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College students' alcohol expectancies, perceptions of risk, alcohol use, and risk behavior were examined. In line with existing research, alcohol expectancies were predicted to explain risky behavior, and risk perceptions were hypothesized to predict alcohol use. Theoretically relevant interactions were also explored. Participants completed questionnaires assessing alcohol use, risky behavior participation, alcohol expectancies, and perceptions of risk. As hypothesized, expectancies predicted alcohol use and risky behavior, but risk perceptions were not significantly related to risky behavior and marginally related to alcohol use. Nevertheless, the relationship between risk perception and alcohol use was stronger for males than females. Implications and future directions for investigation are discussed.

ALCOHOL EXPECTANCIES, ALCOHOL USE, AND RISKY BEHAVIOR AMONG  
COLLEGE STUDENTS

by

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## CHAPTER I

### INTRODUCTION

Heavy and problematic alcohol use among college and university students has become a serious public health issue in the United States. Recent estimates of college students' drinking patterns suggest that nearly 45% of college students have engaged in binge drinking (consuming at least 4 to 5 drinks in one sitting) during the past 2 weeks, with men tending to binge drink more frequently than women (Wechsler, Lee, Kuo, Seibring, Nelson, & Lee, 2002). Moreover, when drinking behavior is assessed across a longer time period, research indicates that nearly 85% of college students have engaged in binge drinking in the previous 3 months (Vik, Carrello, Tate, & Field, 2000). The frequency of such problematic drinking has also increased in recent years. In 1993, 25% of college students reported being drunk on more than three different occasions during the past 30 days; by 2001, nearly 30% endorsed the same frequency of drunkenness, an increase of 20% in less than a decade (Wechsler et al., 2002). These researchers also found that a greater proportion of college students reported drinking alcohol to get drunk in 2001 (48.2%) than they did 8 years prior (39.9% in 1993). These heavy drinking episodes do not appear to be occasional or isolated occurrences for many students. In fact, 37% of college students in the U.S. meet diagnostic criteria for either alcohol

dependence or alcohol abuse (Knight, Wechsler, Kuo, Seibring, Weitzman, & Schuckit, 2002).

Heavy alcohol consumption in the college student population is associated with numerous negative consequences. Survey data indicate that over 696,000 college students in the United States are assaulted each year by another student who has been drinking, 599,000 sustain alcohol-related injuries each year, and 1,700 die annually as a result of such injuries (Hingson, Heeren, Winter, & Wechsler, 2005). High rates of alcohol use are also associated with risky sexual behavior among college students. Hingson et al. (2005) report that over 97,000 college students are victims of alcohol-related sexual assault or date rape each year, and 400,000 have had unprotected sex while under the influence of alcohol. Another 100,000 reported being too intoxicated to know whether or not they consented to having sex (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002). Elevated rates of academic problems, such as missing class, poor performance on assignments and exams, and lower grades have also been linked with heavy alcohol use among college students (Engs, Diebold, & Hansen, 1996; Presley, Meilman, & Cashin, 1996a, 1996b; Wechsler et al., 2002), as have health problems (Hingson et al., 2002) and suicide attempts (Presley, Leichliter, & Meilman, 1998). Drinking and driving is another serious problem, with over 2 million college students driving while under the influence of alcohol each year (Hingson et al., 2002). Finally, vandalism (Wechsler et al., 2002), property damage (Wechsler, Moeykens, Davenport, Castillo, & Hansen, 1995), and police involvement (e.g., arrests for public drunkenness or driving while intoxicated; Hingson et al., 2002) are frequent among alcohol-intoxicated college students.

Although many of these correlates of substance abuse in young adults (e.g., drinking and driving, unprotected sex, vandalism, etc.) clearly qualify as risky, risky behavior as a construct is often poorly operationalized in the literature. Dictionary definitions of *risk* involve the concept of exposure to injury, danger, or cost associated with engaging in a behavior, as well as notions of uncertainty and cost-benefit analysis (American Heritage, 2000; Merriam-Webster, 1999). However, as Leigh (1999) elucidates, being at risk does not necessarily include active risk-taking, and, for young people, there may be positive consequences associated with risky behavior (e.g., social acceptance). Demographic and situational variables are also especially relevant in considering the definition of risky behavior. It is unlikely that a 45 year old man, drinking with friends but not planning to drive, would be categorized as engaging in a risky behavior; whereas a 15 year old girl who drinks at a house party may be putting herself in danger of numerous negative outcomes. Although poorly defined in the existing literature, we define “risky behavior” as a decision on the part of the individual to engage in behavior that is potentially dangerous or costly to the individual and/or those directly involved in his or her risk-taking behavior.

Risky behaviors among college students are not, however, confined to situations that involve drinking. For example, the Centers for Disease Control and Prevention’s (CDC) most recent survey of college students’ risky behavior indicated that nearly 30% of college students were current cigarette smokers and that fewer than 30% reported using a condom during their most recent instance of sexual intercourse in the previous three months (CDC, 1997). Risky behaviors such as drunken driving, unprotected sex,

drug use, smoking, gambling, and criminal behavior are associated with myriad negative outcomes, and individuals who endorse high rates of participation in risky behaviors are more likely to incur such consequences as sexually transmitted diseases, pregnancy, health problems, injury, and death. Over 70% of deaths for individuals ages 10-24 are accounted for by motor vehicle accidents (half of which involve alcohol), homicides, suicides, and other accidents (CDC, 2004). Indeed, risky behavior is the leading cause of death in young people.

Research findings in this area do consistently demonstrate a relationship between alcohol use and behavioral risk taking. For example, physically risky behaviors (e.g., traveling to dangerous places, going on a blind date with a hardly-known person, hitchhiking, selling items door-to-door, etc.) have been shown to be most prevalent among individuals who also endorse high rates of alcohol use (Caces, Stinson, & Harford, 1991), and risky behavior participation is evident in substance dependence as well (American Psychiatric Association, 2000). Thus, serious ramifications and comorbid problems clearly accompany participation in risky behavior.

A wide variety of theories exist to explain alcohol consumption. These explanations focus on a number of factors that include the neurobiological underpinnings of alcoholism (see Altura, Altura, Zhang, & Zakhari, 1996, for a review), personality variables such as sensation seeking (e.g., Cloninger, Sigvardsson, & Bohman, 1988) and neuroticism (e. g., Martin & Sher, 1994); the co-occurrence of problem-behaviors (Jessor & Jessor, 1977), motivation (Cooper, 1994), and personal beliefs, or expectations, about the effects of alcohol use (e.g., Brown, Goldman, Inn, & Anderson, 1980). Alcohol

expectancy theory in particular has been especially useful in helping explain alcohol use patterns, and will be the focus of the present study.

Alcohol expectancies refer to the anticipated behavioral, cognitive, and affective consequences of drinking. They are an individual's expectations about the effects that alcohol consumption will have on him or her. Alcohol expectancy theory relies heavily on behavioral explanations of drinking, and social influences such as family, peers, and modeling of alcohol use are purported to heavily impact alcohol-related beliefs (Christiansen, Goldman, & Inn, 1982). Expectancy theory was initially conceived by Marlatt, Demming, and Reid (1973), who employed a balanced placebo design to demonstrate that alcoholics drank *more*, in a simulated social situation when they believed they were receiving alcohol than when they believed they were receiving tonic water. Social drinkers (those who drink with friends but rarely drink to excess), on the other hand, drank *less* when they thought they were receiving alcohol. These results demonstrate that one's expectations of alcohol consumption play a significant role in actual patterns of use.

Subsequent research has demonstrated that alcohol expectancies influence drinking patterns across a number of populations, including children, adolescents, college students, and alcoholics. Expectancies about alcohol's effects have been observed in children even before the onset of drinking. That is, a child's beliefs about the effects of alcohol predict his or her consumption later in life (Christiansen, Smith, Roehling, & Goldman, 1989). Children's expectations of alcohol also seem to evolve with age, as

alcohol's effects (e.g., social disinhibition) are perceived in an increasingly favorable light as young people get older (Dunn & Goldman, 1996).

As measured by the Alcohol Expectancy Questionnaire (Brown et al., 1980), expectations about alcohol's effects are conceptualized as falling into six distinct domains—alcohol acts as a global transformation agent, changing a wide variety of experiences in a positive way (domain 1); alcohol improves sexual experiences and enhances sexual arousal (2); alcohol enhances physical and social pleasures (3); alcohol creates positive and socially assertive personality changes (4); alcohol produces relaxation and reduces tension (5); and alcohol increases feelings of arousal and aggression (6). The literature indicates that expectancies related to alcohol's ability to alter social behavior, in particular, predict frequent drinking among adolescents, and expectations of alcohol's ability to enhance cognitive and motor functioning predict problem drinking in this same population (Christiansen & Goldman, 1983). These findings were significant even after controlling for the effects of such variables as parental drinking habits and attitudes, presence of an alcoholic family member, ethnic-religious differences, age, and sex. Additionally, teens who expect more social facilitation from alcohol (that is, they expect drinking to enhance their social interactions) tend to drink more frequently and heavily than teens without social facilitation expectancies. This subsequent heavier drinking in turn strengthens teens' positive social alcohol expectancies above and beyond the influence of previous drinking experience (Smith, Goldman, Greenbaum, & Christiansen, 1995). Other longitudinal research has similarly demonstrated the association between social facilitation expectancies and

alcohol use patterns one year later in an adolescent population (Christiansen et al., 1989). Parallel expectancy endorsement patterns (i.e., higher positive expectancies in general and more social facilitation, behavioral, and cognitive expectations in particular) have also been reported among alcohol abusers (Brown, Goldman, & Christiansen, 1985; Brown, Creamer, & Stetson, 1987; Connors, O'Farrell, Cutter, & Thomson, 1986; Southwick, Steele, Marlatt, & Lindell, 1981; Zarantonello, 1986).

Research on these alcohol related expectancies also indicates that, as they gather more experience with drinking, adolescents increasingly believe that alcohol improves social behavior, increases arousal, and decreases tension (Christiansen, Goldman, & Brown, 1985). Moreover, as *problem-drinking* adolescents age, they believe that alcohol consumption improves cognitive and motor functioning as well. Alcoholic adult populations report similar expectancies for cognitive and motor improvement (Brown et al., 1985; Brown et al., 1987), suggesting that expectancies predictive of problematic alcohol use likely emerge in adolescence or earlier. Finally, research indicates that among cohorts of 3<sup>rd</sup> -, 6<sup>th</sup> -, 9<sup>th</sup> -, and 12<sup>th</sup>-graders, heavier drinking children and teens are more likely to associate positive and arousing effects with alcohol-related stimuli, whereas lighter drinking and abstaining individuals in these age groups are more likely to associate undesirable effects with alcohol-related stimuli (Dunn & Goldman, 1998).

To this point, the bulk of research on alcohol expectancies and consumption patterns has been conducted with college students and consistently confirms that heavier drinkers endorse more positive alcohol expectancies. Put simply, heavy drinkers expect to experience more positive effects from drinking than do lighter drinkers (Biscaro,

Broer, & Taylor, 2004), while both groups tend to endorse equal levels of negative expectations (Southwick et al., 1981). Consistent with these findings, college students who abstain from drinking altogether hold higher negative expectancies for alcohol use. Research also shows that less experienced, lighter drinkers tend to have more *global* expectations for the effects of alcohol whereas more experienced, heavier drinkers hold more *specific* expectancies, such as those for social and physical pleasure, sexual enhancement, aggressive arousal, tension reduction, and behavioral impairment (Brown, 1985; Brown et al., 1980; Rohsenow, 1983; Southwick et al., 1981).

Specific expectancies among alcoholic populations, such as those for sexual enhancement, mood elevation, sleep induction, and improved sociability, have been identified as strong predictors of multiple negative alcohol-related consequences (e.g., experiencing acute physical effects of alcohol, spending too much money on drugs and alcohol, drunken driving, legal problems) as well (Kline, 1990; O'Hare & Sherrer, 1997; Teahan, 1988). In addition to problems resulting directly from alcohol use, expectancy research has demonstrated that beliefs about alcohol's ability to increase confidence in social situations and to relieve tension are associated with other such socio-emotional problems as depression, anxiety, family and other relationship difficulties, and negative feelings about oneself. Taken together, these findings suggest that more so than having generally positive perceptions about alcohol's effects, having strong beliefs in alcohol's potential to positively change one's personality, bring about physical and social pleasure, and produce relaxation may be predictive of problematic alcohol use, even prior to the onset of identifiable alcohol misuse.

A broad body of research also indicates that men and women tend to have different expectations for the effects of drinking. Men endorse higher levels of positive alcohol expectancies than women (Wall, Thrussell, & Lalonde, 2003), and heavier drinking appears to activate alcohol-related expectancies for men more quickly than for women (Read, Wood, Lejuez, Palfai, & Slack, 2004). These gender differences are inconsistent across studies, however, and some research indicates that alcohol expectancy scores are more predictive of drinking patterns for women than for men (Mooney, Fromme, Kivlahan, & Marlatt, 1987; Wall, Hinson, & McKee, 1998). Other findings about gender-specific expectancies yield inconclusive results. Some research suggests that the best predictors of problem drinking in women are expectancies of arousal and power, social pleasure/enhancement, assertiveness, and tension reduction, while other research results demonstrate that many of the same expectancies (i.e., physical and social pleasure, stress reduction, arousal/aggression, sexual enhancement, and global changes) best predict drinking patterns for men (Brown et al., 1980; Mooney et al., 1987; Read et al., 2004; Thombs, 1993; Wall et al., 1998). Given this ambiguity, overall patterns of expectancies as they relate to alcohol use and risk-taking behavior for both men and women will be examined in the present study. It is especially important to control for gender differences in terms of alcohol use and risky behavior because men and women tend to engage in these behaviors at different rates and for different reasons (e.g., Bae, Ye, Chen, Rivers, & Singh, 2005; Oser et al., 2006). Consequently, they may also respond to intervention efforts aimed at reducing behavioral risk-taking and alcohol use differently.

The direct relationship between alcohol expectancies and risky behavior has received little research attention. Nevertheless, a link between these two constructs makes sense given the strong relationship between expectancies and alcohol use, and between use and risky behavior. As summarized above, alcohol expectancies predict drinking patterns (e.g., Biscaro et al., 2004; Brown et al., 1985; Christiansen & Goldman, 1983; Christiansen et al., 1989), with higher levels of positive expectancies associated with heavier patterns of alcohol consumption. Heavy drinking, in turn, places individuals at greater risk for participation in risky behaviors as a direct result of intoxication (e.g., Wechsler et al., 2002) and also more generally (Caces et al., 1991). The specific pattern of relationships among expectancies and risk suggest that the problematic mechanism for some individuals may involve a more global distortion in expectations. That is, individuals who have high positive expectations for the effects of alcohol may likewise expect more positive outcomes for risky behavior participation as well, thereby making them more likely to take behavioral risks.

With respect to the current study, holding unrealistic expectations for the effects of drinking is tantamount to perceiving the negative outcomes of risky behaviors as less likely or less serious than they actually are. The research suggests that there is great variability in perceptions of risk, and that some individuals consistently underestimate the probability that engaging in risky behaviors will have harmful ramifications (e.g., Benthin, Slovic, & Severson, 1993; Halpern-Felsher et al., 2001; Johnson, McCaul, & Klein, 2002; Urberg & Robbins, 1984). Those most likely to underestimate risks are in fact more likely to participate in dangerous behaviors. This tendency is commonly

referred to as the “optimistic bias” (Weinstein, 1980), where one perceives him or herself less vulnerable to negative outcomes and at the same time overestimates the likelihood of positive events. The optimistic bias is particularly prevalent among adolescents (e.g., Arnett, 2000; Chapin, de las Alas, & Coleman, 2005; Whaley, 2000), and parallels the higher rates of risk-taking behavior in this population.

Jessor & Jessor (1977) provide support for this hypothesis. Their Problem-Behavior Theory proposes specific systems of psychosocial influence—Personality, Perceived Environment, and Behavior—which are thought to underlie and contribute to the expression of problematic behaviors. A number of factors may account for the underlying propensity to underestimate risks in young people, including personality variables (Cloninger et al., 1988; Martin & Sher, 1994), the role of peer groups (Gardner & Steinberg, 2005), parenting (Maguen & Armistead, 2006), and media influences (Slater & Rasinski, 2005). Such underlying factors fall outside the scope of the current study and are not directly examined; rather, cognitive biases were selected as targets for investigation here because they may be particularly amenable to change efforts (Cohen, Scribner, & Farley, 2000). Jessor & Jessor’s overarching theory of proneness to engagement in problem behaviors supports the notion that overly optimistic expectations for the effects of alcohol may reliably predict risky behavior as well.

An unfortunate limitation of the body of literature on risk perception for the current project, however, is that the bulk of studies in this area have focused on school-age rather than college students. Current work does suggest that older adolescents’ risk judgments are lower (i.e., less accurate) than those of younger adolescents (Millstein &

Halpern-Felsher, 2002), leading some researchers to propose that accurate perceptions of risk tend to decrease during adolescence and into young adulthood (Millstein, 2003). We might expect then that college students' judgments of risk demonstrate similar biases.

The role of alcohol expectancies and risk perceptions in risky behavior generally and in alcohol use specifically has important repercussions for research and treatment. Several studies indicate that interventions which focus on changing individuals' expectations about alcohol are effective in reducing problematic alcohol use (Brown, Carrello, Vik, & Porter, 1998; Corbin, McNair, & Carter, 2001), and that the resulting changes in expectancies are associated with meaningful reductions in alcohol consumption (Connors, Tarbox, & Faillace, 1993; D'Amico & Fromme, 2002; Darkes & Goldman, 1993). These effects have been demonstrated across multiple drinking populations, including adolescents, college students, and alcoholics. In addition to reductions in alcohol consumption, D'Amico and Fromme (2002) found a significantly reduced incidence of driving under the influence of alcohol and of riding with a drunk driver following alcohol expectancy-focused treatment. If alcohol expectancies are, in fact, associated with risky behavior, then perhaps treatment efforts focused on changing expectancies would decrease not only problematic alcohol use but participation in risky behaviors as well. At the same time, more global misperceptions of risk may explain the relationship between alcohol expectancies and use, and intervention efforts might be better targeted at changing this broader cognitive optimistic bias. There is limited evidenced that targeting these optimistic biases in adolescents can be an effective means of reducing risk-related behavior (Chapin & Coleman, 2003). Expectancy- and/or

perception-related efforts may be particularly important for alcohol abuse and risky behavior prevention attempts, especially given that alcohol expectancies have been identified in children prior to the onset of drinking (Miller et al., 1990).

The primary aim of the present study, then, is to determine the extent to which college students' expectations of alcohol use and perceptions of risk influence the relationship between drinking and risky behavior. Four main hypotheses about the relationship between expectancies and alcohol use, and risky behavior will be tested, the first three of which aim to replicate previous research findings. A series of exploratory follow-up analyses are also proposed that explore the extent to which the two measures of optimistic bias interact with alcohol use in predicting risky behavior.

#### *Main effects*

- Alcohol use will be positively associated with optimistic expectancies for alcohol use. That is, individuals who endorse high positive expectations for the effects of alcohol, particularly in terms of physical/social pleasure and relaxation/tension reduction, will drink more heavily than individuals without high positive alcohol expectancies (Figure 1).
- Perceptions of risk will be negatively associated with risky behavior. Specifically, participants with lower perceptions of the risks of certain behaviors will endorse higher rates of participation in these behaviors (Figure 2).
- Alcohol use will be positively associated with risky behavior, such that heavier drinkers will report higher participation in risky behavior than lighter drinkers (Figure 3).

- Alcohol expectancies will be positively associated with risk-taking behaviors, meaning that individuals who hold more positive expectations for the effects of alcohol will also report higher participation in risky behaviors, regardless of their actual rates of alcohol consumption. Risk perception rates are similarly hypothesized to be associated with alcohol use, such that lower perceptions of risk are associated with heavier drinking (Figure 4).

*Follow-up Analyses*

- Alcohol expectancies and risk perceptions will be tested as moderating variables of the relationship between risky behavior and alcohol use. Here, positive expectancies for alcohol use and misperceptions of risk are expected to increase the strength of the relationship between alcohol use and risky behavior (Figure 5).

## CHAPTER II

### METHOD

#### *Participants*

Two hundred and seven undergraduate students enrolled in psychology courses at the University of North Carolina at Greensboro provided data for this study. Consistent with university demographics, 152 (73.6%) were female. One hundred and thirty-five (63.1%) were Caucasian, 51 (22.7%) were African American, 6.7% were Asian, and 7.6% selected “Other” or did not report their ethnicity. The average age of participants was 20.16 years (SD=3.97), while the median age was 19 years. Approximately 20% of participants declined to provide their age. See Table 1 for complete demographic information.

#### *Measures*

*Alcohol Use Disorders Identification Test (AUDIT;* Saunders, Aasland, Babor, & de la Fuente, 1993). The AUDIT is a 10-item self-report questionnaire that assesses the quantity and frequency of, amount of personal harm accrued by, and problems resulting from alcohol use. Sample items include “How often do you have a drink containing alcohol?” and “How often during the last year have you found that you were not able to stop drinking once you had started?” The AUDIT is widely used to identify problematic drinkers, and scores range from 0 to 40. Scores of 8 or higher indicate hazardous alcohol use. The AUDIT has demonstrated adequate reliability in previous studies (mean and

median coefficient alpha estimates are 0.79 and 0.81, respectively) as well as in the current study (coefficient  $\alpha = 0.82$ ).

*Adolescent Risk Taking Questionnaire (ARQ;* Gullone, Moore, Moss, & Boyd, 2000). The ARQ consists of two 22-item self-report questionnaires that assess frequency of participation in risky behaviors and judgments about how risky these behaviors are on a 5-point Likert scale. Scores on each of these measures range from 0 to 88. Examples of behaviors assessed include smoking, speeding, drinking and driving, having unprotected sex, staying out late, overeating, teasing and picking on people, and taking drugs. Each questionnaire consists of four risk subscales: Thrill-seeking Risk, Rebellious Risk, Reckless Risk, and Anti-social Risk. The ARQ demonstrates adequate reliability (coefficient alphas for the various subscales range from 0.7 to greater than 0.8 in published research). In the current study, the coefficient alpha is 0.80 for the behaviors questionnaire and 0.84 for the beliefs questionnaire. Reliability estimates for the individual risky behavior subscales were lower however. Coefficient alpha was 0.52 for Thrill-seeking Risk, 0.80 for Rebellious Risk, 0.54 for Reckless Risk, and 0.55 for Anti-social Risk. For the corresponding risk perception subscales, coefficient alpha was 0.71 for Thrill-seeking Risk, 0.64 for Rebellious Risk, 0.65 for Reckless Risk, and 0.65 for Anti-social Risk. In order to differentiate between these measures for the remainder of this manuscript, the risky behaviors questionnaire will be referred to as “ARQ(b)” and the risk perception questionnaire will be referred to as “ARQ(p).”

*Alcohol Expectancy Questionnaire (AEQ;* Brown et al., 1980). The AEQ is a 120-item self-report questionnaire that assesses the anticipated effects of alcohol use across

six domains, including Global Positive Changes, Social Assertiveness, and Relaxation/Tension Reduction. Participants are to respond “yes” or “no” to items such as “Drinking makes the future seem brighter,” “Having a few drinks helps me relax in a social situation,” and “After a few drinks I am usually in a better mood.” Previous research has established an alpha coefficient for the AEQ of 0.84, indicating good reliability. Coefficient alpha for the current study was quite high at 0.97 for the total questionnaire. For the six domains, the coefficient alpha was 0.91 for Domain 1 (“Alcohol acts as a global transformation agent, changing a wide variety of experiences in a positive way”), 0.63 for Domain 2 (“Alcohol improves sexual experience and enhances sexual arousal”), 0.81 for Domain 3 (“Alcohol enhances physical and social pleasures”), 0.84 for Domain 4 (“Alcohol creates positive and socially assertive personality changes”), 0.80 for Domain 5 (“Alcohol produces relaxation and tension reduction”), and 0.49 for Domain 6 (“Alcohol increased feelings of arousal and aggression”).

### *Procedure*

Participants completed the AUDIT, AEQ, and ARQ measures as well as providing demographic information. Questionnaires were administered by the principle investigator in group sessions and took approximately 20 minutes to complete. Groups ranged in size from one to 30-40 individuals. Participants were given debriefing forms following completion and received course credit for their involvement in the study.

## CHAPTER III

### RESULTS

#### *Preliminary Correlations*

Table 2 provides means and standard deviations for the AUDIT, AEQ, and ARQ measures based on sex. Average alcohol use score for males was higher than for females ( $m = 7.11$  and  $5.43$ , respectively), and a t-test indicated that this difference was significant ( $t = 2.027$ ,  $p = .044$ ), consistent with study hypotheses. However, alcohol expectancies did not vary as a function of gender (i.e., males did not endorse higher alcohol expectancies than females;  $m = 177.20$  and  $177.63$ , respectively;  $t = .095$ ,  $p = .924$ ), nor did males and females significantly differ on other relevant variables. Heavy drinking was, however, well-represented in this sample; nearly 46% of men and 31% of women met criteria for hazardous alcohol use using Saunderson et al. (1993) criteria (i.e., a score of eight or higher on the AUDIT).

The AUDIT was used in this study to specifically examine alcohol use. However, three items on the risky behavior questionnaire assessed alcohol use as well. In order to minimize measurement overlap between these questionnaires, two items on the ARQ(b) that asked about the frequency of participation in risky behaviors involving alcohol use (“underage drinking” and “getting drunk”) were omitted in the analyses, resulting in a 20-item risky behavior questionnaire. The item assessing drinking and driving, although related to alcohol use, was not omitted because of its saliency for young adult

populations. The risk perceptions questionnaire, however, included all 22 items, as this measure assesses how risky various behaviors are *perceived* to be, information which is not obtained with the AUDIT.

Based on previous research using the alcohol expectancy questionnaire (e.g., Brown, 1985; Southwick et al., 1981), the first hypothesis included the prediction that participants' expectations about alcohol's ability to enhance physical and social pleasure (domain three) and to produce relaxation and reduce tension (domain five) would be significantly associated with alcohol use. However, all six domains of the AEQ were significantly correlated with both alcohol use and risk-taking behavior (see Table 3). Thus, total AEQ score was entered into subsequent regression equations as the alcohol expectancy predictor variable.

Correlations between risk perceptions and risk-taking behavior, alcohol use, and alcohol expectancies indicated that the overall risk perception measure (ARQ(p)) was negatively correlated with alcohol expectancies ( $r = -.148, p = .033$ ) but was unrelated to behavior ( $r = -.033, p = .639$ ) and only somewhat associated with alcohol use ( $r = -.114, p = .103$ ) in this sample. Risk perception was also negatively correlated with domains three (physical and social pleasure;  $r = -.167; p = 0.016$ ), four (socially assertive personality changes;  $r = -.149; p = .032$ ) and five (relaxation and tension reduction;  $r = -.160; p = .021$ ) of the alcohol expectancy measure, and with participation in rebelliously-risky behaviors ( $r = -.155, p = .026$ ). These correlations suggest that, as predicted, individuals with lower perceptions of risk are more likely to have high positive expectations about the effects of alcohol, particularly in terms of alcohol's impact on

physical and social pleasure, social personality changes, and feelings of relaxation/tension reduction, and to engage in rebelliously-risky behaviors.

When the four subscales of the risk perception measure were examined, rebellious-risk perceptions in particular emerged as significant predictors of use. Rebellious-risk perceptions were negatively correlated with alcohol use ( $r = -.283, p < .01$ ) and alcohol expectancies ( $r = -.279, p < .01$ ), and were negatively correlated with overall risk-taking behavior ( $r = -.150, p = .033$ ). Nevertheless, when risky behavior was assessed after omitting the two alcohol-related questions discussed above, rebellious-risk perceptions failed to correlate with behavioral risk-taking ( $r = -.078, p = .265$ ). The Rebellious Risk subscale of the ARQ measures participation in (for the ARQ(b)) and perceptions about the riskiness of (for the ARQ(p)) five behaviors: smoking, underage drinking, staying out late, getting drunk, and taking drugs—behaviors frequently considered risky under most circumstances. The other three subscales, Thrill-seeking Risk, Reckless Risk, and Anti-social Risk, assessed behaviors that are perhaps considered to be more permissible (e.g., roller blading, flying in a plane, speeding, talking to strangers, overeating). Thus, because the Rebellious Risk domain of the risk perception measure assessed behaviors that tend to have more harmful ramifications and that are often identified as behaviors to reduce in intervention programs targeting young adults, scores from this subscale were used in the regression equations rather than overall risk perception scores.

### *Main Effects*

A series of hierarchical multiple regression analyses were conducted to test the study hypotheses. In order to conduct analyses involving interaction terms as predictor variables, scores on the AUDIT, AEQ, and ARQ measures were converted to standard scores with a mean of zero and a standard deviation of one. Sex, race, and age were entered into each regression equation in a first step in order to statistically control for the effect of these demographic variables. The variables of theoretical interest were entered as a group in step 2.

The control variables did not account for any significant variance in predicting alcohol use or risky behavior but as predicted by hypothesis one, alcohol expectancies significantly predicted alcohol use after partialing out the effects of risky behavior and risk perceptions ( $\Delta R^2 = .116$ ,  $\beta = .375$ ,  $p < .01$ ; see Table 4). Consistent with hypothesis four and in the correct direction (i.e., negative), rebellious-risk perceptions accounted for meaningful variance in predicting alcohol use although this effect was only marginally significant ( $\Delta R^2 = .015$ ,  $\beta = -.128$ ,  $p = .06$ ; see Table 5).

Consistent with hypothesis three, alcohol use predicted risky behavior participation even after controlling for the effects of alcohol expectancies and risk perceptions ( $\Delta R^2 = .077$ ,  $\beta = .327$ ,  $p < .01$ ; see Table 6). Hypothesis four was further supported; alcohol expectancies predicted participation in risky behavior after controlling for the effects of drinking and risk perceptions in the model ( $\Delta R^2 = .023$ ,  $\beta = .177$ ,  $p = .036$ ; see Table 7). Rebellious-risk perceptions, however, did not significantly account for risky behavior ( $\Delta R^2 = .001$ ,  $\beta = .026$ ,  $p = .734$ ; see Table 8). This finding, that lower rates

of risk perception did not predict higher rates of risky behavior in this sample is divergent from previous findings (e.g., Arnett, 2000; Millstein & Halpern-Felsher, 2002). Finally, when the prediction of risky behavior was reassessed with the inclusion of the two alcohol use questions, rebellious-risk perceptions were significantly related to risky behavior ( $\Delta R^2 = .032$ ,  $\beta = -.182$ ,  $p = .021$ ). However, when the effects of alcohol expectancies and alcohol use were partialled out, risk perceptions failed to account for any significant variance in risky behavior when alcohol use questions were included in this measure ( $\Delta R^2 = .000$ ,  $\beta = -.005$ ,  $p = .938$ ).

#### *Follow-up Analyses*

To explore gender effects, particularly since men and women endorsed different levels of alcohol use, interaction terms that included sex and each of the predictor variables were created. For risky behavior, sex did not significantly interact with any of the three predictor variables (alcohol expectancies, alcohol use, and risk perceptions). In terms of alcohol use, however, the interaction between sex and rebellious-risk perceptions approached significance ( $\beta = .120$ ,  $p = .097$ ), indicating that the relationship between lower perceptions of risk and higher alcohol use was stronger for males than for females (see Table 9).

Finally, it was thought that the relationship between alcohol use and risky behavior would be stronger for individuals who endorse more optimistic bias (i.e., hold higher alcohol expectancies and/or lower judgments of risk). A multiple regression analysis with risky behavior as the outcome variable was conducted to examine whether multiplicative effects between alcohol use and alcohol expectancies and between alcohol

use and risk perceptions helped explain the relationship between alcohol use and risk-taking behavior. Moderation effects were not found. The interaction between alcohol use and alcohol expectancies in predicting risky behavior was non-significant ( $\beta = -.036, p = .641$ ), as was the interaction between alcohol use and rebellious-risk perceptions ( $\beta = .086, p = .317$ ).

## CHAPTER IV

### DISCUSSION

In terms of specific hypotheses, alcohol expectancies were expected to significantly predict alcohol use (hypothesis one). The data in our sample provide support for this hypothesis, with overall alcohol expectancy score uniquely predicting alcohol use. In line with the first hypothesis, it was also predicted that people who scored higher on domains of the alcohol expectancy questionnaire, specifically those that measured the belief that alcohol use would enhance social and physical pleasure, produce relaxation, and reduce tension would endorse significantly more alcohol use. However, analysis of participants' domain scores on the AEQ indicated that none of the six domains were significantly more associated with alcohol use than the total expectancy score. Previous studies using this measure have typically examined associations between the six individual expectancy domains and alcohol use rather than using overall expectancy score. Though not an explicit avenue of investigation in this study, the finding that domain scores were not more associated with alcohol use than the total score lends support for the validity of the Alcohol Expectancy Questionnaire, as the aggregate of a sound measure should be more valid than its parts.

Alcohol use was also significantly associated with risk-taking behavior, as predicted in hypothesis three. Contrary to the second hypothesis, however, risk perceptions were not associated with risk-taking behavior. Participants' beliefs about how

risky smoking, underage drinking, getting drunk, staying out late, and taking drugs are had no statistically measurable bearing on whether they engaged in risky behavior. This finding was inconsistent with previous research on risk perceptions and risky behavior (Benthin et al., 1993; Halpern-Felsher et al., 2001; Johnson et al., 2002; Urberg & Robbins, 1984), which had demonstrated a strong inverse relationship between these variables. Participants' judgments about the riskiness of these behaviors were significantly negatively associated with risky behavior when the alcohol use questions (i.e., "underage drinking" and "getting drunk") were included on the behavior questionnaire. However, when the influence of alcohol expectancies and alcohol use were controlled for, these effects washed out.

That perceptions of risk were only related to risky behavior when alcohol use was included in the measure suggests that the ARQ(b) may be a better measure of alcohol use only rather than risk-taking behavior more broadly, at least for this sample. The unexpected finding that risk perceptions did not significantly predict risky behavior may have been due to the fact that risky behavior was not well-represented in the sample. While normally distributed, the mean item score for the risky behavior questionnaire was just over one on a scale of zero ("Never Done") to four ("Very Often Done";  $M=1.17$ ). Additional issues relevant to the measure used to assess risky behavior in this sample may have contributed to the low levels of behavioral risk taking as well. For example, the ARQ(b) included items about frequency of participation in such activities as parachuting, Tao Kwon Do fighting, stealing cars and going for "joyrides," snow skiing, roller

blading, and entering a competition. These activities may be uncommon even among individuals who engage in a high incidence of more traditional risk-taking behaviors, such as unprotected sex, drug use, drinking and driving, etc., and their inclusion on the ARQ(b) may have reduced participants' total risky behavior score.

It was proposed that both measures of optimistic bias would be related to both measures of behavioral risk. That is, alcohol expectancies would predict risky behavior as well as alcohol use, and risk perceptions would predict alcohol use as well as risky behavior. That alcohol expectancies were significantly associated with alcohol use is discussed above, as is the null finding regarding the relation between risk perceptions and risky behavior. To address the fourth study hypothesis, alcohol expectancies did uniquely relate to risky behavior, and rebellious-risk perceptions were also related to alcohol use. However, both of these findings were relatively weak in significance. Theories about why this may have been the case are discussed below.

In an attempt to better understand the relationship between alcohol use and risky behavior, moderation hypotheses were explored. Alcohol use did not significantly interact with risk perceptions or alcohol expectancies in explaining risky behavior. That is, the strength of the relationship between alcohol use and risky behavior was not impacted by participants' levels of optimistic bias, as measured by perceptions of risk and expectations about drinking. Gender, however, did interact with rebellious-risk perceptions to predict alcohol use, although this finding was small in magnitude and

marginally significant. This indicates that optimistic bias was significantly more predictive of alcohol use for males in this sample.

Overall, the hypothesis that risk perceptions would help explain the relationship between alcohol use and risky behavior was not supported. Risk perceptions, as measured by participants' beliefs about the riskiness of smoking, underage drinking, staying out late, getting drunk, and taking drugs, were significantly associated with risky behavior only when items on the outcome measure that directly assessed perceptions about the predictor itself, alcohol use (i.e., getting drunk and underage drinking), were included. Rebellious-risk perceptions did uniquely account for part of the variance in alcohol use. Based upon these findings and the fact that the rebellious-risk domain of the ARQ(p) was the only one that correlated with any of the outcome variables, it may be that this measure of risk perception is more closely related to risky behavior that expressly involves alcohol use than to risk-taking behavior more broadly. Despite strong internal consistency of this measure demonstrated in both this and other studies (Essau, 2004; Gullone et al., 2000; Gullone & Moore, 2000), these findings call the ability of the perceptions component of the Adolescent Risk Questionnaire to account for a diversity of risky behaviors into question.

It is not entirely clear why risk perceptions were poorly associated with risky behavior in this study; however, some explanations are proposed. Although these measures were related, participants' judgments about the riskiness of behavior failed to predict participation in risky behavior after accounting for levels of drinking and

expectations about alcohol's effects. Many individuals begin experimenting with alcohol during college, and this is a developmental period where peer influence is particularly strong. Frequent drinking among college students is well-documented despite the known risks of heavy alcohol use and efforts on college campuses to decrease alcohol consumption. Thus, heavy drinking may be so prevalent among college students in general that participants in this sample, whether they themselves drink to excess, simply do not believe heavy alcohol use to be risky.

Judgments about alcohol's effects were significantly associated with risk-taking behavior, independent of alcohol use. The nature of the items in each of these questionnaires may have played a role in participants' responses. The Alcohol Expectancy Questionnaire is an assessment of alcohol as an agent for producing *positive* changes, such as becoming more socially vivacious, relaxed, and sensuous. By contrast, the Adolescent Risk Questionnaire (perceptions) is an assessment of the extent to which certain behaviors might be *harmful*. Research indicates that the positive consequences of behavior are more salient to young people than negative consequences—that is, they are more inclined to attend to the benefits and disregard the costs of behavior (Nicoletti & Taussig, 2006; Parsons, Siegel, & Cousins, 1997). This tendency may help explain why participants who identified with alcohol's positive effects were more likely to endorse higher alcohol use and behavioral risk-taking whereas judgments of behavior as deleterious had little impact on behavior.

A related issue is that of relative versus absolute risk. In this study, the majority of the AEQ items were framed in terms of absolute risk (i.e., the extent to which alcohol consumption will personally impact the behavior of the participant), whereas the ARQ(p) items were framed more broadly (i.e., how risky the participant believes a behavior to be in general). Literature on risk perception suggests that participants are more likely to assess the risks of a situation accurately when questions are framed in absolute as opposed to comparative terms (Gerrard, Gibbons, Vande Lune, Pexa, & Gano, 2002; Johnson et al., 2001). Had the ARQ(p) asked participants to assess the extent to which engaging in risky behaviors would impact them personally, perhaps higher rates of risk perception would have been demonstrated in this sample.

This study was limited by a number of factors. The relatively small sample size likely reduced the statistical power and limited the strength about which conclusions could be drawn. For example, the fact that domains three and five of the alcohol expectancy measure did not differentially predict drinking habits is most likely due to the small size of the sample, as this relationship is well-documented in the literature. Likewise, the wording of the questionnaires may have effected the results. Ensuring that the phrasing of such questions was consistent on both questionnaires of perception bias (i.e., both either positive or negative; both phrased in terms of either absolute or relative risk) may have made examining the effects of these cognitive factors on alcohol use and risky behavior more comparable.

Alcohol expectancies, risky behavior, and rebellious-risk perceptions did significantly relate to alcohol use in this population, and both alcohol expectancies and alcohol use helped explain risk-taking behavior more generally. Nevertheless, the magnitude of the effects was small, and much variance remains to be explained and the present effort did not fully account for the relationships among these variables. Personality factors such as extraversion and sensation-seeking have been implicated in previous research on risk-taking (e.g., Cloninger et al., 1988; Miller et al., 2004; Nicholson, Soane, Fenton-O’Creevy, & Willman, 2005; Vollrath & Torgersen, 2002), as have peer groups (e.g., Gardner & Steinberg, 2005; Matsueda, Kreager, & Huizinga, 2006) and parenting factors (e.g., Brown, Tate, Vik, Haas, & Aarons, 1999; Maguen & Armistead, 2006; Pastor & Evans, 2003). For example, Matsueda et al. found that observing the outcomes of peer behavior influences adolescents’ perceptions of the riskiness of these behaviors, and individuals with a family history of alcoholism have been shown to espouse higher expectations for alcohol’s effects (Brown et al.). These and other potentially important variables were not assessed in this study, but may be important to considering in future studies about cognitive factors and risk-taking behaviors.

Additionally, the impact of demographic variables other than sex on alcohol use, risky behavior, and cognitive biases were not examined in this study. For example, research suggests that individuals of varying ethnic groups and socioeconomic statuses endorse different patterns of involvement in risk behavior (e.g., Gruber, DiClemente, &

Anderson, 1996; Lewis & Watters, 1991). Future research should explore and propose specific hypotheses about how such variables may impact the relationships among risk-taking behavior and cognitive biases.

Although a number of the hypotheses put forth in this study were unsupported, optimistic biases about the dangers of risky behaviors does appear to put individuals at risk for increased rates of participation in risky behavior, particularly alcohol use. Results also suggest that judgments about alcohol use, when phrased positively, may be a better means of assessing behavioral risk-taking than negatively-phrased expectations about the outcomes of risky behavior. Additionally, males may be more likely to drink heavily when they perceive the risks of such behaviors as smoking, underage drinking, and taking drugs to be less risky. Given the significant interaction between gender and expectancies, future research might specifically target the relationship between outcome expectations and alcohol use/risky behavior for females. They might also employ larger samples, and expand the scope of possible correlates of expectancies and use. More research clearly needs to be conducted in this area, as behavioral risk-taking is harmful for both the individuals engaging in risky behaviors as well as society more generally. Hopefully the results of this study will help inform future scientific efforts in this domain.

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APPENDIX A

FIGURES

Figure 1

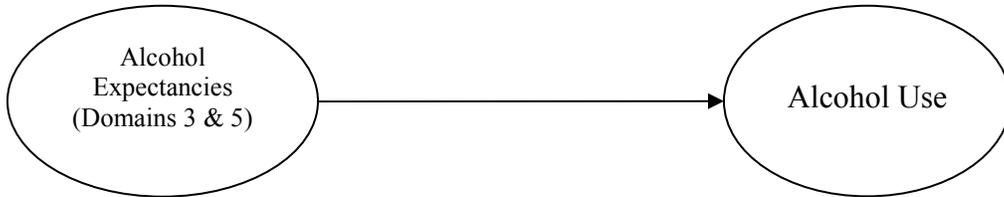


Figure 2



Figure 3

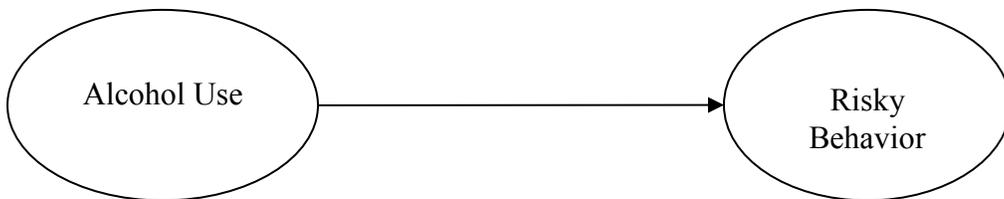


Figure 4

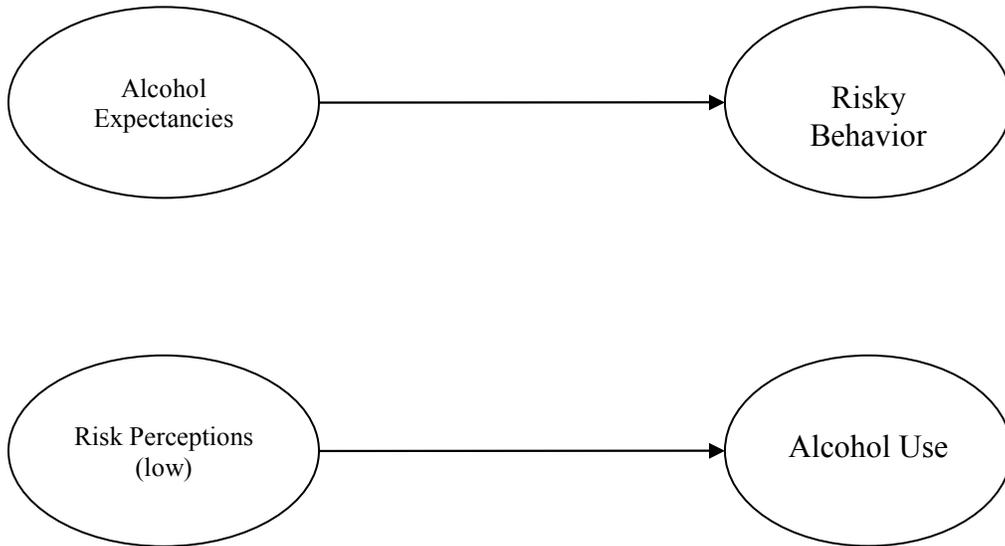
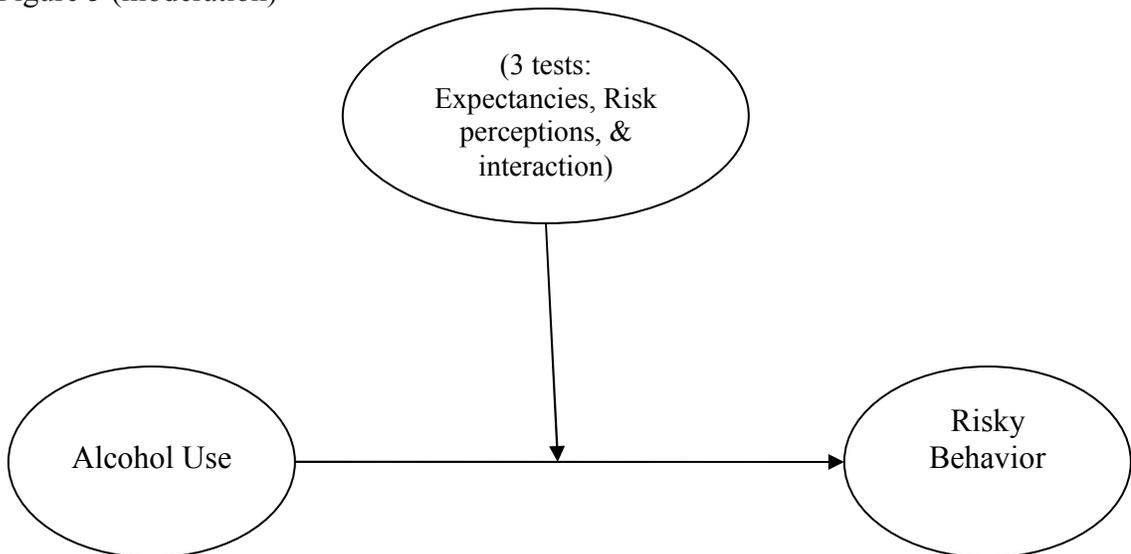


Figure 5 (moderation)



APPENDIX B

TABLES

Table 1. Demographic characteristics of participants (N=207)

<u>Age</u>	<u>Male</u>	<u>Female</u>	<u>Overall</u>
Mean	20.57 years	19.99 years	20.16
years			
Standard Deviation	4.12 years	3.91 years	3.97
years			
<u>Ethnicity</u>			
African American		22.7%	
Asian		6.7%	
Caucasian		63.1%	
Hispanic		1.8%	
Other/none reported		5.8%	

Table 2. Response frequencies for AUDIT, ARQs, and AEQ. Mean (standard deviation).

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	Male	Female
AUDIT	7.11 (6.2)	5.43 (4.9)
AEQ	177.20 (28.5)	177.63 (28.1)
ARQ(b)*	23.16 (10.0)	23.44 (8.7)
ARQ(p)**	12.55 (3.6)	13.27 (3.0)

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\* Questions assessing “Underage drinking” and “Getting drunk” omitted

\*\*Rebellious Risk Perceptions

Table 3. Pearson's product-moment correlation matrix for AUDIT, ARQ(b), AEQ, and the six AEQ domains.

	AUDIT	ARQ(b)	ARQ(p)	ARQ(p)†	AEQ	AE1	AE2	AE3	AE4	AE5	AE6
AUDIT	1	.38**	-.11	-.28**	.46**	.43**	.26**	.47**	.43**	.45**	.19**
ARQ(b)		1	-.03	-.08	.31**	.27**	.22**	.32**	.25**	.25**	.13
ARQ(p)			1	.77**	-.15*	-.13	-.09	-.17*	-.15*	-.16*	-.08
ARQ(p)†				1	-.28**	-.25**	-.16*	-.29**	-.29**	-.31**	-.10
AEQ					1	.92**	.72**	.80**	.88**	.86**	.56**
AE1						1	.65**	.66**	.77**	.79**	.50**
AE2							1	.49**	.59**	.50**	.38**
AE3								1	.71**	.73**	.35**
AE4									1	.72**	.46**
AE5										1	.40**
AE6											1

\*\* $p < .01$ ; \* $p < .05$

ARQ(b): Risky Behavior; alcohol use questions omitted

ARQ(p): Risk Perceptions

ARQ(p)†: Rebellious-Risk Perceptions

AE1: Alcohol acts as a global transformation agent, changing a wide variety of experiences in a positive way.

AE2: Alcohol improves sexual experience and enhances sexual arousal.

AE3: Alcohol enhances physical and social pleasures.

AE4: Alcohol creates positive and socially assertive personality changes.

AE5: Alcohol produces relaxation and reduces tension.

AE6: Alcohol increases feelings of arousal and aggression.

Table 4. Hierarchical multiple regression results: Predicting alcohol use from expectancies.

	B	SE B	$\beta$	$\Delta R^2$
Step 1: Controls				.015
Sex	.098	.083	.091	
Age	-.018	.019	-.075	
Race	-.041	.068	-.046	
Step 2: Partialled main effects				.208**
Risky Behavior	.377	.069	.380**	
Rebellious-Risk Perceptions	-.207	.067	-.217	
Step 3: Main Effect for AEQ				.116**
Alcohol Expectancies	.361	.068	.375**	

\*\* $p < .01$

“Risky Behavior”=ARQ(b) with alcohol use questions omitted.

Table 5. Hierarchical multiple regression results: Predicting alcohol use from risk perceptions.

	B	SE B	$\beta$	$\Delta R^2$
Step 1: Controls				.015
Sex	.098	.083	.091	
Age	-.018	.019	-.075	
Race	-.041	.068	-.046	
Step 2: Partialled main effects				.309**
Alcohol Expectancies	.393	.066	.408**	
Risky Behavior	.266	.068	.269**	
Step 3: Main Effect for ARQ(p)				.015*
Rebellious-Risk Perceptions	-.122	.064	-.128*	

\*\* $p < .01$ ; \* $p < .1$

“Risky Behavior”=ARQ(b) with alcohol use questions omitted.

Table 6. Hierarchical multiple regression results: Predicting risky behavior from alcohol use.

	B	SE B	$\beta$	$\Delta R^2$
Step 1: Controls				.001
Sex	-.017	.085	-.016	
Age	.000	.019	.002	
Race	.030	.069	.034	
Step 2: Partialled Main Effects				.110**
Alcohol Expectancies	.319	.075	.328**	
Rebellious-risk Perceptions	-.017	.075	-.018	
Step 3: Main Effect for AUDIT				.077**
Alcohol Use	.330	.084	.327**	

\*\* $p < .01$

“Risky Behavior”=ARQ(b) with alcohol use questions omitted.

Table 7. Hierarchical multiple regression results: Predicting risky behavior from expectancies.

	B	SE B	$\beta$	$\Delta R^2$
Step 1: Controls				.001
Sex	-.017	.085	-.016	
Age	.000	.019	.002	
Race	.030	.069	.034	
Step 2: Partialled Main Effects				.164**
Alcohol Use	.412	.076	.408**	
Rebellious-risk Perceptions	-.001	.072	-.001	
Step 3: Main Effect for AEQ				.023*
Alcohol Expectancies	.172	.081	.177*	

\*\* $p < .01$ ; \* $p < .05$

“Risky Behavior”=ARQ(b) with alcohol use questions omitted.

Table 8. Hierarchical multiple regression results: Predicting risky behavior from perceptions.

	B	SE B	$\beta$	$\Delta R^2$
Step 1: Controls				.001
Sex	-.017	.085	-.016	
Age	.000	.019	.002	
Race	.030	.069	.034	
Step 2: Partialled Main Effects				.186**
Alcohol Expectancies	.167	.080	.172*	
Alcohol Use	.326	.083	.323**	
Step 3: Main Effect for AUDIT				.001
Rebellious-Risk Perceptions	.025	.073	.026	

\*\* $p < .01$ ; \* $p < .05$

“Risky Behavior”=ARQ(b) with alcohol use questions omitted.

Table 9. Hierarchical multiple regression results: Sex as a moderating variable in predicting alcohol use.

	B	SE B	$\beta$	$\Delta R^2$
Step 1: Controls				.007
Age	-.017	.019	-.069	
Race	-.038	.068	-.043	
Step 2: Partialled Main Effects				.324**
Risky Behavior	.262	.067	.265**	
Alcohol Expectancies	.360	.068	.374**	
Risk Perceptions	-.127	.064	-.133*	
Step 3: Higher order effects (sex interactions)				.015
Sex*Risky Behavior	-.039	.069	-.039	
Sex*Alcohol Expectancies	.101	.076	.105	
Sex*Risk Perceptions	.115	.069	.120*	

\*\* $p < .01$ ; \* $p < .10$

“Risky Behavior”=ARQ(b) with alcohol use questions omitted.