in perception and belief triggered by social information. Individuals have taken on the personas of prison guards and prisoners when asked to play these roles, and subsequently altered their perceptions of themselves and others in order to do so (Zimbardo, 1971). Another set of experiments asked participants to judge which in a group of lines was the same length as

a comparison line. In the company of a group of confederates who all agreed on an incorrect answer, a majority of participants were shown to acquiesce to the group opinion (Asch, 1955).

Social manipulations can also affect memory. Researchers have shown that susceptibility to memory corruption of observed events varies with changes in the size of the group participants are in (Dalton & Daneman, 2006; Asch, 1956). Level of consensus about events among other group members (Betz, Skowronski, & Ostrom, 1996) and proximity of group members (Allan & Gabbert, 2008) are also factors that may affect reported memory.

Work done on the phenomenon of *risky shift* in the 1960s and 1970s demonstrated the different risk-taking tendencies of people in groups versus alone. A variety of studies have shown that other individuals need not be physically present to exert such an effect. They may be observed or communicated with via intercom, for example, and the effects of groups were significant on a range of measures of risky behavior (Clark, 1971). The influence of peer contact via technological conduits such as text messaging and social networking websites may have similar influences. The presence of others also impacts judgment and decision-making within a social group. *Diffusion of responsibility* occurs when individuals fail to step forward to take responsibility for events in their environment because they assume others will do so. *Groupthink* refers to situations in which individually capable problem-solvers settle on mediocre solutions as a group.

This body of literature demonstrates that social influence can have significant impact on individuals' cognitions across a series of conditions, including the nature of the material to be remembered (video, photographs, or words), whether a peer was physically

present or "responding" from another location, whether a peer "responded" via microphone (e.g. recording) or computer, or whether testing consisted of recognition or recall. Most importantly for the purpose of this study, the presence of one or more peers during task completion can also affect cognitive processes. This phenomenon has been termed *social contagion* (Roediger, Meade, & Bergman, 2001; Meade & Roediger, 2002). Social contagion effects show that the presence of peers can affect perceptions of truth and self-presentation, and that this effect is consistent across research methods. These findings support the theory that social influences trigger cognitive shifts, which subsequently alter decision-making and behavior.

**Social facilitation.** Research dating back to the late 19th century has examined the effect of others on task performance and behavior. In a comprehensive review of this phenomenon, Aiello & Douthitt (2001) describe early work done by Triplett (1898) in which improved biking times in adults and fishing rod reeling times in children were observed when subjects were in the presence of others versus alone. Interest in this phenomenon was strong through the 1920s and 1930s, and a distinction was drawn between competitors and "co-actors," refocusing this line of research away from competition and on present others performing the same task as subjects or an audience of one or more observers (Aiello & Douthitt, 2001). While some work has examined the influence of an evaluative audience, many researchers have worked to remove any suggestion of overt evaluation in order to examine the effects of the "mere presence of others" (Zajonc, 1980; see Geurin, 1986 for a review).

Several researchers, beginning with Zajonc (1965), have noted that performance on simple tasks appears to be enhanced by the presence of others, while performance on

relatively complicated tasks is inhibited. The widely accepted interpretation of this is that "dominant," or well-learned responses, such as those used for simple tasks, are strengthened by the presence of others. Alternatively, new learning such as acquisition of skills for more complicated tasks, is inhibited. Zajonc (1965; 1980) also suggested that this social facilitation effect was the result of increased drive and characterized by increased arousal. Some evidence lends modest credence to this explanation, but psychophysiological research has frequently failed to support it (Geen & Bushman, 1989). Thus physiological arousal, while still probably a mediating factor for social effects on performance in some situations, appears not to be necessary for social facilitation to occur.

It has been argued that social influences on performance are dependent upon an individual's social learning history (Cottrell, 1972). According to this idea, changes in behavior that result from the presence of others are not innate, but are instead a direct function of an individual's knowledge of whether the presence of others in a given situation is related to aversive or rewarding outcomes. Thus instead of consisting of the singular inborn static drive process, the mechanisms of social facilitation may vary according to the characteristics (such as personality and self-esteem; Uziel, 2007) and history of the individual and the circumstances in which performance is to take place, which include may the number and nature of co-actors or observers.

**Social context and risk-taking in youth.** Recent research examining social facilitation effects has demonstrated that the presence of peers results in an increase in risk-taking behavior. Gardner & Steinberg (2005) sampled three age groups: adolescents (13-16-year-olds), emerging adults (18-22-year-olds), and older adults (aged 24 and

older; mean age 37.24). Participants completed experimental sessions with 2 of their own friends or acquaintances versus alone. Subjects played a computerized game of "chicken," in which they were to "drive" toward a digital wall and come as close to it as they could without hitting it. Risky behavior was operationalized by how close to the wall participants stopped their virtual cars. For participants of all ages, the presence of peers resulted in a significant increase in risk-taking behavior. In addition, this increase varied by age. Adolescents engaged in the riskiest behavior in the presence of peers, and young adults' behavior was riskier than that of older adults. This finding is consistent with the notion that developmental processes converge to enhance risk-taking by adolescents and young adults in the presence of peers.

In summary, multiple areas of research have demonstrated that the presence of others changes the way humans function. These changes appear to affect perception, memory, and performance. We may infer that the presence of others affects not only perception and memory, but all processes upstream of behavior, including not only cognition but also the related processes of motivation and decision-making.

**Social influences on drinking**

The social transitions of emerging adulthood are related to increases in alcohol consumption. Overall, 18-year-old youth who have completed high school use psychoactive substances at higher rates than their same-aged peers who are still in high school (White, Labouvie, & Papadaratsakis, 2005). The transition from living in parents' homes to living in dorms or apartments with peers is associated with increased problematic alcohol consumption (Gfroerer, Greenblatt, & Wright, 1997; Dawson, Grant, Stinson, & Chou, 2004). Drinking among college students decreases as academic

demands increase, and drinking increases around weekends, holidays and breaks, and at the beginning and end of semesters when youth have fewer responsibilities and tend to socialize (Del Boca, Greenbaum, Darkes, & Goldman, 2004). Youth in the military show increased levels of alcohol abuse as well (Ames & Cunradi, 2002), indicating that densely packed groups of emerging adults tend to display high rates of alcohol use and related problems regardless of the exact nature of the environment. How these social influences act on emerging adults' decisions to drink is integral to a comprehensive understanding of this stage of life.

A strong relationship between youths' drinking and the drinking of their peers is well established, both among adolescents and emerging adults (Pandina, Johnson, & White, 2010; Andrews & Hops, 2010). A common explanation for this relationship- one that many parents lean on- is that a youth will begin to drink if he/she falls in with a "bad" crowd. This explanation for the convergence of substance use among members of a social group, or *socialization*, emphasizes the pressure placed on individuals by their peer groups. Another explanation places emphasis on the influence of an individual's own social choices on their subsequent drinking. This *peer selection* perspective points out that youth choose their friends based on common interests and characteristics, which may include interest in drinking and drug use. It appears that both approaches to the relationship between individuals' drinking and that of their friends reflect reality. Individual and peer characteristics interact to reinforce an individual's drinking.

Peer influences act on alcohol consumption in other ways as well. Recent research with emerging adult populations has explored the impact of perceptions of peers' drinking on personal consumption. Many researchers have reported that the higher

normative consumption among peers is perceived to be, the more likely an individual is to drinking heavily and experience negative alcohol-related consequences (see Perkins, 2002; Pandina et al. 2010, Andrews & Hops, 2010). Multiple prevention efforts have focused on perceived norms as a way to decrease problematic drinking in college populations.

Institutionalized expectations for alcohol consumption are another form of social influence on drinking. Membership in a sorority or fraternity or participation in organized sports is associated with risk for heavy drinking (Presley, Meilman, & Leichliter, 2002). Young adults who join Greek social organizations or sports teams are exposed to social norms and expectations encouraging heavy drinking (Park, Sher, Wood, & Krull, 2009, Grossbard, Geisner, Mastroleo, Turrisi, Larimer, & Kilmer, 2009). It is in this context that many young adults have overdosed on alcohol- and died- in high profile incidents on college campuses. This type of social pressure is intertwined with the belief that excessive drinking is an indication of strength and necessary for social bonding.

These social influences on drinking have been explained by social learning theory and other approaches that emphasize the development of alcohol-related associations and reinforcements within a social context over time (Pandina et al., 2010). Such approaches consider social context in the macrosetting sense of the term: the larger social environment in which individuals function. Research on the influence of immediate context, or interaction between the individual and present social cues, has been less common.

Alcohol consumption appears to be higher among those in groups relative to individuals drinking alone or in dyads (McCarty, 1985). While this may in part be

explained by expectations for heavier drinking in certain types of social gatherings (sports team parties, fraternity pledge parties, etc.), explanation of this pattern has included the role of societal rituals and demands. These include drinking after a toast and the buying of drinks in rounds so that groups of individuals often keep their consumption in pace with companions' (McCarty, 1985). Decision-making about alcohol consumption and subsequent drinking has also been shown to be susceptible to social influences. In a 25-day study in which four alcoholics lived full-time in a research facility, Goldman and colleagues (1973) demonstrated that participation in a social group significantly impacted both decision-making about drinking and actual consumption. Participants were asked to decide how much to drink and subsequent drinking was measured. In some circumstances the decided-upon and consumed amounts were significantly higher in the group versus when participants were alone, and this pattern was reversed under different circumstances.

One explanation for the finding that group participation increases alcohol consumption may come from how alcohol affects group functioning. In a study examining the effects of alcohol consumption on group formation, Kirchner and colleagues (2006) gave either alcohol or placebo to triads of males. Those who consumed alcohol reported greater social bonding than those who received placebo. In addition, objective ratings of social behavior (smiling, speech) showed increased social coordination among those who received alcohol relative to those who consumed placebo. This work provides evidence for the conventional wisdom that alcohol is a social facilitator; it aids alliance building.

**Alcohol Expectancies**

Alcohol expectancies are associations in memory between stimuli, behavior, and outcomes that affect alcohol-related behavior. These associations vary according to individual differences in experiences with alcohol, and can prospectively predict drinking. It has been shown that heavier drinkers tend to endorse stronger positive and arousing expectancies than lighter drinkers, who tend to endorse sedating alcohol effects (Goldman, Reich, & Darkes, 2006; Reich & Goldman, 2005; Reich, Noll, & Goldman, 2005; Reich, Goldman, & Noll, 2004). Expectancies have been shown to vary along the dimensions of valence (positive-negative) and arousal (arousing-sedating), and to reflect individual differences across a variety of alcohol outcome domains, including tension reduction, sexual enhancement, social and physical pleasure, aggression, and social assertiveness (Goldman, Greenbaum, & Darkes, 1997).

Alcohol expectancies appear to mediate the relationship between individual risk factors and alcohol use (Goldman, Darkes, & Del Boca, 1999; Darkes, Greenbaum, & Goldman, 2004). It seems that those who possess early risk factors for alcohol-related problems have a tendency to develop expectancies that facilitate problematic alcohol use. Thus expectancies cannot be considered to be distinct from other risk factors, but instead to be a function and enhancement of them. An iterative relationship between alcohol use and risk factors, mediated by expectancy, exists.

Although commonly used expectancy measures ask participants about their alcohol-related thoughts, the concept of expectancy is not limited to conscious cognition. Expectancy can be conceptualized as affect, learning, evaluation of reward, and motivation. The expectancy concept embodies all anticipatory neurobiological processes

we draw upon when selecting behavioral responses to our environment (Goldman, Darkes, Reich, & Brandon, 2006), and can be thought of as a convergence of all processes that contribute to goal-directed behavior and decision-making (Goldman, Reich, & Darkes, 2005). Expectancy has typically been conceptualized as a trait-level phenomenon, and measured with questionnaires about general associations with alcohol use. Recent work in the field has updated both the concept and measurement of expectancy.

**Immediate context and alcohol expectancies**. General drinking patterns portray the influence of context on drinking. Youth often drink more than they intend to in social situations, a fact that provides evidence for the idea that there is something about social situations per se that may prime expectancy processes, which in turn facilitate alcohol consumption. It seems that expectancies include an ephemeral, context-based state component. The existence of fluid expectancy processes is supported by a growing body of literature that demonstrates the influence of immediate context on alcohol-related cognition and behavior. Several lines of recent research have demonstrated the impact of immediate context on expectancy activation. One body of work has examined activation of expectancy via semantic priming.

***Semantic priming*.** Alcohol expectancies are thought to operate semantically, with alcohol-related information organized in memory according to relatedness of concepts (Rather, Goldman, Roehrich, & Brannick, 1992; Rather & Goldman, 1994). Thus consistent with popular theories of cognition (e.g. spreading activation theory, Collins & Loftus, 1973), presentation of concepts one associates with alcohol or alcohol use will in turn prime, or activate, other concepts in individuals' alcohol-related semantic networks.

Zack, Toneatto, & MacLeod (1999) measured interference of an alcohol prime on categorization of expectancy words in a lexical decision task among problem drinkers who were either high or low in psychiatric distress. Participants high in psychiatric distress categorized negative expectancy words faster than neutral words after an alcohol prime. Those low in psychiatric distress categorized neutral words faster than negative expectancy words following the alcohol prime. Thus the alcohol prime triggered cascade of associational processes that reflected individual differences among participants.

Kramer & Goldman (2003) used alcohol or neutral words to prime a Stroop ink color naming task. Individual differences in Stroop task performance have been found when the content of words included in the task is varied to be more or less salient to subjects; the more emotionally salient printed words are, the more interference subjects experience. Participants were primed with an alcohol or neutral beverage word. Neutral, positive, arousing, and negative words were printed in different colors, and participants were to name the ink color, not the printed word. Heavier drinkers showed the most interference naming the ink color of positive expectancy words in the alcohol prime condition. Lighter drinkers showed the most interference naming the ink color of sedating expectancy words in the alcohol condition.

Reich, Noll, & Goldman (2005) found that beginning a list of grocery and expectancy words with "beer" instead of "milk" resulted in greater memory for expectancy relative to grocery words. They also found an expectancy word type by drinker type interaction. Heavier drinkers recalled more positive expectancy words than did lighter drinkers.

Priming of alcohol expectancies appears to change even non alcohol-related behavior. Friedman, McCarthy, Forster, & Denzler (2005) presented participants with alcohol or neutral suboptimal primes and asked them to rate either attractiveness or intelligence of women in a series of photographs. They found that subjects presented with an alcohol prime rated women as more attractive than those presented with the neutral prime, and those scoring higher on a previously obtained measure of alcohol expectancy for increased sexual desire gave the highest ratings of attractiveness. Conducting two experiments, Friedman, McCarthy, Barthalow, & Hicks (2007) also measured participants' expectancies prior to their participation. The first experiment examined the effect of an alcohol prime on behavior consistent with tension reduction expectancies. Those reporting higher tension reduction expectancies prior to participation showed greater willingness to meet with an opposite sex partner under tension-inducing circumstances following an alcohol prime. In the second experiment, subjects with higher risk and aggression expectancies showed greater hostility toward the experimenter in an evaluation following an alcohol prime than those with lower aggression expectancies.

These studies demonstrate that priming with alcohol-related cues activates expectancy processes, which vary in nature according to individual differences. Alcohol associations are more positive and arousing for participants who report more frequent drinking and greater quantities of consumption. Crucially, the Friedman et al. (2005; 2007) experiments also demonstrate that an alcohol prime can trigger expectancy-consistent behavior, even in the absence of alcohol.

***Mood priming***. In addition to semantic primes, affective primes have been used to activate expectancy information in memory. Zack, Poulos, Fragopoulos, & MacLeod

(2003) measured interference of a mood-laden prime with recognition of alcohol words in a timed word-naming task. Participants were presented with positive or negative mood relevant phrases and then asked to quickly name degraded alcohol or neutral target words that followed. Participants identified alcohol words faster following negative mood phrases.

Hufford (2001) explored the influence of state affect on expectancy. He found that those in an induced negative mood tended to endorse more positive alcohol-related expectancies than those in an induced positive mood. This result suggests that a negative mood state may be related to a tendency to view drinking as an attractive option for coping. As described below, Stein, Goldman, & Del Boca (2000) also found induced mood to be related to ad lib alcohol consumption. These studies provide evidence for the hypothesis that environmental cues need not be explicitly alcohol-related for alcohol-related cognition or behavior to be significantly impacted.

***Other contextual stimuli.*** In addition to semantic and mood primes, the effects of other environmental primes on expectancy activation have been examined. Some alcohol researchers have compared responses given in a simulated bar context to those given in a neutral environment. Wall, McKee, & Hinson (2000) measured the effects of context and instructional set on self-reported alcohol expectancies. Participants completed measures in either a bar or neutral laboratory context, and were asked to endorse outcome expectancies they believed to be consistent with having imbibed "just enough to begin to feel intoxicated" or having had "too much to drink." Participants in the bar condition reported higher stimulation, perceived dominance, and pleasurable disinhibition expectancies than those in the laboratory condition, regardless of instructional set.

The false memory paradigm (Deese, 1959; Roediger & McDermott, 1995) has also been used to examine activation of alcohol-related words (Reich, Goldman, & Noll, 2004). Self-reported heavy drinkers falsely remembered having studied more positive alcohol expectancy words after studying an expectancy word list in a bar setting than in a neutral setting. In another study, Reich and colleagues measured the differential effects of a bar or conference room context on an implicit expectancy task (Reich, Kwiatkowski, Lombardi, Nicklaus, Wooten, Below, & Goldman, 2008). Participants completing a free associates task in a bar context rated their own first associates as more positive than those in the neutral context, and the frequency of words generated as first associates varied between groups; those in the bar context tended to generate more positive words. These studies show that passive environmental cues, to which participants have not been instructed to attend, greatly impact alcohol expectancy processes.

***Expectancy priming and ad libitum drinking***. The relationship between stable measures of expectancy and drinking patterns is well established. Several studies have also examined the effect of expectancy activation on ad libitum drinking. Roehrich and Goldman (1995) looked at the effects of alcohol or neutral primes (clips of the television shows *Cheers* and *Newhart*) and expectancy versus neutral semantic primes embedded in a Stroop task on ad lib drinking. Participants who were exposed to the alcohol and expectancy primes drank more than participants in any other condition in an ostensibly separate marketing experiment. Those exposed to the alcohol prime but not the expectancy semantic prime drank the second most, and those exposed to both neutral primes drank the least. These findings demonstrate how implicit priming of alcohol-related information can influence alcohol consumption outside of awareness.

Another study used an alcohol Stroop task for cognitive priming, adding a negative outcome priming condition to the positive and neutral embedded in the Stroop task by Roehrich and Goldman (Carter, McNair, Corbin, & Black, 1998). These authors reported that subjects in the positive priming condition drank the most, and those in the neutral priming condition drank more than those in the negative condition. These two studies both demonstrated that semantic priming triggers cognitive processes that impact alcohol consumption.

Stein, Goldman, & Del Boca (2000) used positive expectancy versus neutral verbal primes, or positive versus neutral mood primes (exposure to music) to examine how drinking is impacted by expectancy activation. Results showed a prime by drinker type interaction, whereby relatively heavier drinkers in the positive expectancy verbal prime condition drank most, and heavier drinkers in both mood induction conditions drank more than lighter drinkers. Those in the neutral verbal prime condition drank the least. This work showed that affective priming, in addition to semantic priming, initiates processes that facilitate alcohol consumption, demonstrating that expectancy processes operate via multiple intertwined systems.

An additional study examined the effects of a sociability expectancy prime on ad libitum drinking (Friedman, McCarthy, Pederson, & Hicks, 2009). Sociability expectancies were collected prior to participation in the experiment. Participants were presented with a sociability expectancy word-laden Stroop task or a neutral Stroop task. Findings were that previously reported sociability expectancies and prime interacted. Those with higher pre-existing sociability expectancies who were exposed to the sociability prime drank the most.

This set of studies shows that alcohol consumption is sensitive to a variety of environmental cues. If cues are consistent with individually held alcohol expectancies, the facilitation of drinking is even greater. Collectively, this work on the relation between semantic or affective primes and activation of alcohol expectancies and actual behavior supports the notion that activation of alcohol-related cognition mediates the relationship between immediate individual and contextual factors and alcohol-related behavior.

**Developmental changes in alcohol-related cognition.** As discussed above, alcohol expectancies are commonly conceptualized as associations between alcohol and stimuli, behaviors, and outcomes held in memory. Such associations appear to develop in youth before drinking does (Dunn & Goldman, 1998; Christiansen, Smith, Roehling, & Goldman; 1989). At a young age, children tend to internalize what their parents tell them- that they shouldn't drink- and report largely negative associations to alcohol use. As children enter and move through adolescence, their alcohol expectancies increase in quantity and complexity and also shift toward being more positive and arousing (Dunn & Goldman, 1996, 1998, 2000). These changes in the composition of alcohol expectancy networks seem to open the door to initiation of alcohol use. This shift in the density and complexity of alcohol expectancies may be a function of increasing overall cognitive abilities (Bekman, Goldman, Darkes, & Brandon, 2009). Alcohol expectancies are part of larger shifts in cognitive processes that mediate the relationship between ontogenetic changes and riskier behavior that is characteristic of youth.

## The Present Study

The present study aimed to manipulate social context and examine its effects on affective and cognitive processes (appraisal of risk and reward) and ad lib drinking. A

condition including individuals who completed the protocol alone was compared to a condition comprised of non-interactive small groups and a condition comprised of interactive small groups. Thus experimental manipulations were intended to parse apart the effects of the simple presence of others versus social interaction on 1) drinking-related behavior in an ad libitum drinking session presented to participants as a "taste test," 2) the evaluation of risk and reward, and 3) on the influence of individually-held social and tension reduction alcohol expectancies on ad libitum drinking.

## Method

### Participants

195 participants between the ages of 21 and 25 ($M$ = 22.11; $SD$ = 1.22) were recruited from undergraduate University of South Florida psychology classes through SONA, an electronic participant pool. To be included in the study, participants must have indicated on a screening questionnaire that they consumed alcohol at least once a month for the previous year. Participants were randomly assigned to one of three groups: a solo (S) condition in which each participant completed the protocol alone, a group condition in which participants completed protocol in the mere presence of 2-4 peers (Mere Presence, or MP condition), or a condition in which participants participated in socially facilitated groups with 2-4 peers (SF condition). An online random numbers generator was used to randomly assign timeslots to condition, though some exceptions to this were made (e.g. if only one participant signed up for a slot assigned to a group condition that participant was instead included in the group condition, and on a handful of occasions notable social interaction was underway when the experimenter arrived to retrieve a group of participants to begin the study; those groups were included in the SF condition even if they had been previously assigned to the MP condition). Participants were compensated for their time with either partial course credit or course extra credit.

Of those who participated in this study, a total of 29 were excluded from all analyses, leaving a sample size of 166 (56 in the Social Facilitation Condition, 51 in the

Solo condition, and 59 in the Mere Presence Condition). These participants were excluded for the following reasons: participation in study pilot (n = 3; one target participant and two group members were excluded since subject discussed her past participation with the others), group members participated in excessively negative discussion of the experiment and taste of beverages and openly discussed suspicion that beverages were non-alcoholic (n = 4), all members of a Social Facilitation group appeared to have just woken up for their noontime study and were resistant to participation in the focus group discussion (1 group, n = 4), at the time of participation reported drinking less than required for inclusion (n = 16), one reported grossly discrepant drinking patterns in response to difference questionnaire items (drinking 3-6 times per year but drinking to intoxication 5 or more times a week), and at the time of study one reported being 28 years of age, which was out of acceptable age range for inclusion). An additional 15 participants were excluded from analyses using data from the taste test and the subsequently administered PGRS for the following reasons: verbal instructions issued by research assistants at the beginning of the taste tests were inconsistent with experimental condition (i.e. subjects told not to talk when they shouldn't have been; n = 11), a participant in the group withdrew from the study during the taste test after being alerted to a personal emergency (1 group, n = 3), or a solo participant did not complete the taste test (n = 1). This left a sample of 151 for analyses using self-report data from the taste test and beverage measures (amount poured, consumed; SF n = 48, S n = 50, MP n = 53).

Of the 166 participants included in analyses, 61 (36.7%) were male. The proportion of men in each condition was equivalent (26 of 56 or 46.4% in the SF

condition, 19 of 40 or 32.2% in the MP condition, and 16 of 51 or 31.4% in the S condition; $X^2$ (2, n = 166) = 3.42, $p$ = .18). Between the two group conditions, composition of groups was also equivalent. Of the 16 SF groups included in final analyses, the average was 3.94 participants per group. Of those, three groups were all female (the three groups excluded form all analyses were from this condition and all female) and one was all male. Of the remaining groups, one was 20% male, two 25%, one 33%, three 50%, one 60%, two 67%, and two were 75% male. Of the 18 MP groups, the average group size was 3.72, with seven all female groups and one that was all male. Of the remaining ten groups, one was 20% male, two were 25%, three were 33%, and four were 75% male.

**Measures**

**Alcohol Expectancy Questionnaire** (**AEQ**; Brown, Christiansen, & Goldman, 1987). The AEQ asks participants to either agree or disagree with a series of statements about the effects of alcohol (e.g. "drinking adds a certain warmth to drinking occasions," "alcohol makes me worry less"). The subscales of the sixty-eight-item AEQ have coefficient alphas ranging from .72 to .92. It has been shown to account for 57% of variance in concurrent drinking, and 50% of variance in drinking over one year (Goldman & Darkes, 2004). The AEQ was administered via SONA as part of a required mass screening survey; participants were unaware that completion of this questionnaire was tied to the present study.

**NEO-Five Factor Inventory** (**NEO-FFI;** Costa & McCrae, 1005; 2010). The extraversion subscale of the NEO-FFI (e.g. "I like to have a lot of people around me") was administered to subjects prior to participation, as extraversion likely impacts

individuals' responses to and behavior in social settings. This subscale has an internal consistency of .79 (Costa & McCrae, 2010).

**Zuckerman-Kuhlman Personality Questionnaire** (**ZKPQ**; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). The Impulsive Sensation Seeking (IMP-SS) scale of the ZKPQ ($\alpha$ = .77-.82; Zuckerman et al., 1993) consists of nineteen items (e.g. "I often do things on impulse," "I'll try anything once") and two subscales: impulsivity and sensation seeking. These aspects of personality are related to risk-taking and substance use and thus may impact social responsiveness and/or drinking behavior during this study. These questions were administered to participants via SONA before their participation in the study as part of a larger mass screening survey.

**Affect Grid** (Russell, Weiss, & Mendelsohn, 1989). The affect grid asks subjects to "think about how you feel right now, in this moment" on two dimensions: pleasure-displeasure (e.g. valence), and high arousal-sleepiness. Participants are asked to mark a single box on a 2-dimensional grid indicating their current level of pleasure and arousal. The result is a score ranging from 1 to 9 for each dimension. Ratings of emotion-related words using the Affect Grid have been shown to be highly reliable (.97-.98), to have high convergent validity with other measures of affect and arousal (.89-.97), and low discriminant validity scores verifying orthogonality between the constructs of affect and arousal (Russell et al., 1989).

Reward evaluation is impacted by complex cognitive, affective, and motivational processes. The Affect Grid was administered at the beginning of study sessions to obtain a baseline measure of affect valence and arousal. The measure was also given immediately following the manipulation to determine whether participants (particularly

those in the SF condition) experienced an increase in affect valence and arousal resulting form the manipulation that may impact self-reported risk-taking on subsequently administered measures.

**Demographics Questionnaire**. Participants were asked to report their age, year in school, gender, and ethnic background in addition to other filler lifestyle information, including television watching habits (e.g. "How often do you watch television?"). Administration of this questionnaire prior to placebo consumption was thought to help reinforce the cover story that this experiment is part of a marketing project and increase believability of the manipulation.

**Delay Discounting** (**DD**; Kirby, Petry, & Bickel, 1999). Delay discounting paradigms ask participants to make judgments about whether they would prefer a smaller, immediate reward to a larger, later reward. Delay discounting has been shown to be related to alcohol abuse (Petry, 2001), and has also been shown to be sensitive to changes in state (Dixon, Jacobs, & Sanders, 2006; Odum & Baumann, 2010) thought it is often thought of as a trait impulsivity measure. Kirby et al.'s paper and pencil measure consists of twenty-seven items asking participants to choose between an immediate monetary reward or a larger delayed monetary reward across 27 items. Amounts varied range between $11 and $85 and the delay of future rewards varied from 7 days to 186 days. Participants' discounting rate parameters (k), or the rate at which participants discount future rewards, were calculated based on the instructions set forth by Kirby (2000). This measure was administered following the experimental manipulation and after the second administration of the Affect Grid.

**Youth Decision-Making Questionnaire** (**YDMQ**; Ford, Wentzel, Wood, Stevens, & Siesfeld, 1989). The YDMQ presents six hypothetical situations in which participants risk the loss of peer approval if they do not make a risky choice (e.g. allowing a friend to bring drugs into one's home, helping a friend cheat on an exam). Decisions in each situation may result in a negative outcome such as the risk of disapproval by authority figures (parents or teachers). Participants are asked to indicate the likelihood that they would do as friends ask or refuse friends' requests across three variations of likelihood of negative outcome: certainty of no negative outcome, uncertainty of outcome, and certainty of negative outcome. Thus the possible decision options for each situation carry varying amounts of risk; participants must choose between these options for each variation of negative outcome probability (Gardner & Steinberg, 2005; Cauffman & Steinberg, 2000).

Participants were asked to rate how likely they would be to make a risky decision in each of the situations on a scale of 1 (definitely would make risky decision) to 4 (definitely would not make risky decision). Average risky decision scores were calculated for each individual and each outcome scenario. An average risk-taking score for each hypothetical situation was calculated by summing the decision scores across each outcome scenario. The uncertain outcome scenario has internal consistency of $\alpha = .65$ using this scoring method (Gardner & Steinberg, 2005) and is the scenario of greatest interest for the purpose of this study; shifting evaluations of risk and reward are expected to have the greatest impact on behavior in situations where the likelihood of potential consequences are unknown. This measure was administered immediately after the delay discounting measure and before the taste test.

**Craving Questionnaire.** Participants' desire to drink was assessed when they entered the ad lib drinking session with 5 questions. Three assessed their general desire to drink (e.g. "I do want to drink right now; Stasiewicz, Brandon, & Bradizza, 2007), and two assessed the influence of participants' responsibilities on their drinking (e.g. "If it were not for other things I had to do, I would drink more right now"; see Appendix A) This measure allowed for exploration of differences between conditions in participants' concerns about the influence of alcohol consumption on later activities or responsibilities. The three general craving items were summed to create a "Desire to Drink" score that was used as an outcome in analyses.

**Taste Test Questionnaire**. A taste test questionnaire was administered to determine participants' physiological state (i.e. level of hunger and thirst) during the taste test.

**Ad lib drinking**. As part of an ostensible "product rating task," participants were given two carafes, marked "A" and "B," each holding 12 ounces (1 serving) of non-alcoholic beer (Kaliber NA and St. Pauli Girl NA) and asked to pour the beverages into corresponding pint glasses (marked "A" and "B") in order to taste them. The amount poured was measured by determining the amount of beer left in each carafe, and the amount consumed was measured by determining the amount left in each glass after tasting, adding this amount to how much remained in the corresponding carafes, and subtracting this from to original serving amount.

**Taste Test Rating Form**. Participants were asked to complete two ratings forms, rating each beverage on five different dimensions (color, consistency, aroma, taste, likelihood of consumption at a party) on a scale of 1 (e.g. "disgusting") to 7 (e.g.

"delicious"; see Appendix B). For each participant, these ratings were summed to create an index liking score for each beer, and then these index scores were combined to create a total Beer Ratings score, which was used as an outcome. This questionnaire also asked a series of open-ended questions relating to product description, experience, and marketing in order to prolong the task, as several participants attempted to end the taste test early if they finished initial ratings quickly.

**Perceived Group Reinforcement Scale (PGRS**; Sayette, 2007**).** The PGRS is a 12-item scale measuring group cohesion as perceived by members of a group ($\alpha$ = .68 for the first 11 items). Questions ask participants to indicate likeability of the overall group (e.g. "I liked this group"), feelings of inclusion in the group (e.g. "members of this group are interested in what I have to say"), and interest in remaining part of the group beyond the experimental session (as measured by one item: "If an opportunity occurred outside this lab, I would look forward to being part of this group in the future"). This scale served as a manipulation check; scores were expected to be higher in the SF condition, in which participant interaction was encouraged, than they were in the MP condition.

**Demand Characteristics**. Participants were asked to give responses on a 5-point scale about their level of commitment to the focus group and experimenter. Participants in the MP and SF conditions were also asked if they knew any other group member before the experiment, and if so, how they knew the group member(s) ("Did you know any of the people in your group before today?" see Appendix L). Open-ended questions about perceptions of demand characteristics and suspicions about the nature of the study were also asked to probe for effectiveness of the manipulation and possible differing perceptions of the study purpose between conditions.

**Drinking Questionnaire**. At the end of the study, participants were asked to answer a short series of questions about their alcohol use including their typical monthly frequency of drinking, quantity per drinking occasion, and frequency of intoxication over the previous year (see Appendix I). Frequency and quantity items were also answered online prior to participation in order to determine eligibility for the study though these were not recorded.

**Procedure**

Prior to presenting for the experiment, participants were randomly assigned to condition. An exception was made, however, if experimenters had a suspicion that group members knew one another prior to presenting for this study (e.g. if they were interacting familiarly when the researcher arrived to fetch them from the location to which they reported), groups were assigned to the SF condition. Exceptions occurred rarely and the decision to assign groups this way was designed to minimize the social tenor of MP groups. Sessions were run Monday through Friday and began between 11:15 a.m. and 3:45 p.m. Thus the taste test portion of the study was never begun before noon or later than 5:00 p.m.

Participants were gathered and seated in a conference room for the "focus group" portion of the study. For group conditions the seating arrangement was closely controlled so that the experimenter sat at the head of the table, two participants sat immediately to her left or right, and additional participants sat directly next to another. This seating arrangement was explained to participants as helpful for the distribution of questionnaires, but also facilitated interaction in the Social Facilitation condition and controlled for physical proximity in the Mere Presence Condition. The study was

presented as a marketing focus group designed to examine product preferences among young adults. After informed consent was received, participants were asked to complete the baseline affect grid and demographics questionnaire.

Next, participants were asked to reflect on television commercials with which they were familiar with as part of a marketing activity. This activity served as the experimental manipulation and also bolstered the study's cover story. All subjects, regardless of condition, were told that the research team was interested in finding out about young adults' perceptions of television advertising. Those in the group and solo conditions were given a questionnaire packet, asked to "describe a television commercial you feel very strongly about (really like, really don't like, or think has influenced you)" and asked to write out responses to the same series questions (e.g. "Why does this commercial or ad campaign appeal to you? Please be as specific as possible;" see Appendix C) for each advertisement. Subjects in the social facilitation condition were asked to complete this same questionnaire, but for only one commercial (one set of questions). Subjects in these groups then took turns describing the commercials, and the entire group discussed the remaining items.

Following the marketing task, participants completed the Affect Grid for the second time, the Delay Discounting questionnaire, and the YDMQ. Next, participants were told that they were to take part in a taste test and taken to another room in the psychology department. Those in the MP condition were asked not to talk to one another for the duration of the study. Participants were then brought into the taste test room, in which (as briefly described above) two carafes marked "A" and "B" each holding 12 ounces of beer had been placed for each participant around a small table by a second

researcher. At each station were also two pint glasses (also marked "A" and "B") and a glass of water. At this point, the first experimenter departed and participants were asked by the second experimenter to sit at a station. The size of the table allowed no more than five people to sit and stations were arranged so that in the group conditions, a participant was always either sitting directly next to or across from another (or both). Participants were asked to sign an additional informed consent (the purpose of administering the alcohol consent form at this point in the experiment as opposed to at the beginning was to prevent participants from being exposed to any alcohol-related cues earlier on). Participants then completed the Craving and Taste Test Questionnaires, and rating forms were distributed. Participants were instructed by the experimenter to make ratings about the beers as they tasted them. Participants will be asked to pour beer from the carafes into the corresponding glasses (i.e. from carafe "A" only into glass "A" and from carafe "B" only into glass "B" and sample as much as they would like. Participants in the MP condition were reminded not to speak to one another during the task so as not to influence one another's responses. No such instruction was issued to the SF condition. Ad lib drinking sessions were all videotaped.

Once instructions for the task were presented to participants, the experimenter told participants he/she needed to leave the room and would be back. The experimenter returned after about 7 ½ minutes, ostensibly to point out that the rating forms had questions on the back, and left again until 15 minutes had passed since he/she initially left participants to complete the task. The length of the task and experimenter's return at the halfway point are standard in such taste rating tasks and were originally used by Rohsenow and Marlatt (1981).

Upon completion of the taste test, participants were returned to the charge of the first experimenter and taken back to the conference room to complete the PGRS (if applicable), demand characteristics measure, and drinking questionnaire. Lastly, all participants were fully debriefed and released.

## Results

### Baseline Differences

Analyses were conducted to explore possible pre-existing differences between conditions. Means for personality and typical drinking variables can be found in Table 1; baseline affect and arousal and AEQ subscale means can be found in Table 2. Three MANOVAs were conducted, one testing possible differences on AEQ subscales, one testing ZKPQ personality variables, and one examining pre-existing drinking patterns (high correlations were found within these variable groupings; see Appendix D for correlation tables). ANOVAs with the NEO-E, baseline affect and arousal, and time of day sessions began as outcomes were conducted, and chi-square analyses were run to determine whether groups differed in terms of ethnic or gender composition or the day of the week on which they were run.

MANOVA results indicated no significant differences in AEQ or ZKPQ scores between conditions. No differences between conditions were found on the NEO-E, baseline affect, baseline arousal, time of day sessions were run, or in ethnic or gender composition. A significant chi-square did, however, indicate that sessions were not evenly distributed over weekdays by condition ($\chi^2$ (8, N = 166) = 21.73; $p$ = .005). Frequency of intoxication also varied between conditions with those in the group conditions reporting greater frequency than those in the solo condition ($F$(2) = 3.117; $p$ = .047). Frequency of intoxication was therefore controlled for in all further analyses and

Table 1

*Means and Standard Deviations for Baseline Affect and Arousal and Personality by Condition and Gender*

| | SOCIAL FACILITATION | MERE PRESENCE | SOLO | ALL |
|---|---|---|---|---|
| **ZKPQ IMP** | | | | |
| Women | 3.17 (2.23) | 3.00 (1.97) | 2.57 (1.84) | 2.90 (2.00) |
| Men | 3.35 (1.70) | 3.22 (1.77) | 2.80 (1.78) | 3.17 (1.72) |
| **All** | **3.25 (1.98)** | **3.07 (1.90)** | **2.64 (1.80)** | **3.00 (1.91)** |
| **ZKPQ SS** | | | | |
| Women | 6.23 (3.32) | 7.10 (2.91) | 6.09 (2.77) | 9.42 (4.45) |
| Men | 8.04 (2.82) | 7.37 (3.09) | 7.67 (2.58) | 7.73 (2.82) |
| **All** | **7.07 (3.20)** | **7.19 (2.94)** | **6.56 (2.79)** | **7.00 (2.98)** |
| **ZKPQ I-SS** | | | | |
| Women | 9.40 (5.18) | 10.10 (4.18) | 8.66 (4.06) | 9.42 (4.45) |
| Men | 11.38 (4.02) | 0.56 (3.93) | 10.47 (3.56) | 10.90 (3.84) |
| **All** | **10.32 (4.74)** | **10.24 (4.08)** | **9.20 (3.97)** | **9.95 (4.29)** |
| **NEO-E** | | | | |
| Women | 29.60 (5.73) | 31.10 (4.44) | 28.63 (6.47) | 29.85 (5.60) |
| Men | 29.69 (5.77) | 30.58 (4.54) | 30.00 (6.76) | 30.05 (5.62) |
| **All** | **29.64 (5.69)** | **30.93 (4.44)** | **29.06 (6.53)** | **29.92 (5.59)** |
| **Frequency** | | | | |
| Women | 5.30 (.77) | 5.44 (1.05) | 5.37 (.77) | 5.38 (.93) |
| Men | 5.54 (.81) | 5.76 (1.01) | 5.44 (.89) | 5.58 (.89) |
| **All** | **5.41 (.89)** | **5.54 (1.04)** | **5.39 (.80)** | **5.45 (.92)** |
| **Quantity** | | | | |
| Women | 3.63 (1.27) | 3.46 (1.55) | 3.17 (1.20) | 3.41 (1.36) |
| Men | 4.23 (1.68) | 4.61 (1.92) | 4.19 (2.01) | 4.34 (1.82) |
| **All** | **3.91 (1.49)** | **3.84 (1.75)** | **3.49 (1.55)** | **3.75 (1.61)** |
| **Freq. Intox.** | | | | |
| Women | 3.67 (1.92)* | 3.51 (1.83)± | 2.83 (1.62)*± | 3.33 (1.81) |
| Men | 3.96 (1.68) | 4.42 (1.71) | 3.56 (1.79) | 4.00 (1.72) |
| **All** | **3.80 (1.80)** | **3.81 (1.83)** | **3.06 (1.69)** | **3.58 (1.80)** |

Note. ZKPQ IMP = ZKPQ Impulsivity scale; ZKPQ SS = ZKPQ Sensation-Seeking scale; ZKPQ I-SS = ZKPQ Impulsive Sensation-Seeking Scale; NEO-E = NEO Extraversion scale; Frequency = frequency of drinking, Quantity = typical quantity consumed; Freq. Intox. = frequency of drinking to intoxication.

The relationship between condition and participation by day of the week was further explored.

Distribution of participation by day of the week can be found in Table 3. This distribution indicates that more data was collected from participants in the MP condition toward the end of the week, while more was collected from participants in the S condition

Table 2

*Means and Standard Deviations for AEQ Subscales by Condition and Gender*

| | SOCIAL FACILITATION | MERE PRESENCE | SOLO | ALL |
|---|---|---|---|---|
| **AFFECT 1** | | | | |
| Women | 5.53 (1.63) | 5.63 (1.43) | 6.17 (1.52) | 5.78 (1.53) |
| Men | 5.50 (1.58) | 6.26 (1.46) | 6.00 (1.41) | 5.87 (1.54) |
| **All** | **5.52 (1.60)** | **5.83 (1.49)** | **6.12 (1.48)** | **5.81 (1.53)** |
| **AROUSAL 1** | | | | |
| Women | 5.20 (1.37) | 4.98 (1.59) | 5.11 (1.64) | 5.09 (1.54) |
| Men | 5.46 (1.33) | 5.42 (1.46) | 5.75 (2.08) | 5.34 (1.59) |
| **All** | **5.32 (1.35)** | **5.12 (1.55)** | **5.10 (1.78)** | **5.18 (1.56)** |
| **AEQ GLO** | | | | |
| Women | 7.25 (4.32) | 8.05 (5.64) | 8.73 (5.45) | 8.05 (5.22) |
| Men | 8.35 (5.73) | 10.06 (5.58) | 9.62 (6.16) | 9.21 (5.73) |
| **All** | **7.75 (4.98)** | **8.66 (5.65)** | **8.98 (5.60)** | **8.45 (5.41)** |
| **AEQ SEX** | | | | |
| Women | 2.75 (2.08) | 2.75 (2.43) | 2.73 (2.24) | 2.74 (2.25) |
| Men | 2.58 (2.04) | 3.25 (1.91) | 3.40 (2.17) | 3.00 (2.01) |
| **All** | **2.68 (2.04)** | **2.90 (2.28)** | **2.90 (2.22)** | **2.83 (2.17)** |
| **AEQ SPP** | | | | |
| Women | 7.25 (1.38) | 7.11 (1.70) | 6.88 (2.30) | 7.07 (1.83) |
| Men | 7.36 (1.98) | 7.64 (1.55) | 7.75 (1.48) | 7.53 (1.74) |
| **All** | **7.30 (1.67)** | **7.25 (1.66)** | **7.11 (2.13)** | **7.23 (1.81)** |
| **AEQ SA** | | | | |
| Women | 7.04 (2.67) | 6.73 (3.44) | 6.85 (3.33) | 6.85 (3.18) |
| Men | 6.36 (3.09) | 7.35 (2.18) | 8.46 (1.66) | 7.16 (2.64) |
| **All** | **6.72 (2.87)** | **6.91 (3.11)** | **7.30 (3.02)** | **6.96 (3.00)** |
| **AEQ TR** | | | | |
| Women | 5.68 (2.33) | 5.89 (2.67) | 5.23 (2.75) | 5.61 (2.59) |
| Men | 5.83 (2.62) | 6.75 (1.88) | 6.58 (1.98) | 6.29 (2.27) |
| **All** | **5.75 (2.44)** | **6.15 (2.47)** | **5.60 (2.61)** | **5.85 (2.49)** |
| **AEQ AA** | | | | |
| Women | 4.69 (2.49) | 4.78 (2.95) | 4.71 (2.55) | 4.73 (2.67) |
| Men | 4.52 (2.25) | 5.07 (2.76) | 5.40 (2.27) | 4.88 (2.40) |
| **All** | **4.61 (2.36)** | **4.87 (2.87)** | **4.88 (2.47)** | **4.78 (2.57)** |
| **AEQ TOT** | | | | |
| Women | 34.41 (11.30) | 33.92 (16.86) | 33.88 (16.54) | 34.04 (15.27) |
| Men | 34.17 (14.93) | 38.75 (13.48) | 39.75 (14.12) | 36.92 (14.24) |
| **All** | **34.30 (12.96)** | **35.35 (15.96)** | **35.44 (16.00)** | **35.03 (14.94)** |

Note. Affect 1 = baseline affect; Arousal 1 = baseline arousal; AEQ GLO = AEQ Global Positive scale; AEQ Sex = AEQ Sexual Enhancement scale; AEQ SPP = AEQ Social and Physical Pleasure scale; AEQ SA = AEQ Social Assertion scale; AEQ TR = AEQ Tension Reduction scale; AEQ AA = AEQ Aggression and Arousal; AEQ TOT = AEQ Total scale.

earlier in the week. As it is well known that college students drink more later in the week, this raised the concern that day of the week on which subjects participated, and not

Table 3

*Number of Participants by Day of Participation and Condition*

| | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|---|---|---|---|---|---|
| Social Facilitation | 8 | 16 | 10 | 14 | 8 |
| Mere Presence | 6 | 10 | 16 | 6 | 21 |
| Solo | 8 | 19 | 10 | 10 | 4 |
| All | 22 | 45 | 36 | 30 | 33 |

condition per se, may have driven any potential differences in ad libitum placebo consumption between conditions.

Graph 1 depicts amount of placebo beverage consumed by condition by day of the week. The graph indicates that those in the MP condition, more likely to participate on a Friday than those in the S condition, actually drank notably less on this day than those in other conditions. The pattern observed in this graph is inconsistent with what would have been expected if day of the week drove drinking scores. Thus there is no evidence that day of the week on which sessions were run may have confounded potential differences between conditions.

The primary hypothesis of this study was that drinking (as indexed by amount of placebo beer consumed and poured during the taste test) would vary by condition, with those in the SF condition drinking the most and those in the S condition drinking the least. It was also expected that conditions would differ on other indices of drinking-related behavior (number of sips taken, desire to drink, and beer ratings), with results following the same pattern anticipated for alcohol consumption. Those in the SF condition were also expected to report greater post-manipulation affect and arousal, have steeper delay discounting rates, and report greater likelihood of risky decision-making than those in the other conditions, while those in the S condition were anticipated have

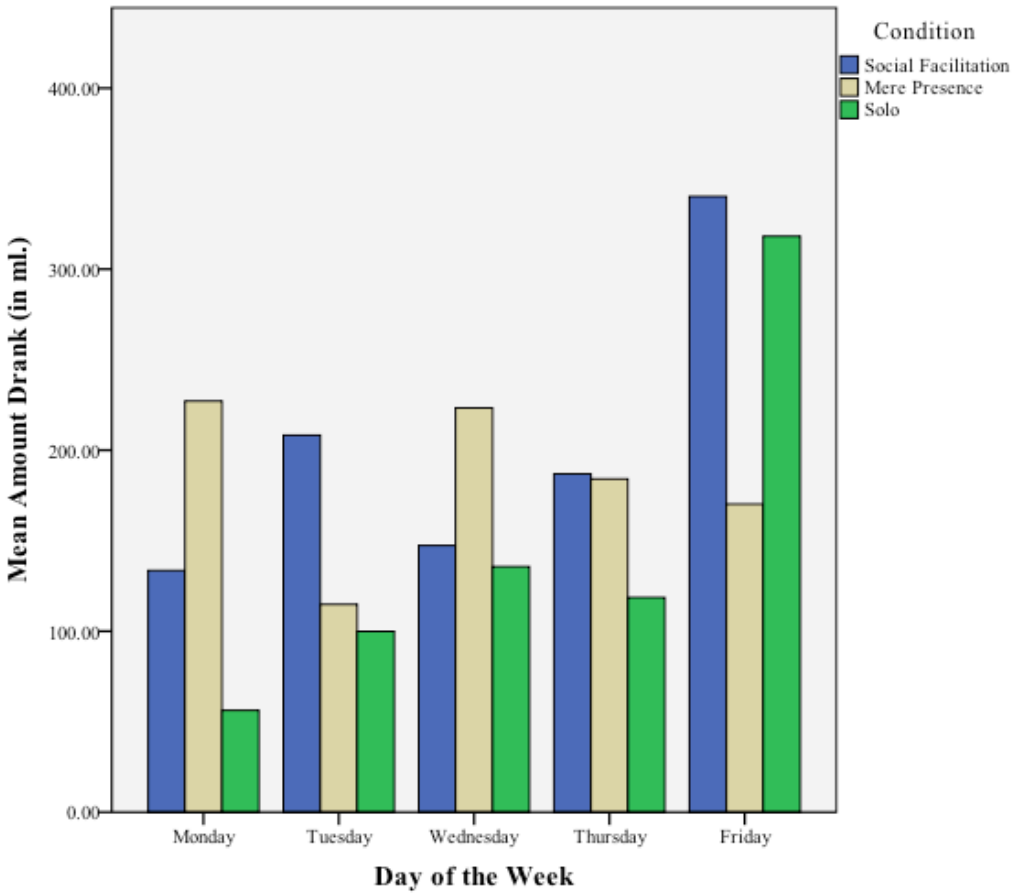


Figure 1. *Mean Amount of Placebo Consumed During Ad Libitum Drinking Session by Condition and Day of the Week.*

the lowest scores on these measures. Lastly, it was hypothesized that those in the SF condition would report greater perceived group reinforcement than those in the MP condition.

Before testing these hypotheses, the normality of outcome data was examined. The Kolmogorov-Smirnov and Shapiro-Wilk tests were run for each outcome and for baseline affect and arousal. According to these tests, the only outcome variable that was normally distributed was the total of beer ratings made during the taste test. All other

outcomes were consequently natural log transformed and these transformations were used in all analyses, though all tables and graphs included were created using raw data for ease of interpretation. Next, tests were run to identify any mean differences between conditions on outcome measures. Lastly, regression analyses were also conducted to look for possible interactions between social expectancies and condition.

**Differences between Conditions**

**Drinking.** The ultimate goal of this study was to determine whether manipulation of the social environment would affect drinking. The social manipulation was expected to result in increased drinking in the SF condition, with those in non-interactive groups drinking less and those who completed the protocol alone (S condition) drinking the least. Mean amount of beverage consumed and amount poured from carafes into glasses during the taste test reflect this expected pattern (see Table 4 for means and standard deviations by condition and gender) with those in the SF condition having consumed 202.69 ml on average (about 6.85 ounces, or over half a 12 ounce beer), those in the MP condition having consumed an average of 190.09 ml (about 6.43 ounces, also over half a beer), and those in the S condition having consumed about 122.30 ml (4.14 ounces; about 1/3 a beer). The pattern for amount poured was similar, with those in the SF condition pouring about 11.75 ounces (347.43 ml), those in the MP condition pouring about 11.66 ounces (344.75 ml) and about 7.99 ounces (236.40 ml) having been poured by those in the S condition.

To test whether these differences were statistically significant, a Multivariate Analysis of Covariance (MANCOVA) was conducted grouping the conceptually and statistically related amount of beverage consumed and amount poured as outcomes (see

Table 4

*Means and Standard Deviations for Drinking-Related variables by Condition and Gender*

| | SOCIAL FACILITATION | MERE PRESENCE | SOLO | ALL |
|---|---|---|---|---|
| **POURED** | | | | |
| Women | 300.92 (186.22)* | 303.32 (174.97)± | 219.90 (163.56)*± | 274.02 (176.76) |
| Men | 397.98 (164.83) | 449.70 (260.72) | 272.70 (188.36) | 377.16 (210.25) |
| **All** | **347.43 (181.18)** | **344.75 (210.99)** | **236.40 (171.45)** | **310.71 (195.04)** |
| **DRANK** | | | | |
| Women | 125.78 (110.92)* | 134.76 (131.34)± | 93.09 (101.12)*± | 118.10 (116.68) |
| Men | 286.29 (134.34) | 330.23 (248.65) | 186.56 (206.77) | 270.50(197.39) |
| **All** | **202.69 (145.93)** | **190.09 (191.89)** | **122.30 (147.02)** | **172.31 (166.70)** |
| **SIPS** | | | | |
| Women | 8.75 (6.76) | 9.55 (6.82) | 7.95 (6.75) | 8.86 (6.71) |
| Men | 14.43 (7.39) | 12.27 (6.75) | 9.75 (8.03) | 12.58 (7.35) |
| **All** | **11.40 (7.51)** | **10.30 (6.83)** | **8.46 (7.03)** | **10.11 (7.12)** |
| **DESIRE/DRINK** | | | | |
| Women | 6.76 (2.65)* | 6.87 (2.70)± | 6.03 (2.62)*± | 6.55 (2.66) |
| Men | 8.13 (3.61) | 9.60 (3.54) | 5.13 (3.10) | 7.65 (3.81) |
| **All** | **7.42 (3.19)** | **7.64 (3.18)** | **5.74 (2.78)** | **6.94 (3.15)** |
| **BEER RATINGS** | | | | |
| Women | 41.40 (9.96) | 38.78 (12.35) | 35.06 (12.88) | 38.15 (12.12) |
| Men | 36.26 (12.44) | 37.40 (10.62) | 38.75 (9.77) | 37.31 (11.05) |
| **All** | **38.94 (11.40)** | **38.39 (11.80)** | **36.24 (12.00)** | **37.85 (11.72)** |

Note. Poured = amount poured during ad libitum drinking session (in ml.); Drank = amount drank during ad libitum drinking session (in ml.); Sips = number of sips taken during ad libitum drinking session; Desire/Drink = self-reported desire to drink; Beer Ratings = overall beer ratings given during ad libitum drinking session.

Appendix D for correlation tables) and frequency of intoxication as a covariate (see Table 5 for results). There were significant differences between conditions for both variables ($F(2) = 3.363$; $p = .037$ for amount consumed, $F(2) = 5.451$, $p = .005$ for amount poured). Univariate test results indicated significant contrasts for both outcomes ($F(2) = 5.276$; $p = .006$ and $F(2) = 4.358$; $p = .015$ respectively) with those in both group conditions having poured statistically more than those in the S condition ($p = .004$ for both outcomes between SF and S; $p = 006$ for amount poured between MP and S and $p = .045$ for amount drank between MP and S). There were no differences found between the two group conditions. Thus the expectation that those in the S condition would pour and drink

the least of all three conditions was supported, but the hypothesis that those in the SF condition would pour and drink the most was not.

**Other drinking-related outcomes.** Analyses of Variance (ANCOVAs rather than a MANCOVA were used due to differences in available sample size for each outcome; see Table 6 for results) were conducted to examine whether differences existed between conditions on other drinking-related outcomes. Outcomes tested were the number of sips taken, participants' self-reported desire to drink, and overall ratings of the placebo beers. Bonferroni corrections were used for this round of analyses. There were no significant differences for number of sips taken during the taste test or beer ratings,

Table 5

*MANCOVA Table for Amount of Beverage Poured and Consumed*

Note. Frequency of Intox. = self-reported frequency of intoxication.

| Source | SS | *df* | MS | *F* | *P* |
|---|---|---|---|---|---|
| **Corrected Model** | | | | | |
| Poured | 9.99 | 1 | 9.99 | 28.16 | .000 |
| Consumed | 24.84 | 1 | 24.84 | 21.42 | .000 |
| **Intercept** | | | | | |
| Poured | 759.61 | 1 | 759.61 | 2140.54 | .000 |
| Consumed | 436.58 | 1 | 436.58 | 376.33 | .000 |
| **Frequency of Intox.** | | | | | |
| Poured | 9.99 | 1 | 9.99 | 28.16 | .000 |
| Consumed | 24.84 | 1 | 24.84 | 21.42 | .000 |
| **Error** | | | | | |
| Poured | 52.17 | 147 | .36 | | |
| Consumed | 170.53 | 147 | 1.16 | | |
| **Total** | | | | | |
| Poured | 4634.53 | 149 | | | |
| Consumed | 3377.20 | 149 | | | |
| **Corrected Total** | | | | | |
| Poured | 62.16 | 148 | | | |
| Consumed | 195.38 | 148 | | | |

Table 6

*Combined ANCOVA Table for Number of Sips Taken, Desire to Drink, and Overall Beer Ratings*

| Source | SS | *df* | MS | *F* | *p* |
|---|---|---|---|---|---|
| **Corrected Model** | | | | | |
| Sips | 10.239 | 3 | 3.413 | 7.001 | .000 |
| Desire | 196.614 | 3 | 65.538 | 7.435 | .000 |
| Ratings | 1.139 | 3 | .380 | 2.553 | .058 |
| **Intercept** | | | | | |
| Sips | 33.430 | 1 | 33.430 | 68.570 | .000 |
| Desire | 864.656 | 1 | 864.656 | 98.086 | .000 |
| Ratings | 345.543 | 1 | 345.543 | 2324.292 | .000 |
| **Frequency of Intox.** | | | | | |
| Sips | 8.105 | 1 | 8.105 | 16.624 | .000 |
| Desire | 87.626 | 1 | 87.626 | 9.940 | .002 |
| Ratings | .968 | 1 | .968 | 6.512 | .012 |
| **Condition** | | | | | |
| Sips | .827 | 2 | .413 | .848 | .432 |
| Desire | 69.717 | 2 | 34.858 | 3.954 | .021 |
| Ratings | .045 | 2 | .022 | .151 | .860 |
| **Error** | | | | | |
| Sips | 45.828 | 94 | .488 | | |
| Desire | 1295.850 | 147 | 8.815 | | |
| Ratings | 21.854 | 147 | .149 | | |
| **Total** | | | | | |
| Sips | 468.608 | 98 | | | |
| Desire | 8766.000 | 151 | | | |
| Ratings | 1948.907 | 151 | | | |
| **Corrected Total** | | | | | |
| Sips | 56.068 | 97 | | | |
| Desire | 1492.464 | 150 | | | |
| Ratings | 22.993 | 150 | | | |

Note. Frequency of Intox. = self-reported frequency of intoxication.

but there was a significant difference between conditions on desire to drink ($F(2) = 5.83$; $p = .004$) with those in group conditions reporting a higher desire to drink alcohol at the beginning of the taste test than those in the S condition. As with drinking, there was no difference between the two group conditions. The consistency in this pattern indicates

that the effect exerted by membership in a group condition preceded the actual taste test. Those in group conditions wanted to drink more than those in the S condition and subsequently did.

**Reward and risk evaluation differences.** It was hypothesized that differences in drinking-related behavior would be driven by differential patterns of risk and reward evaluation. To examine whether differences between conditions existed, a MANCOVA was conducted including all three YDMQ measures of decision-making under all three conditions of consequence (if it was known there would be no negative outcome, if it was known there would be a negative outcome, if the outcome were uncertain), and an ANVOCA was conducted with k as the dependent variable (see Table 7 for means and standard deviations by condition and gender). Neither of these analyses yielded significant results (see Tables 8 and 9). As participants across the three conditions did not seem to evaluate risk and reward differently, further examination of possible links between risk/reward evaluation and drinking in this sample was precluded. Lack of differences between conditions on these variables could indicate that the experimental manipulation was not strong enough to affect how participants evaluated risk and reward. It may also be that differences in drinking behavior between conditions were not driven by such evaluations as was hypothesized. Alternatively, the instruments used to measure these constructs may not have been sensitive enough to detect possible differences between conditions.

**Differences in subjective experience.** Those in the Social Facilitation condition were expected to report significantly different subjective experiences of their

Table 7

*Means and Standard Deviations for Risk/Reward Evaluation Variables by Condition and Gender*

| | SOCIAL FACILITATION | MERE PRESENCE | SOLO | ALL |
|---|---|---|---|---|
| **K** | | | | |
| Women | .0289 (.0510) | .0257 (.0412) | .0229 (.0434) | .0257 (.0443) |
| Men | .0453 (.0593) | .0470 (.0591) | .0432 (.0672) | .0452 (.0604) |
| **All** | **.0365 (.0548)** | **.0326 (.0483)** | **.0292 (.0522)** | **.0329 (.0515)** |
| **YDMQ NO** | | | | |
| Women | 11.13 (1.70) | 10.89 (1.54) | 11.24 (1.94) | 11.08 (1.72) |
| Men | 10.88 (1.61) | 11.32 (1.83) | 11.13 (1.93) | 11.08 (1.74) |
| **All** | **11.02 (1.65)** | **11.04 (1.64)** | **11.20 (1.92)** | **11.08 (1.72)** |
| **YDMQ NEG.** | | | | |
| Women | 13.17 (.83) | 13.00 (1.12) | 13.15 (1.16) | 13.10 (1.05) |
| Men | 12.92 (1.13) | 13.21 (.85) | 12.81 (1.05) | 12.98 (1.02) |
| **All** | **13.05 (.98)** | **13.07 (1.03)** | **13.04 (1.12)** | **13.06 (1.04)** |
| **YDMQ UN.** | | | | |
| Women | 12.07 (1.51) | 12.00 (1.34) | 12.29 (1.82) | 12.12 (1.44) |
| Men | 12.23 (1.18) | 12.47 (1.39) | 11.94 (1.44) | 12.23 (1.31) |
| **All** | **12.14 (1.12)** | **12.16 (1.36)** | **12.18 (1.70)** | **12.16 (1.39)** |

Note. K = delay discounting parameter; YDMQ NO NEG. = Youth Decision Making Questionnaire score for circumstances under which respondents knew outcomes would *not* be negative; YDMQ NEG. = Youth Decision Making Questionnaire score for circumstances under which respondents knew outcomes *would* be negative; YDMQ NO NEG. = Youth Decision Making Questionnaire score for circumstances under which respondents were uncertain of outcomes.

participation than those in the other conditions. SF participants were expected to make significantly higher ratings of affect valence and arousal following the social manipulation as measured by the Affect Grid. Those in the SF condition were also expected to report that they found their group experience to be more rewarding than those in the MP condition did (as measured by the PGRS; see Table 10 for observed means and standard deviations). Three different analyses were conducted to test these hypotheses. ANCOVAs examined possible differences in post-manipulation affect valence (controlling for baseline affect), arousal (controlling for baseline arousal), and the PGRS

Table 8

*MANCOVA Table for YDMQ Subscales*

| Source | SS | *df* | MS | *F* | *p* |
|---|---|---|---|---|---|
| **Corrected Model** | | | | | |
| No negative | .015 | 3 | .005 | .181 | .909 |
| Negative | .051 | 3 | .017 | 2.652 | .051 |
| Uncertain | .004 | 3 | .001 | .098 | .961 |
| **Intercept** | | | | | |
| No negative | 182.047 | 1 | 182.047 | 6627.256 | .000 |
| Negative | 217.970 | 1 | 217.970 | 33902.013 | .000 |
| Uncertain | 201.554 | 1 | 201.554 | 13868.311 | .000 |
| **Frequency of Intox.** | | | | | |
| No negative | .010 | 1 | 600.76 | 13.49 | .000 |
| Negative | .051 | 1 | 87.63 | 9.94 | .002 |
| Uncertain | .004 | 1 | 1155.78 | 8.83 | .003 |
| **Condition** | | | | | |
| No negative | .007 | 2 | .004 | .134 | .875 |
| Negative | .003 | 2 | .002 | .245 | .783 |
| Uncertain | .001 | 2 | .000 | .029 | .971 |
| **Error** | | | | | |
| No negative | 4.340 | 158 | 44.55 | | |
| Negative | 1.016 | 158 | 8.815 | | |
| Uncertain | 2.296 | 158 | 130.915 | | |
| **Total** | | | | | |
| No negative | 931.922 | 162 | | | |
| Negative | 1067.318 | 162 | | | |
| Uncertain | 1007.766 | 162 | | | |
| **Corrected Total** | | | | | |
| No negative | 4.355 | 161 | | | |
| Negative | 1.067 | 161 | | | |
| Uncertain | 2.301 | 161 | | | |

Note. Frequency of Intox. = self-reported frequency of intoxication.

(see Table 11 for results). Both mood ANCOVAs were significant, with those in the SF condition reporting higher levels of post-manipulation affect valence and arousal than those in the MP or S conditions ($F(2) = 8.92$; $p < .001$; $F(2) = 8.90$; $p < .001$ respectively). Thus as expected, those in the SF condition experienced heightened subjective mood and arousal as a result of the interactive experimental manipulation.

Table 9

*ANCOVA Table for Delay Discounting Parameter k*

| **Source** | **SS** | ***df*** | **MS** | ***F*** | ***p*** |
|---|---|---|---|---|---|
| **Corrected Model** | 9.913 | 3 | 3.04 | 2.036 | .111 |
| **Intercept** | 709.865 | 1 | 709.865 | 437.347 | .000 |
| **Frequency of Intox.** | 8.994 | 1 | 8.994 | 5.541 | .020 |
| **Condition** | .212 | 2 | .106 | .065 | .937 |
| **Error** | 261.321 | 161 | 1.623 | | |
| **Total** | 3179.548 | 165 | | | |
| **Corrected Total** | 271.234 | 164 | | | |

Note. Frequency of Intox. = self-reported frequency of intoxication.

PGRS scores from one Social Facilitation Group (3 participants) were excluded from analysis because the score of one participant in the SF condition (PGRS total = 41) fell further than three standard deviations below the mean PGRS score for the SF condition ($M$ = 90.86; $SD$ = 14.83) and for the whole sample ($M$ = 87.87; $SD$ = 15.48; maximum possible PGRS score = 108). Scores for the other group members (which were 62 and 72) were also excluded due to possible contamination of their social experiences by the third group member. There were no outlier scores in the MP condition. The removal of these scores resulted in a 3-point increase in the mean PGRS score for the SF condition ($M$ = 93.03; $SD$ = 12.11). A significant difference was found between the SF and MP conditions on the PGRS; those in the SF condition reported significantly greater perceived reinforcement from their experimental groups ($F(1) = 7.63$; $p = .007$).

Table 10

*Means and Standard Deviations for Subjective Experience Variables by Condition and Gender*

| | SOCIAL FACILITATION | MERE PRESENCE | SOLO | ALL |
|---|---|---|---|---|
| **AFFECT 2** | | | | |
| Women | 6.23 (1.33)*± | 5.50 (1.26)* | 5.77 (1.57)± | 5.80 (1.41) |
| Men | 6.62 (1.42) | 6.00 (1.15) | 6.56 (1.09) | 6.41 (1.27) |
| **All** | **6.41 (1.37)** | **5.07 (1.52)** | **6.02 (1.48)** | **6.02 (1.39)** |
| **AROUSAL 2** | | | | |
| Women | 5.93 (1.17)*± | 4.90 (1.50)* | 5.23 (1.52)± | 5.30 (1.47) |
| Men | 6.38 (1.42) | 5.42 (1.54) | 5.75 (2.08) | 5.92 (1.68) |
| **All** | **6.14 (1.30)** | **5.07 (1.52)** | **5.39 (1.71)** | **5.53 (1.57)** |
| **PGRS** | | | | |
| Women | 92.20 (12.03)*± | 83.97 (14.40)* | - | 87.13 (14.03) |
| Men | 93.91 (12.42) | 87.87 (18.75) | - | 31.46 (15.35) |
| **All** | **93.03 (12.11)** | **85.10 (15.68)** | - | **88.78 (14.62)** |

Note. AFFECT 2 = post-manipulation affect valence; AROUSAL 2 = post-manipulation arousal; PRGS = Perceived Group Reinforcement Scale.

These findings support the initial hypotheses that those in the SF condition would experience increased affect, arousal, and perceived groupiness as a result of the experimental manipulation. Interestingly, however, this pattern of results differs from drinking patterns in this sample. Those in the SF condition experienced higher mood, arousal, and a more positive group-related experience than those in the MP and S conditions. Yet those in the MP condition poured and drank as much as those in the SF condition during the taste test. This pattern demonstrates that though the manipulation affected the subjective experiences of participants in the SF condition, the mere presence of others was sufficient to result in increased drinking.

**Moderator Analyses**

Lastly, regression analyses examined whether social and tension-reduction expectancies moderated the relationship between condition and drinking-related

Table 11

*Combined ANCOVA Table for Post-Manipulation Affect, Arousal, and PGRS*

| Source | SS | *df* | MS | *F* | *p* |
|---|---|---|---|---|---|
| **Corrected Model** | | | | | |
| Affect | 4.439 | 4 | 1.110 | 24.569 | .000 |
| Arousal | 8.743 | 4 | 2.186 | 47.864 | .000 |
| PGRS | .240 | 2 | .120 | 3.840 | .025 |
| **Intercept** | | | | | |
| Affect | 2.313 | 1 | 2.313 | 51.208 | .000 |
| Arousal | 2.694 | 1 | 2.694 | 47.864 | .000 |
| PGRS | 339.723 | 1 | 339.723 | 10851.526 | .000 |
| **Baseline** | | | | | |
| Affect | 4.012 | 1 | 4.012 | 88.822 | .000 |
| Arousal | 7.100 | 1 | 7.100 | 126.128 | .000 |
| PGRS | - | - | - | - | - |
| **Freq. of Intox**. | | | | | |
| Affect | .093 | 1 | .093 | 2.064 | .153 |
| Arousal | .049 | 1 | .049 | .877 | .350 |
| PGRS | .235 | 1 | .235 | .118 | .732 |
| **Condition** | | | | | |
| Affect | .822 | 2 | .411 | 9.104 | .000 |
| Arousal | 1.001 | 2 | .500 | 8.888 | .000 |
| PGRS | 2.943 | 94 | .031 | 7.500 | .007 |
| **Error** | | | | | |
| Affect | 7.227 | 160 | .045 | | |
| Arousal | 9.007 | 160 | .056 | | |
| PGRS | 2.943 | 94 | .031 | | |
| **Total** | | | | | |
| Affect | 525.789 | 165 | | | |
| Arousal | 473.176 | 165 | | | |
| PGRS | 1942.072 | 97 | | | |
| **Corrected Total** | | | | | |
| Affect | 11.667 | 165 | | | |
| Arousal | 17.750 | 165 | | | |
| PGRS | 3.183 | 96 | | | |

Note. Frequency of Intox. = self-reported frequency of intoxication.

outcomes. Analyses were conducted to further examine each drinking-related outcome that significantly varied by condition (amount consumed during the taste test, amount poured, and Desire to Drink). For each outcome, three analyses were run, one looking at

Table 12

*Regression Table for Social Alcohol Expectancies and Condition on Drinking-Related Outcomes: Solo versus Group Conditions*

| OUTCOME | SOURCE | *B* | *SE* | $\beta$ | *t* | *p* |
|---|---|---|---|---|---|---|
| AMOUNT COMSUMED | Constant | 2.977 | .549 | | 5.424 | .000 |
| | Social Facilitation | -.152 | .856 | -.065 | -.178 | .859 |
| | Mere Presence | -.128 | .854 | -.055 | -.150 | .881 |
| | AEQ SPP | .119 | .051 | .215 | 2.628 | .010 |
| | Freq. of Intox. | .133 | .074 | .196 | 1.605 | .111 |
| | SF x SPP | .103 | .114 | .333 | .902 | .369 |
| | MP x SPP | .072 | .114 | .235 | .632 | .529 |
| | | **FULL MODEL adjusted $R^2$=.183; $F$(6) = 6.009**** | | | | |
| | Constant | 3.038 | .433 | | 7.015 | .000 |
| | Social Facilitation | 1.494 | .589 | .607 | 2.536 | .012 |
| | Mere Presence | .503 | .554 | .210 | .909 | .365 |
| | Freq. of Intox. | .143 | .053 | .222 | 2.708 | .008 |
| | AEQ SA | .090 | .055 | .237 | 1.645 | .102 |
| | SF x SA | -.108 | .077 | -.329 | -1.408 | .161 |
| | MP x SA | .006 | .071 | .020 | .088 | .930 |
| | | **FULL MODEL adjusted $R^2$=.166; $F$(6) = 5.643**** | | | | |
| | Constant | 3.030 | .400 | | 7.570 | .000 |
| | Social Facilitation | 1.049 | .546 | .446 | 1.921 | .057 |
| | Mere Presence | .233 | .566 | .100 | .411 | .682 |
| | Freq. of Intox. | .143 | .051 | .231 | 2.783 | .006 |
| | AEQ TR | .132 | .063 | .296 | 2.088 | .039 |
| | SF x TR | -.077 | .087 | -.211 | -.888 | .376 |
| | MP x TR | .020 | .087 | .058 | .228 | .820 |
| | | **FULL MODEL adjusted $R^2$=.181; $F$(6) = 5.869**** | | | | |
| AMOUNT POURED | Constant | 4.432 | .312 | | 14.223 | .000** |
| | Social Facilitation | -.156 | .486 | -.115 | -.320 | .749 |
| | Mere Presence | .729 | .485 | .542 | 1.504 | .135 |
| | AEQ SPP | .074 | .042 | .260 | 3.258 | .001 |
| | Freq. of Intox. | .094 | .029 | .212 | 1.772 | .079 |
| | SF x SPP | .074 | .065 | .407 | 1.133 | .259 |
| | MP x SPP | -.051 | -.051 | -.285 | -.784 | .435 |
| | | **FULL MODEL adjusted $R^2$=.222; $F$(6) = 7.391**** | | | | |
| | Constant | 4.645 | .240 | | 19.339 | .000 |
| | Social Facilitation | .600 | .327 | .436 | 1.836 | .069 |
| | Mere Presence | .496 | .307 | .371 | 1.614 | .109 |
| | Freq. of Intox. | .111 | .029 | .308 | 3.782 | .000 |
| | AEQ SA | .036 | .030 | .167 | 1.170 | .244 |
| | SF x SA | -.034 | .043 | -.184 | -.792 | .430 |
| | MP x SA | -.020 | .039 | -.115 | -.496 | .621 |
| | | **FULL MODEL adjusted $R^2$=.178; $F$(6) = 6.063**** | | | | |
| | Constant | 4.577 | .229 | | 19.993 | .000 |
| | Social Facilitation | .441 | .313 | .323 | 1.410 | .161 |
| | Mere Presence | .635 | .324 | .471 | 1.960 | .052 |
| | Freq. of Intox. | .091 | .029 | .254 | 3.096 | .002 |
| | AEQ TR | .065 | .036 | .252 | 1.799 | .074 |
| | SF x TR | -.006 | .050 | -.028 | -.118 | .907 |
| | MP x TR | -.045 | .050 | -.228 | -.900 | .370 |
| | | **FULL MODEL adjusted $R^2$=.201; $F$(6) = 6.543**** | | | | |

Table 12 Continued

| | | | | | | |
|---|---|---|---|---|---|---|
| **DESIRE TO DRINK** | Constant | 1.260 | .218 | | 5.777 | .000 |
| | Social Facilitation | .181 | .347 | .191 | .522 | .603 |
| | Mere Presence | -.194 | .346 | -.206 | -.560 | .576 |
| | Freq. of Intox. | .053 | .021 | .212 | 2.569 | .011 |
| | AEQ SPP | .037 | .030 | .152 | 1.253 | .212 |
| | SF x SPP | .001 | .047 | .011 | .031 | .975 |
| | MP x SPP | .059 | .046 | .470 | 1.263 | .209 |
| | | | **FULL MODEL adjusted $R^2$=.160; $F$(6) = 5.312**** | | | |
| | Constant | 1.375 | .170 | | 8.071 | .000 |
| | Social Facilitation | .205 | .232 | .214 | .883 | .379 |
| | Mere Presence | .129 | .218 | .138 | .590 | .556 |
| | Freq. of Intox. | .043 | .021 | .172 | 2.072 | .040 |
| | AEQ SA | .023 | .021 | .154 | 1.068 | .287 |
| | SF x SA | .005 | .030 | .040 | .172 | .864 |
| | MP x SA | .020 | .028 | .170 | .722 | .471 |
| | | | **FULL MODEL adjusted $R^2$=.141; $F$(6) = 4.871**** | | | |
| | Constant | 1.306 | .163 | | 8.002 | .000 |
| | Social Facilitation | .452 | .225 | .470 | 2.014 | .046 |
| | Mere Presence | .028 | .233 | .029 | .121 | .904 |
| | Freq. of Intox. | .060 | .021 | .238 | 2.825 | .005 |
| | AEQ TR | .032 | .026 | .176 | 1.237 | .218 |
| | SF x TR | -.043 | .036 | -.289 | -1.204 | .231 |
| | MP x TR | .029 | .036 | .212 | .818 | .415 |
| | | | **FULL MODEL adjusted $R^2$=.150; F(6) = 4.916**** | | | |

Note. Freq. of Intox. = self-reported frequency of intoxication.; AEQ SPP = Alcohol Expectancy Questionnaire Social and Physical Pleasure scale; AEQ SA = Alcohol Expectancy Questionnaire Social Assertion scale; AEQ TR = Alcohol Expectancy Questionnaire Tension Reduction scale.

the impact of the AEQ Social and Physical Pleasure (SPP) subscale, one looking at the impact of the AEQ Social Assertion (SA) subscale, and one looking at AEQ Tension Reduction (TR). Two condition variables were included in analyses, one indicating membership in the SF condition (coded 1 for SF participants, 0 for others) and one indicating membership in the MP condition (coded 1 for MP participants, 0 for others). For each analysis, the two condition variables were entered in step one, the AEQ score and frequency of intoxication in step 2, and the interaction terms between the two condition variables and AEQ score in step 3. There were multiple main effects for condition, AEQ, and frequency of intoxication on drinking outcomes, but no interaction terms were significant (see Table 12).

## Discussion

Humans are a social species, and past research has shown social factors to have tremendous impact on the perception and behavior of individuals. Alcohol use patterns also are strongly tied to social factors. Membership in certain social groups affects risk for binge drinking and alcohol-related consequences. Modeling and social traditions impact situational drinking, and the size and composition of immediate social groups affect patterns of alcohol consumption.

The main hypothesis of this study was that exposure to a social environment, operationalized as social interaction within small groups, would impact alcohol-related behavior more than the mere presence of others would. Specifically, it was expected that those in interactive small groups would drink more placebo alcohol than those in non-interactive small groups or those not in groups. It was expected that following the social manipulation, those in the Social Facilitation condition would experience shifts in their evaluation of risk and reward, resulting in increased affect valence and arousal, greater rates of delay discounting, and higher self-reported likelihood of risky decisions. Thus those in the Social Facilitation condition were not only expected to drink more than those in other conditions, but also to report higher levels of post-manipulation affect valence and arousal, to have higher rates of delay discounting (k) and self-reported risky decision-making (as measured by the YDMQ). Finally, those in the Social Facilitation condition

were also expected to report greater perceived group reinforcement than those in the Mere Presence condition (as measured by the PGRS).

The main hypothesis of this study, that social influences would impact drinking, was supported. Yet results told a different story than was expected. Those in interactive groups were expected to drink more than those in the other two conditions, and those the Solo condition were expected to drink the least. While those in the Solo condition did drink significantly less than those in the group conditions, participants in the Social Facilitation and Mere Presence poured and drank equivalent amounts during the taste test. This indicates that the added experimental manipulation of interaction for the Social Facilitation condition during the focus group did not incrementally impact drinking behavior beyond the mere presence of others in a small group. Thus it did not matter whether small groups interacted or not; just being around other young adults yielded enough influence to result in greater drinking. This indicates that higher levels of drinking and related behavior in social situations may be driven by self-presentation and not by factors tied to interaction per se. Those in the Mere Presence and Social Facilitation conditions certainly would have been concerned with self-presentation whether they interacted with their small groups or not.

At the outset of the taste test, those in the two group conditions reported a significantly higher desire to drink alcohol than those in the Solo condition. This indicates that the social presence that impacted drinking had already exerted its effect prior to alcohol consumption. This could be because the presence of others resulted in private conformity to expectations about the relationship between social groups and

alcohol consumption. In other words, the equivalence of desire to drink between the group conditions could be the result of social contagion.

An alternative explanation for the equivalence of desire to drink and drinking behavior between the group conditions is that those in the Social Facilitation condition drank more because they experienced greater sociality, while those in non-interactive groups desired to drink and drank to reduce possible social anxiety associated with sitting with others without interaction. Those in the Mere Presence condition sat next to each other during the focus group and taste test portions of the study and were asked not to interact; this may have resulted in high levels of tension or awkwardness, elevated desire to drink, and subsequent increase in drinking behavior to alleviate it.

This latter explanation is more consistent with findings regarding post-manipulation mood and perceived group reinforcement. Those in the Social Facilitation condition reported more positive and activated mood than those in the Mere Presence or Solo conditions and a more positive group experience than those in the Mere Presence condition. Thus it is possible that affect, arousal, and positive group experience drove drinking in the Social Facilitation Condition, and that drinking was driven by unmeasured factors (possibly a desire to reduce tension) in the Mere Presence condition. If desire to drink and amount of placebo poured and consumed were driven by social contagion factors, post-manipulation mood and perceived group reinforcement could also be expected to have been equivalent between group conditions.

Equivalent mean scores across all three conditions on the delay discounting and decision-making measures indicated that evaluation of risk and reward was not affected by the manipulation. In other words, results from this study to not indicate that social

influence on drinking necessarily occurs via shifts in reward evaluation. These results also may have been due to a weak manipulation or due to inability of the measures used to capture reward and risk evaluation shifts. Delay discounting has been seldom used as a state measure, and conditions under which shifts in discounting may occur are not fully understood. The YDMQ is a relatively unknown measure without well-established psychometric properties and, like delay discounting, conditions under which differences in scores can be expected to be found are not well known.

Interactions between social and tension-reduction expectancies were not found. If the explanation that a high overall desire to drink and elevated drinking behavior were driven by social forces in the Social Facilitation condition and by a desire to reduce tension in the Mere Presence condition were correct, then such interactions would have been expected. Lack of such findings may be evidence for the social contagion interpretation of results, though lack of power or restriction of range in expectancy scores may also have affected these analyses.

**Study Limitations and Directions for Future Research**

The process by which social settings influence drinking is not fully understood. This exploratory study sought to isolate elements of the social environment (presence of vs. interaction with others) and determine their effect on drinking-related behavior. It also attempted to identify affective and cognitive mediators of this environment-behavior link. The constructs this study attempted to measure are not easily operationalized. For example, there are few sources that discuss what constitutes a "group" or how to measure social phenomena that occur within cohesive groups. Few studies that have attempted to manipulate such phenomena. Similarly, there are not many valid measures that have been

established to measure constructs related to "groupiness" or social cohesion. Consequently, it was difficult to identify precisely what type of effect to expect from the social manipulation and to measure it. Furthermore, objective judging of social interaction proved near impossible. Few rating schemes are available, and those that do exist require tremendous expertise, advanced technology, and are time intensive.

Another difficulty is that, given the automatic nature of social interaction, it was not possible to fully control sociality. While many groups in the Mere Presence condition followed experimenters' requests not to talk, several groups spontaneously interacted at different points during the experiment. Therefore within this condition there was great variability in how much interaction occurred and in participants' perceptions of group reinforcement. The close proximity of participants in this study may have encouraged interaction and clouded the distinction between mere presence and interaction effects. Future work may be informed by the social facilitation literature, which has demonstrated that mere presence effects still occur when there is greater physical distance between individuals. Social facilitation effects have also been found simply when participants expected that they were being observed by or interacting with individuals in another room.

As it was difficult to prevent interaction in the Mere Presence condition, it was also at times difficult to create it among groups in the Social Facilitation condition. Participants in this study presented to earn points for partial course credit or extra credit and not with the intention to socialize. Some participants in this condition seemed to have limited motivation to engage with others during the focus group conversation or taste test. Many participants discussed coursework and commitments during the taste test,

suggesting that they were preoccupied with factors outside of the room and not fully focused on immediate social processes.

Though earlier research by Gardener and Steinberg (2005) has demonstrated that individuals in small pre-established social groups tend to take greater risks than individuals alone, this is the first study known to this writer that *created* small social groups with the purpose of facilitating risky behavior. In Gardner and Steinberg's (2005) research, index participants were accompanied by two members of their pre-existing social circle, thus allowing for activation of existing social expectations and scripts and negating any need for alliance building between group members. In the present study, participants likely had less stake in the opinions of others and also may have had less in common with other group members or other difficulties relating to them; this was observed at times both in focus group discussions and in interactions during the taste test. Despite these problems, however, most participants in the Social Facilitation condition did engage in prosocial behavior in their groups and several groups were characterized by the expected tenor of high sociality.

It also seemed to be the case that group interactions during the taste test may have impacted outcomes in unexpected ways, especially for the Social Facilitation condition. In group discussions during the taste test, groups unfailingly discussed the task, which typically meant discussion of the beverages they were rating. If one participant began to make comments regarding the taste of the beverages or verbalize suspicion that they were nonalcoholic (which happened several times), other group members' opinions may have been impacted. Thus given statements of dislike for one or both beverages and a handful of comments regarding the alcohol content of the beverages, it is possible that

consumption of the beverages was actually suppressed in the Social Facilitation condition.

Creation of groups was a painstaking endeavor. Often not enough participants would enroll in a session to create a group of three to five, or one or more enrolled participant would not present. In these cases it was necessary to attempt to reschedule participants for sessions in order to create groups. It is possible that this raised suspicion in some participants. These reschedulings came up several times in conversation during taste tests, and sometimes led to hypothesizing about the purpose of the study. Further, these scheduling difficulties resulted in high enrollment in the Solo condition earlier in the course of data collection. Related, there was a difference between the Solo and Mere Presence conditions on day of the week sessions were run, Though no discernable pattern of drinking during the taste test by condition and day of the week that may have driven findings on drinking differences were found. Since college student drinking is known to vary significantly by day of the week, this factor should be carefully controlled in future research using similar paradigms.

Many of these study limitations all point to a need for stronger literature regarding the social environment. Better characterizations and measures of groupiness and sociality in groups are needed. Further, a greater understanding of the impact of social environments and interactions on affective and cognitive function including alcohol expectancy is needed, as is more thorough experimental exploration of the impact of social factors on drinking behavior. Though this study design met with some unexpected complications, they were still transcended by the influence of social influence on subjective experience and drinking-related behavior.

## Conclusions

Despite some limitations brought forth by the exploratory nature of this study, the pattern of results found here remains striking. Those in any kind of small group drank more than those alone and beforehand reported a higher desire to do so. Those in interactive groups reported greater affect and arousal following experimental manipulation and a more positive group experience at the end of the study than those in other conditions. I have offered two explanations for the similarities between the group conditions. One is be that social contagion resulted in private conformity; concern with self-presentation may have impacted individuals' drinking cravings and drinking. Alternatively, a social facilitation effect may have been responsible for cravings and drinking for those in interactive groups, while desire to relieve anxiety or social tension may have driven these behaviors in non-interactive groups. Hopefully future research can provide evidence for which of these explanations may be more accurate by tapping into social cognitive processes or motives for drinking. Further, this study may inform future attempts to examine whether the effects reported here occur similarly for men versus women, and for same-sex versus mixed-sex groups.

These results offer some insight into the elevated alcohol-related risk that young adults face. Hopefully with clarification regarding the reasons for the present pattern of results, this research can guide future investigation into understanding alcohol-related risk in Emerging Adulthood. Ultimately work in this arena will hopefully contribute to the development of effective interventions to reduce such risk and associated morbidity, mortality, and costs to society.

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# Appendices

## Appendix A: Desire to Drink Questionnaire

Please answer the following questions about how you feel right now.

1. **I want to drink right now.**

   1 2 3 4 5

   Completely disagree Completely agree

2. **I crave a drink right now.**

   1 2 3 4 5

   Completely disagree Completely agree

3. **If it were not for other things I had to do, I would drink more right now.**

   1 2 3 4 5

   Completely disagree Completely agree

4. **I have a desire for a drink right now.**

   1 2 3 4 5

   Completely disagree Completely agree

5. **Other responsibilities are keeping me from drinking how much I want to right now.**

   1 2 3 4 5

   Completely disagree Completely agree

## Appendix B: Taste Test Rating Form

Product: __[A or B]__

Please rate this product on the following dimensions by circling the number you think best represents the corresponding characteristic. Please take your time.

1. **How appealing is the <u>color</u> of this product?**

0 1 2 3 4 5 6 7

completely unappealing very appealing

2. **How appealing is the <u>consistency</u> of this product?**

0 1 2 3 4 5 6 7

completely unappealing very appealing

3. **How appealing is the <u>aroma</u> of this product?**

0 1 2 3 4 5 6 7

completely unappealing very appealing

4. **How does this product <u>taste</u>?**

0 1 2 3 4 5 6 7

disgusting delicious

5. **How likely would you be to drink this product at a party?**

0 1 2 3 4 5 6 7

I would never drink this I would definitely drink this

## Appendix C: Television Advertisement Questionnaire

We are trying to gather information from consumers about how they perceive different advertisements, and why. Sometimes we are drawn to television commercials, sometimes they bother us, and sometimes we find them very persuasive. Please answer each of the following questions as thoughtfully and with as much detail as possible. If you are asked the same question more than once, please answer with information about a *different* commercial or ad campaign.

1. Describe a television commercial you feel very strongly about (really like, really don't like, or think has influenced you).

2. What is the product or service advertised?

3. What is it about this commercial or ad campaign that appeals/doesn't appeal to you? Please be as specific as possible.

4. What is most memorable about this commercial/ad campaign?

5. Do you like or dislike the people in the ad? Why? Please be as specific as possible.

6. What do you think could be done to improve this commercial/ad campaign?

## Appendix D: Correlations between Variables[1]

Table D1

*Correlations between Alcohol Expectancy Questionnaire and Personality Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. AEQ GLO** | 1 | - | - | - | - | - | - | - | - | - | - |
| **2. AEQ SEX** | .63** | 1 | - | - | - | - | - | - | - | - | - |
| **3. AEQ SPP** | .61** | .51** | 1 | - | - | - | - | - | - | - | - |
| **4. AEQ SA** | .67** | .51** | .63** | 1 | - | - | - | - | - | - | - |
| **5. AEQ TR** | .71** | .53** | .71** | .62** | 1 | - | - | - | - | - | - |
| **6. AEQ AA** | .71** | .63** | .60** | .66** | .67** | 1 | - | - | - | - | - |
| **7. AEQ TOT** | .91** | .74** | .76** | .81** | .82** | .83** | 1 | - | - | - | - |
| **8. ZKPQ IMP** | .05 | .01 | .06 | -.03 | .08 | .08 | .01 | 1 | - | - | - |
| **9. ZKPQ SS** | .15 | .10 | .11 | .04 | .21* | .17* | .14 | .51** | 1 | - | - |
| **10. ZKPQ I-SS** | .12 | .06 | .11 | .02 | .18* | .15 | .10 | .80** | .92** | 1 | |
| **11. NEO-E** | -.05 | -.07 | .10 | -.16* | .07 | -.07 | -.03 | .15 | .16* | .16* | 1 |

*Note.* AEQ GLO = Alcohol Expectancy Questionnaire Global Positive scale; AEQ SEX = Alcohol Expectancy Questionnaire Sexual Enhancement scale; AEQ SPP = Alcohol Expectancy Questionnaire Social and Physical Pleasure scale; AEQ SA = Alcohol Expectancy Questionnaire Social Assertiveness scale; AEQ TR = Alcohol Expectancy Questionnaire Tension Reduction scale; AEQ AA = Alcohol Expectancy Questionnaire Arousal and Aggression scale; AEQ TOT = Alcohol Expectancy Questionnaire Total; ZKPQ IMP = Zuckerman-Kuhlman Personality Questionnaire Impulsivity scale; ZKPQ SS = Zuckerman-Kuhlman Personality Questionnaire Sensation Seeking scale; ZKPQ I-SS = Zuckerman-Kuhlman Personality Questionnaire Impulsivity-Sensation Seeking scale; NEO-E = NEO Extraversion scale.

[1] Correlations were computed using log transformed values of all dependent measures except average beer ratings (as were all analyses). Data used for all other variables were raw.

## Appendix D Continued

Table D2

*Correlations between Alcohol Expectancy Questionnaire and Self-Reported Drinking Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. AEQ GLO** | 1 | - | - | - | - | - | - | - | - | - |
| **2. AEQ SEX** | .63** | 1 | - | - | - | - | - | - | - | - |
| **3. AEQ SPP** | .61** | .51** | 1 | - | - | - | - | - | - | - |
| **4. AEQ SA** | .67** | .51** | .63** | 1 | - | - | - | - | - | - |
| **5. AEQ TR** | .71** | .53** | .71** | .62** | 1 | - | - | - | - | - |
| **6. AEQ AA** | .71** | .63** | .60** | .66** | .70** | 1 | - | - | - | - |
| **7. AEQ TOT** | .91** | .74** | .76** | .81** | .82** | .83** | 1 | - | - | - |
| **8. F** | .16 | .25** | .20* | .20* | .21** | .28** | .23** | 1 | - | - |
| **9. Q** | .28** | .21* | .15‡ | .23** | .29** | .24** | .29** | .36** | 1 | - |
| **10. F. INT.** | .27** | .32** | .22** | .21** | .25** | .2** | .29** | .54** | .59** | 1 |

*Note.* AEQ GLO = Alcohol Expectancy Questionnaire Global Positive scale; AEQ SEX = Alcohol Expectancy Questionnaire Sexual Enhancement scale; AEQ SPP = Alcohol Expectancy Questionnaire Social and Physical Pleasure scale; AEQ SA = Alcohol Expectancy Questionnaire Social Assertiveness scale; AEQ TR = Alcohol Expectancy Questionnaire Tension Reduction scale; AEQ AA = Alcohol Expectancy Questionnaire Arousal and Aggression scale; AEQ TOT = Alcohol Expectancy Questionnaire Total; F = Frequency of alcohol consumption; Q = Typical quantity of alcohol consumed per occasion; F. INT. = frequency of intoxication.

## Appendix D Continued

Table D3

*Correlations between Alcohol Expectancy Questionnaire, Affect Valence, and Arousal*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. AEQ GLO** | 1 | - | - | - | - | - | - | - | - | - | - |
| **2. AEQ SEX** | .63** | 1 | - | - | - | - | - | - | - | - | - |
| **3. AEQ SPP** | .61** | .51** | 1 | - | - | - | - | - | - | - | - |
| **4. AEQ SA** | .67** | .51** | .63** | 1 | - | - | - | - | - | - | - |
| **5. AEQ TR** | .71** | .53** | .71** | .62** | 1 | - | - | - | - | - | - |
| **6. AEQ AA** | .71** | .63** | .60** | .66** | .70** | 1 | - | - | - | - | - |
| **7. AEQ TOT** | .91** | .74** | .76** | .81** | .82** | .83** | 1 | - | - | - | - |
| **8. AFFECT 1** | .01 | -.09 | -.04 | .04 | -.05 | -.07 | -.02 | 1 | - | - | - |
| **9. AFFECT 2** | .05 | -.04 | .06 | .06 | .01 | -.05 | .05 | .55** | 1 | - | - |
| **10. ARO. 1** | .10 | .07 | .06 | .03 | .02 | .04 | .09 | .18* | .38** | 1 | - |
| **11. ARO. 2** | .03 | -.06 | .05 | .02 | -.01 | .03 | .03 | .13‡ | .36** | .66** | 1 |

*Note.* AEQ GLO = Alcohol Expectancy Questionnaire Global Positive scale; AEQ SEX = Alcohol Expectancy Questionnaire Sexual Enhancement scale; AEQ SPP = Alcohol Expectancy Questionnaire Social and Physical Pleasure scale; AEQ SA = Alcohol Expectancy Questionnaire Social Assertiveness scale; AEQ TR = Alcohol Expectancy Questionnaire Tension Reduction scale; AEQ AA = Alcohol Expectancy Questionnaire Arousal and Aggression scale; AEQ TOT = Alcohol Expectancy Questionnaire Total; AFFECT 1 = baseline affect valence; AFFECT 2 = post-manipulation affect valence; ARO. 1 = baseline arousal; ARO. 2 = Post-manipulation arousal.

## Appendix D Continued

Table D4

*Correlations between Alcohol Expectancy Questionnaire, Youth Decision-Making Questionnaire, and Delay-Discounting Parameter k*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. AEQ GLO** | 1 | - | - | - | - | - | - | - | - | - | - |
| **2. AEQ SEX** | .63** | 1 | - | - | - | - | - | - | - | - | - |
| **3. AEQ SPP** | .61** | .51** | 1 | - | - | - | - | - | - | - | - |
| **4. AEQ SA** | .67** | .51** | .63** | 1 | - | - | - | - | - | - | - |
| **5. AEQ TR** | .71** | .53** | .71** | .62** | 1 | - | - | - | - | - | - |
| **6. AEQ AA** | .71** | .63** | .60** | .66** | .70** | 1 | - | - | - | - | - |
| **7. AEQ TOT** | .91** | .74** | .76** | .81** | .82** | .83** | 1 | - | - | - | - |
| **8. YDMQ NO** | -.09 | .00 | .05 | -.03 | .07 | .03 | .01 | 1 | - | - | - |
| **9. YDMQ NG** | -.19* | -.09 | -.18* | -.15‡ | -.16* | -.19* | -.17* | .40** | 1 | - | - |
| **10. YDMQ U** | -.13 | -.05 | -.07 | -.10 | -.01 | -.03 | -.07 | -.62** | .52** | 1 | - |
| **11. k** | -.06 | -.08 | -.09 | -.18* | -.06 | -.09 | -.09 | -.10 | -.13· | -.12 | 1 |

*Note.* AEQ GLO = Alcohol Expectancy Questionnaire Global Positive scale; AEQ SEX = Alcohol Expectancy Questionnaire Sexual Enhancement scale; AEQ SPP = Alcohol Expectancy Questionnaire Social and Physical Pleasure scale; AEQ SA = Alcohol Expectancy Questionnaire Social Assertiveness scale; AEQ TR = Alcohol Expectancy Questionnaire Tension Reduction scale; AEQ AA = Alcohol Expectancy Questionnaire Arousal and Aggression scale; AEQ TOT = Alcohol Expectancy Questionnaire Total; YMDQ NO = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known not to be negative; YDMQ NG = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known to be negative; YDMQ U = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be uncertain; k = natural log transformed delay discounting parameter k.

## Appendix D Continued

Table D5

*Correlations between the Alcohol Expectancy Questionnaire and Dependent Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. AEQ GLO** | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| **2. AEQ SEX** | .63** | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **3. AEQ SPP** | .61** | .51** | 1 | - | - | - | - | - | - | - | - | - | - |
| **4. AEQ SA** | .67** | .51** | .63** | 1 | - | - | - | - | - | - | - | - | - |
| **5. AEQ TR** | .71** | .53** | .71** | .62** | 1 | - | - | - | - | - | - | - | - |
| **6. AEQ AA** | .71** | .63** | .60** | .66** | .70** | 1 | - | - | - | - | - | - | - |
| **7. AEQ TOT** | .91** | .74** | .76** | .81** | .82** | .83** | 1 | - | - | - | - | - | - |
| **8. DTD** | .26** | .21* | .27** | .23** | .22* | .21** | .29** | 1 | - | - | - | - | - |
| **9. BR RTGS** | .17 | .29** | .19* | .20* | .20* | .21* | .24** | .20* | 1 | - | - | - | - |
| **10. PRD** | .17* | .13 | .29** | .12 | .25** | .27** | .22* | .44** | .29** | 1 | - | - | - |
| **11. DRANK** | .24** | .22* | .33** | .18* | .31** | .30** | .31** | .44** | .36** | .76** | 1 | - | - |
| **12. SIPS** | .28** | .15 | .33** | .20‡ | .21* | .27* | .29** | .46** | .32** | .66** | .82** | 1 | - |
| **13. PGRS** | .03 | .05 | -.04 | .11 | .08 | -.00 | .01 | -.25** | -.11 | .37** | -.31** | -.20* | 1 |

*Note.* AEQ GLO = Alcohol Expectancy Questionnaire Global Positive scale; AEQ SEX = Alcohol Expectancy Questionnaire Sexual Enhancement scale; AEQ SPP = Alcohol Expectancy Questionnaire Social and Physical Pleasure scale; AEQ SA = Alcohol Expectancy Questionnaire Social Assertiveness scale; AEQ TR = Alcohol Expectancy Questionnaire Tension Reduction scale; AEQ AA = Alcohol Expectancy Questionnaire Arousal and Aggression scale; AEQ TOT = Alcohol Expectancy Questionnaire Total; DTD = self-reported desire to drink at the beginning of ad libitum drinking session; BR RTGS = mean ratings of placebo beers A and B; PRD = total amount of placebo poured during the ad libitum drinking session; DRANK = total amount of placebo consumed during the ad libitum drinking session; SIPS = total number of sips taken during ad libitum drinking session; PGRS = Perceived Group Reinforcement Questionnaire.

## Appendix D Continued

Table D6

*Correlations between Personality and Self-Reported Drinking Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| **1. ZKPQ IMP** | 1 | - | - | - | - | - | - |
| **2. ZKPQ SS** | .51** | 1 | - | - | - | - | - |
| **3. ZKPQ I-SS** | .80** | .92** | 1 | - | - | - | - |
| **4. NEO-E** | .15‡ | .16* | .16* | 1 | - | - | - |
| **5. F** | .29** | .29** | .33** | .13‡ | 1 | - | - |
| **6. Q** | .21** | .23** | .25** | -.02 | .36** | 1 | - |
| **7. F. INTOX.** | .30** | .26** | .31** | .16* | .54** | .59** | 1 |

Note. ZKPQ IMP = Zuckerman-Kuhlman Personality Questionnaire Impulsivity scale; ZKPQ SS = Zuckerman-Kuhlman Personality Questionnaire Sensation Seeking scale; ZKPQ I-SS = Zuckerman-Kuhlman Personality Questionnaire Impulsivity-Sensation Seeking scale; NEO-E = NEO Extraversion scale; F = Frequency of alcohol consumption; Q = Typical quantity of alcohol consumed per occasion; F. INTOX. = frequency of intoxication.

## Appendix D Continued

Table D7

*Correlations between Personality Variables, Affect Valence, and Arousal*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| **1. ZKPQ IMP** | 1 | - | - | - | - | - | - | - |
| **2. ZKPQ SS** | .51** | 1 | - | - | - | - | - | - |
| **3. ZKPQ I-SS** | .80** | .92** | 1 | - | - | - | - | - |
| **4. NEO-E** | .15‡ | .16* | .16* | 1 | - | - | - | - |
| **5. AFFECT 1** | .10 | -.04 | .01 | .04 | 1 | - | - | - |
| **6. AFFECT 2** | .15* | .08 | .12 | .08 | .55** | 1 | - | - |
| **7. AROUSAL 1** | .11 | -.06 | .01 | .03 | .18* | .38** | 1 | - |
| **8. AROUSAL 2** | .16* | .06 | .11 | .02 | .13 | .36** | .66** | 1 |

Note. ZKPQ IMP = Zuckerman-Kuhlman Personality Questionnaire Impulsivity scale; ZKPQ SS = Zuckerman-Kuhlman Personality Questionnaire Sensation Seeking scale; ZKPQ I-SS = Zuckerman-Kuhlman Personality Questionnaire Impulsivity-Sensation Seeking scale; NEO-E = NEO Extraversion scale; AFFECT 1 = baseline affect valence; AFFECT 2 = post-manipulation affect valence; AROUSAL 1 = baseline arousal; AROUSAL 2 = Post-manipulation arousal.

## Appendix D Continued

Table D8

*Correlations between Personality Variables, YDMQ subscales, and Delay Discounting*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| **1. ZKPQ IMP** | 1 | - | - | - | - | - | - | - |
| **2. ZKPQ SS** | .51** | 1 | - | - | - | - | - | - |
| **3. ZKPQ I-SS** | .80** | .92** | 1 | - | - | - | - | - |
| **4. NEO-E** | .15‡ | .16* | .16* | 1 | - | - | - | - |
| **5. YDMQ NO** | -.08 | .06 | .00 | -.04 | 1 | - | - | - |
| **6. YDMQ NG** | -.11 | -.14 | -.14 | -.03 | .40** | 1 | - | - |
| **7. YDMQ U** | -.01 | .06 | .03 | .02 | .62** | .52** | 1 | - |
| **8. k** | .13‡ | .04 | .09 | .19* | -.10 | -.13‡ | -.12 | 1 |

Note. ZKPQ IMP = Zuckerman-Kuhlman Personality Questionnaire Impulsivity scale; ZKPQ SS = Zuckerman-Kuhlman Personality Questionnaire Sensation Seeking scale; ZKPQ I-SS = Zuckerman-Kuhlman Personality Questionnaire Impulsivity-Sensation Seeking scale; NEO-E = NEO Extraversion scale; YMDQ NO = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known not to be negative; YDMQ NG = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known to be negative; YDMQ U = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be uncertain; k = natural log transformed delay discounting parameter k.

## Appendix D Continued

Table D9

*Correlations between Personality Variables and Dependent Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. ZKPQ IMP** | 1 | - | - | - | - | - | - | - | - | - |
| **2. ZKPQ SS** | .51** | 1 | - | - | - | - | - | - | - | - |
| **3. ZKPQ I-SS** | .80** | .92** | 1 | - | - | - | - | - | - | - |
| **4. NEO-E** | .15‡ | .16* | .16* | 1 | - | - | - | - | - | - |
| **5. DTD** | .16‡ | .10 | .14 | .02 | 1 | - | - | - | - | - |
| **6. BR RTGS** | .12 | .10 | .12 | .05 | .20* | 1 | - | - | - | - |
| **7. POURED** | .26** | .19* | .25** | .12 | .44** | .29** | 1 | - | - | - |
| **8. DRANK** | .17** | .23** | .23** | .08 | .44** | .36** | .76** | 1 | - | - |
| **9. SIPS** | .09 | .21* | .18‡ | .06 | .46** | .32** | .66** | .82** | 1 | - |
| **10. PGRS** | -.20* | -.08 | -.04 | .17* | -.25** | -.11 | .37** | -.31** | -.20* | 1 |

Note. ZKPQ IMP = Zuckerman-Kuhlman Personality Questionnaire Impulsivity scale; ZKPQ SS = Zuckerman-Kuhlman Personality Questionnaire Sensation Seeking scale; ZKPQ I-SS = Zuckerman-Kuhlman Personality Questionnaire Impulsivity-Sensation Seeking scale; NEO-E = NEO Extraversion scale; DTD = self-reported desire to drink at the beginning of ad libitum drinking session; BR RTGS = mean ratings of placebo beers A and B; POURED = total amount of placebo poured during the ad libitum drinking session; DRANK = total amount of placebo consumed during the ad libitum drinking session; SIPS = total number of sips taken during ad libitum drinking session; PGRS = Perceived Group Reinforcement Questionnaire.

## Appendix D Continued

Table D10

*Correlations between Self-Reported Drinking Variables, Affect Valence, and Arousal*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| **1. F** | 1 | - | - | - | - | - | - |
| **2. Q** | .36** | 1 | - | - | - | - | - |
| **3. F INTOX** | .54** | .59** | 1 | - | - | - | - |
| **4. AFFECT 1** | .04 | -.19* | -.16* | 1 | - | - | - |
| **5. AFFECT 2** | .05 | -.09 | .00 | .55** | 1 | - | - |
| **6. AROUSAL 1** | .08 | .05 | .07 | .18* | .38** | 1 | - |
| **7. AROUSAL 2** | .06 | .16 | .10 | .13 | .36** | .66** | 1 |

Note. F = Frequency of alcohol consumption; Q = Typical quantity of alcohol consumed per occasion; F INTOX = frequency of intoxication; AFFECT 1 = baseline affect valence; AFFECT 2 = post-manipulation affect valence; AROUSAL 1 = baseline arousal; AROUSAL 2 = Post-manipulation arousal.

## Appendix D Continued

Table D11

*Correlations between Self-Reported Drinking Variables, YDMQ Subscales, and k*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| **1. F** | 1 | - | - | - | - | - | - |
| **2. Q** | .36** | 1 | - | - | - | - | - |
| **3. F INTOX** | .54** | .59** | 1 | - | - | - | - |
| **4. YDMQ NO** | .18* | -.03 | .04 | 1 | - | - | - |
| **5. YDMQ NG** | -.06 | -.21** | -.21** | .40** | 1 | - | - |
| **6. YDMQ U** | .15‡ | -.08 | -.04 | .62** | .52** | 1 | - |
| **7. k** | .12 | .14‡ | .19* | -.10 | -.13‡ | -.12 | 1 |

Note. F = Frequency of alcohol consumption; Q = Typical quantity of alcohol consumed per occasion; F INTOX = frequency of intoxication; YMDQ NO = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known not to be negative; YDMQ NG = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known to be negative; YDMQ U = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be uncertain; k = natural log transformed delay discounting parameter k.

## Appendix D Continued

Table D12

*Correlations between Self-Reported Drinking Variables and Dependent Measures*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| **1. F** | 1 | - | - | - | - | - | - | - | - |
| **2. Q** | .36** | 1 | - | - | - | - | - | - | - |
| **3. F INTOX** | .54** | .59** | 1 | - | - | - | - | - | - |
| **4. DTD** | .31** | .24** | .29** | 1 | - | - | - | - | - |
| **5. BR RTGS** | .16‡ | .25** | .25** | .20* | 1 | - | - | - | - |
| **6. PRD** | .34** | .28** | .40** | .44** | .29** | 1 | - | - | - |
| **7. DRANK** | .38** | .30** | .36** | .44** | .36** | .76** | 1 | - | - |
| **8. SIPS** | .35** | .32** | .41** | .46** | .32** | .66** | .82** | 1 | - |
| **9. PGRS** | -.08 | -.08 | -.20* | -.25** | -.11 | .37** | -.31** | -.20* | 1 |

Note. F = Frequency of alcohol consumption; Q = Typical quantity of alcohol consumed per occasion; F INTOX = frequency of intoxication; DTD = self-reported desire to drink at the beginning of ad libitum drinking session; BR RTGS = mean ratings of placebo beers A and B; POURED = total amount of placebo poured during the ad libitum drinking session; DRANK = total amount of placebo consumed during the ad libitum drinking session; SIPS = total number of sips taken during ad libitum drinking session; PGRS = Perceived Group Reinforcement Questionnaire.

## Appendix D Continued

Table D13

*Correlations between Affect Valence, Arousal, and YDMQ Subscales*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| **1. AFFECT 1** | 1 | - | - | - | - | - | - | - |
| **2. AFFECT 2** | .55** | 1 | - | - | - | - | - | - |
| **3. ARO 1** | .18* | .38** | 1 | - | - | - | - | - |
| **4. ARO 2** | .13 | .36** | .66** | 1 | - | - | - | - |
| **5. YDMQ NO** | -.05 | -.04 | .06 | .00 | 1 | - | - | - |
| **6. YDMQ NG** | -.03 | -.07 | -.02 | -.01 | .40** | 1 | - | - |
| **7. YDMQ U** | -.14‡ | -.03 | -.07 | .04 | .62** | .52** | 1 | - |
| **8. k** | -.02 | .10 | -.03 | -.01 | -.10 | -.13‡ | -.12 | 1 |

Note. AFFECT 1 = baseline affect valence; AFFECT 2 = post-manipulation affect valence; ARO 1 = baseline arousal; ARO 2 = Post-manipulation arousal; YMDQ NO = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known not to be negative; YDMQ NG = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known to be negative; YDMQ U = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be uncertain; k = natural log transformed delay discounting parameter k.

## Appendix D Continued

Table D14

*Correlations between Affect Valence, Arousal, and Dependent Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. AFFECT 1** | 1 | - | - | - | - | - | - | - | - | - |
| **2. AFFECT 2** | .55** | 1 | - | - | - | - | - | - | - | - |
| **3. ARO 1** | .18* | .38** | 1 | - | - | - | - | - | - | - |
| **4. ARO 2** | .13 | .36** | .66** | 1 | - | - | - | - | - | - |
| **5. DTD** | -.13 | .02 | .07 | .04 | 1 | - | - | - | - | - |
| **6. BR RTGS** | -.12 | -.07 | .13 | .12 | .20* | 1 | - | - | - | - |
| **7. POURED** | -.13 | .05 | -.07 | .05 | .44** | .29** | 1 | - | - | - |
| **8. DRANK** | -.13 | .06 | -.01 | .08 | .44** | .36** | .76** | 1 | - | - |
| **9. SIPS** | -.07 | .10 | .03 | .13 | .46** | .32** | .66** | .82** | 1 | - |
| **10. PGRS** | .09 | -.12 | -.08 | -.05 | -.25** | -.11 | .37** | -.31** | -.20* | 1 |

Note. AFFECT 1 = baseline affect valence; AFFECT 2 = post-manipulation affect valence; ARO 1 = baseline arousal; ARO 2 = Post-manipulation arousal; DTD = self-reported desire to drink at the beginning of ad libitum drinking session; BR RTGS = mean ratings of placebo beers A and B; POURED = total amount of placebo poured during the ad libitum drinking session; DRANK = total amount of placebo consumed during the ad libitum drinking session; SIPS = total number of sips taken during ad libitum drinking session; PGRS = Perceived Group Reinforcement Questionnaire.

## Appendix D Continued

Table D15

*Correlations between YDMQ Subscales, k, and Dependent Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. YDMQ NO** | 1 | - | - | - | - | - | - | - | - | - |
| **2. YDMQ NG** | .40** | 1 | - | - | - | - | - | - | - | - |
| **3. YDMQ U** | .62** | .52** | 1 | - | - | - | - | - | - | - |
| **4. k** | -.10 | -.13‡ | -.12 | 1 | - | - | - | - | - | - |
| **5. DTD** | -.13 | .02 | .07 | .04 | 1 | - | - | - | - | - |
| **6. BR RTGS** | -.12 | -.07 | .13 | .12 | .20* | 1 | - | - | - | - |
| **7. POURED** | -.12 | -.07 | .13 | .05 | .44** | .29** | 1 | - | - | - |
| **8. DRANK** | -.13 | .05 | -.01 | .08 | .44** | .36** | .76** | 1 | - | - |
| **9. SIPS** | -.07 | .10 | .03 | .13 | .46** | .32** | .66** | .82** | 1 | - |
| **10. PGRS** | .09 | -.02 | -.08 | .05 | -.25** | -.11 | .37** | -.31** | -.20* | 1 |

Note. YMDQ NO = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known not to be negative; YDMQ NG = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be known to be negative; YDMQ U = Youth Decision-Making Questionnaire self-reported likelihood of making risky decisions when the outcome would be uncertain; k = natural log transformed delay discounting parameter k; DTD = self-reported desire to drink at the beginning of ad libitum drinking session; BR RTGS = mean ratings of placebo beers A and B; POURED = total amount of placebo poured during the ad libitum drinking session; DRANK = total amount of placebo consumed during the ad libitum drinking session; SIPS = total number of sips taken during ad libitum drinking session; PGRS = Perceived Group Reinforcement Questionnaire.