

A PSYCHOSOCIAL INVESTIGATION OF ALCOHOL USE IN A SOCIAL DRINKING
CONTEXT

by

JESSICA JEAN BROOKS

(Under the Direction of Ezemenari M. Obasi)

ABSTRACT

It has been well established that personality characteristics, the presence of mental health symptomology, and other individual factors (e.g., expectancies, motives, and impulsivity) are associated with problematic drinking behavior. What is less clear, however, is the extent to which these factors are able to predict future drinking behavior or how social aspects of drinking contribute to the development and maintenance of drinking behaviors. These gaps are likely the result of disjointed theories of alcohol use that fail to capture the various psychological, social, and biological aspects of behavior at once. The current study is rooted in a biopsychosocial approach; however, only the psychosocial aspects were the focus. This investigation examined the following aims across two phases using a mixed-methods model, which allowed for exploration of behavioral data: (1) Identification of psychosocial variables linked to problematic alcohol use; (2) Examination of potential variables that influence decision to drink alcohol in naturalistic setting; and (3) Exploration of the influence of social interaction on individual's choice to consume alcohol. The sample consisted of 51 community-based participants, ages 21-35 ($M = 23.78$), who ranged from social to problematic drinkers. Results revealed that individuals who endorsed significant levels of depression were more likely to choose alcohol in

relation to their counterparts. Participants with MDD and APD were more likely to endorse problematic alcohol use, as well as those who endorsed internal (particularly enhancement) motives. Traits of impulsivity and social drinking motives did not significantly beverage choice in a social context, whereas individuals who engaged in social interaction during the mingling phase of the social drinking task were more likely to choose an alcoholic beverage when given the option, regardless of initial beverage preference. This suggests that social interaction influences not only drinking behavior (which has been found in previous studies), but also decisions to drink alcohol, which is an area that has been largely overlooked in the literature. Implications and areas of future research are discussed.

INDEX WORDS: Alcohol, Mental Health, Social Interaction, Problem Drinking, Depression, Antisocial Personality, Impulsivity, Drinking Motives.

A PSYCHOSOCIAL INVESTIGATION OF ALCOHOL USE IN A SOCIAL DRINKING
CONTEXT

by

JESSICA JEAN BROOKS

B.A.S., The University of Minnesota, Duluth, 2005

M.S., North Dakota State University, 2008

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial
Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2013

© 2013

Jessica Jean Brooks

All Rights Reserved

A PSYCHOSOCIAL INVESTIGATION OF ALCOHOL USE IN A SOCIAL DRINKING
CONTEXT

by

JESSICA JEAN BROOKS

Major Professor:

Ezemenari M. Obasi

Committee:

Alan Stewart
Georgia Calhoun
Brian Glaser

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
August 2013

DEDICATION

I dedicate this work to my parents. With your unconditional support, I have made it where I am today. Thank you for always believing and reminding me of what I am capable of.

ACKNOWLEDGEMENTS

I would like to extend many thanks to my committee, Drs. Obasi, Stewart, Calhoun, and Glaser, and the Counseling Psychology faculty who have seen me through my time at the University of Georgia. I am particularly grateful to Dr. Ezemenari Obasi who has been supportive and guiding throughout my training; thank you for the necessary pushes and words of encouragement! You are truly a wonderful mentor who has taught me so much. Lastly, I would like to acknowledge the support I have received over the years from my fellow classmates, friends, and family. You have been inspirational and motivational throughout this process. I hope I have made you proud.

TABLE OF CONTENTS

Page		
	ACKNOWLEDGEMENTS.....	v
	LIST OF TABLES.....	viii
	CHAPTER	
1	INTRODUCTION	1
	Purpose of the Present Study.....	5
	Primary Aims.....	7
	Exploratory Aim.....	8
2	A PSYCHOSOCIAL INVESTIGATION OF ALCOHOL USE IN A SOCIAL DRINKING CONTEXT.....	10
	Models of Alcohol Use	10
	Investigations into Alcohol-Related Behaviors.....	19
	A Biopsychosocial Approach to Conceptualizing Alcohol Use.....	26
3	METHODS	30
	Participants	30
	Research Design.....	31
	Instruments.....	32
	Data Collection.....	36
	Procedures.....	37
	Hypotheses.....	38
	The Statistical Plan.....	39

	Assumptions.....	40
4	RESULTS.....	41
	Influence of Mental Health on Problematic Drinking.....	41
	Relationship between Drinking Motives and Alcohol Use.....	41
	Relationship between Trait Impulsivity and Alcohol Use.....	42
	Examining Preference for Alcohol.....	43
	Predicting Beverage Choice.....	44
	Inter-rater Reliability of Social Interaction.....	45
	Influence of Social Interaction on Beverage Choice.....	46
	Influence of Gender and Race on Decision to Consume Alcohol.....	46
5	DISCUSSION.....	51
	Examining Psychosocial Variables Associated with Problem Drinking.....	51
	Predicting Beverage Preference and Beverage Choice in a Social Context.....	54
	Examining Influence of Social Interaction and Demographic Variables on Beverage Choice.....	56
	Strengths and Limitations.....	58
	Future Directions.....	59
	Conclusion.....	61
	REFERENCES	63

LIST OF TABLES

Page

Table 1: Summary statistics, correlations, and analysis from the multiple regression for heavy alcohol consumption.....	48
Table 2: Summary statistics, correlations, and analysis from the multiple regression for alcohol-related problems.....	48
Table 3: Association between beverage preference and Major Depressive Disorder.....	49
Table 4: Association between beverage preference and Antisocial Personality Disorder.....	49
Table 5: Summary of model statistics from logistic regression for alcohol preference.....	49
Table 6: Summary of model statistics from logistic regression for alcohol preference.....	49
Table 7: Association between beverage preference and beverage choice.....	50
Table 8: Association between primary activity and beverage choice.....	50
Table 9: Association between race and beverage choice.....	50
Table 10: Association between gender and beverage choice.....	50

CHAPTER 1

INTRODUCTION

It is important to investigate the predictors of drinking behavior, as the ramifications of alcohol use disorders have extensive psychological, social, and economical costs in the United States. Alcohol use has an alarming economic impact estimated at \$185 billion dollars per year, along with increased risks of physical and mental health problems that accompany heavy alcohol consumption (Harwood, 2000). Heavy alcohol consumption is strongly coupled with increased physical health problems (e.g., liver cancer, sexually transmitted diseases; CDC, 2004) and physical injuries (e.g., motor vehicle crashes, drowning; Naimi et al., 2003), most of which are largely avoidable risks (Rehm et al., 2009). And although the identification of common risk factors has been helpful in conceptualizing problematic alcohol use, there has been a recent call in the literature to focus on contextual and situational characteristics that may also capture unaccounted for variance in current models (Bot, Engels, Knibbe, & Meeus, 2007a). Thus it is crucial to understand the underpinnings of problematic alcohol use within the social context of the individual, in that doing so will likely lead to inclusive, yet appropriately tailored, prevention and intervention strategies for these individuals.

In the United States, approximately 4 to 5 percent of the population at any given time meets criteria for alcoholism (i.e., alcohol dependence) (Hasin, Stinson, Ogburn, & Grant, 2007). It has been well established that alcohol abuse and dependence also frequently occur with other psychiatric disorders (Kessler et al., 1996; NIAAA, 2004). According to the National Comorbidity Survey (NCS) (Grant, Stinson, Dawson, Chou, Ruan, & Pickering, 2006), comorbidity of alcohol use disorders and psychiatric disorders was quite common during the 12-

month period prior to the survey. Rates, however, differed depending on the psychiatric disorder, for instance whether it was anxiety- or depression-based. It is important to note that these data are based on the criteria outlined in the Diagnostic Statistical Manual of Mental Disorders, 4th Edition (DSM-IV-TR; American Psychiatric Association [APA], 2000). Reportedly, 4.65% of respondents of the NCS met criteria for alcohol abuse, which is characterized in the DSM-IV-TR by a maladaptive pattern of alcohol use over a 12-month period which negatively impacts the fulfillment of responsibilities, leads to persistent interpersonal problems, and/or results in recurrent alcohol-related problems (e.g., legal issues, physical harm). Of those who abused alcohol and sought treatment, approximately 6% met criteria for a mood disorder (e.g., major depression) and 5% met the criteria an anxiety disorder (e.g., general anxiety). Perhaps expectedly, the risk of comorbidity almost doubles with alcohol dependence, which shares criteria with alcohol abuse but is further characterized by craving, possible physical symptoms of dependence and tolerance, and an inability to control one's drinking. Of the 3.81% of respondents who met criteria for alcohol dependence, comorbidity rates were remarkably higher in comparison to alcohol abusers. Specifically, 11% of these individuals also met criteria for a mood disorder during the previous year. Similarly, more than 8% of individuals also met criteria for an anxiety disorder.

Although these rates of comorbidity may seem alarming initially, results of the NCS showed that individuals with comorbid alcohol use disorders and psychiatric disorders are more likely to enter treatment; however, socio-emotional issues beyond substance abuse behaviors often go untargeted in treatment (Petrakis, Gonzalez, Rosenheck, & Krystal, 2002). These prevalence rates indicate a need not only for the integration of treatment services provided by

mental health professionals, but also research aimed at better understanding the underlying processes of this comorbidity.

In addition to psychiatric comorbidity, identification of personality traits has been an area of interest in conceptualizing what is commonly described as “addictive behavior.” Behavior is considered “addictive” when an individual (a) demonstrates impaired control over behavior that has been strongly reinforced (Okasaka, Morita, Nakatani, & Fujisawa, 2008; Webb, Sneihotta, & Michie, 2010), along with (b) failure to regulate the behavior results in negative consequences (Webb et al., 2010; West, 2001; West, 2006). While the idea of an “addictive personality” type is an attractive concept, its existence remains a topic of debate amongst researchers in the field (see Kerr, 1996, for discussion of addictive personality myths). That is not to say, however, that particular personality profiles cannot be linked to an increased likelihood of engagement in substance use behaviors. Following this line of thought, it has been suggested that even greater success may lie in focusing on individual differences in personality rather than a cluster of traits (Slutske, Caspi, Moffitt, & Poulton, 2005). Despite some skepticism in the validity of an addictive personality profile, research in this area has been successful in identifying certain personality characteristics with problematic alcohol use and alcohol-related problems.

Personality traits implicated in the “risk” for the development of alcohol abuse and dependence, based on substantial findings in the literature, point to traits such as extraversion neuroticism, and sensation seeking (Peterson, Morey, & Higgins, 2005; Schall, Kemeny, & Maltzmann, 1992). Antisocial personality traits have also been linked to greater risk of problematic alcohol use (e.g., Pihl & Peterson, 1995) and greater likelihood of the expression of aggressive behaviors while under the influence (Giancola, 2000). Excessive alcohol use has been found to correlate with violence (e.g., suicide, homicide interpersonal violence) (NIDA,

2003) and robust correlations exist between alcoholism and criminality (Giancola, 2000). Individuals with antisocial personality tend to have higher prevalence rates of alcoholism in comparison to those without (Lewis & Bucholz, 1991), show earlier age of onset of first alcoholic drink (Lumsden, Hadfield, Littler, & Howard, 2005), and have more extensive substance abuse histories (Messina, Wish, Hoffman, & Nemes, 2002). Although standardized operationalization of what constitutes an addictive personality remains up for discussion, it is clear that certain personality traits may predispose an individual to engage in risky behaviors, including the abuse of alcohol.

The interaction between antisocial personality traits and alcohol use is further compounded by the trait impulsivity. Although there has been some debate in the literature as to whether impulsivity is an actual personality factor or simply a predisposition (see Whiteside & Lynam, 2009 for review), a clear and consistent relationship between impulsivity and problem drinking has been shown (Whiteside & Lynam, 2006). Not only has impulsivity been linked to a greater propensity to engage in risky behaviors (Cyders & Smith, 2008), impulsive individuals have a greater likelihood of problematic alcohol use (e.g., binge drinking; Cyders et al., 2007), as well as increased probability of aggression (Dom et al., 2006). Researchers have also begun to tease apart potential differences between sensation-seeking and impulsivity, suggesting that while impulsivity may not be a primary facilitator of initial alcohol use behaviors it could be more involved with loss of control over alcohol consumption (Dom et al., 2006). Furthermore, the influence of impulsivity has been found to differ depending on existing psychopathology, such as antisocial personality disorder (Whiteside & Lynam, 2009).

From review of prevalence rates and contributing factors to the development and maintenance of problematic alcohol use, several gaps can be identified. First, research aimed at

identifying predictors of problem drinking has led to mixed results that some have attributed to discrepancies in measurement of variables, particularly in the identification of at-risk personality traits (see Skeel et al., 2008, for review). Second, no research to date has used clinical interviewing methods within an experimental design to assess the influence of mental health issues on decisions to consume alcohol. The implications of this involve a sole reliance on self-report measures of psychological distress. Lastly, with the exception of a few studies (e.g., Bot et al., 2007a, 2007b; Demers et al., 2002), examination of the effects of situational or contextual characteristics on an individual's decision to consume alcohol have largely been overlooked. This is of concern largely because the effects of social processes on individual alcohol use remains unclear.

Purpose of the Present Study.

There is great need for an inclusive conceptualization of alcohol use behaviors. While much work has aimed to identify predictors of problematic alcohol use, emphasis has been on individual factors, such as certain personality traits, alcohol-related expectancies, or drinking motives. This represents a large limitation in the current body of literature, as alcohol is typically consumed in a group, therefore making consumption susceptible to social influences.

Unfortunately, this approach has failed to address *under what conditions* these variables lead to the prediction of alcohol use behaviors, largely due to the tendency to examine these factors outside of the context in which alcohol is typically consumed—within a social setting. Thus, to make predictions as to what factors contribute to one's decision to consume alcohol, one must consider the social aspects of drinking behavior, as well as individual factors.

This investigation sought to accomplish several different aims: (1) To build upon existing literature identifying psychosocial variables linked to problematic alcohol use; (2) To examine

the processes which may influence an individual's choice to drink alcohol in a naturalistic drinking context. That is, to determine what variables effectively predict an individual's decision to drink an alcohol beverage while in a social drinking situation (i.e., a bar lounge); and (3) To explore the influence of social interaction on an individual's choice to consume either an alcoholic or nonalcoholic beverage. The last aim is important, as it addresses the aforementioned limitations in the literature by investigating psychosocial predictors of alcohol consumption in a social drinking context. In other words, this investigation examined the processes influence individuals' choice to drink alcohol in a social context.

This study is one of the first to investigate alcohol use behaviors in a group setting using an *ad lib* drinking paradigm (see Bot et al., 2007a; Bot et al., 2007b; Larsen et al., 2010 for examples). The experiment took place in a naturalistic bar lounge under conditions that allowed for the participant to choose their drink (hence *ad lib*), either alcoholic or nonalcoholic. The advantages in this design are threefold. First, participants not only have the choice between alcoholic or nonalcoholic drink, they also have options within each category (a variety of beers, hard lemonade, soda, power drinks, and water) and have the freedom to drink however much of the one beverage as they wish. Second, observation of interactions is not limited to same-sex dyads, as in previous studies (e.g., Larsen et al., 2010). Third, the evaluation of a wide-range of variables can be observed and tested in order to draw a more complete picture of the influence of individual factors and social interaction on alcohol use behaviors. Based on previous research investigating personality, mental health, social, and cognitive factors in relation to alcohol use and alcohol-related behaviors, the following research aims were established.

Primary Aims.

Aim 1: In order to understand contributions to the development and maintenance of alcohol abuse and dependence, it is necessary to identify the variables linked to initial problematic drinking behaviors. Therefore, the first aim of this study is to determine what psychosocial factors best predict problematic alcohol use in a group of individuals aged 21 to 35, which will then lend itself to the development of an inclusive model of problematic alcohol use. The variables included in this prediction are those previously identified by alcohol researchers. It is important to note that “problem drinkers” in the present study were characterized by individual scores on the Alcohol Use Disorders Identification Test (see Chapter 3 for more details).

Hypothesis 1.1. Being that a high rate of comorbidity between substance use disorders and other psychiatric disorders exists, it is expected that those who meet criteria for a mood disorder or antisocial personality disorder will demonstrate increased engagement in problematic alcohol consumption.

Hypothesis 1.2. A large body of literature has linked individuals’ reasons for drinking (i.e., enhancement of positive affect or coping with negative affect) to heavier alcohol consumption. Therefore, it is expected that individuals who endorse enhancement reasons or coping reasons for drinking alcohol will have increased incidences of heavy drinking and endorse greater alcohol-related problems.

Hypothesis 1.3. Based on a strong correlation between heavy alcohol use and impulsivity, it is predicted that individuals endorsing greater impulsivity will also report greater alcohol consumption and alcohol-related problems.

Aim 2: The second aim of this study is to investigate the potential factors which contribute to one’s choice to consume alcohol in a naturalistic drinking context. This is in hopes

of determining what factors are most helpful in predicting future behavior based on measures of self-reported behavior and clinical interviewing. As a majority of studies to date rely solely on paper-and-pencil measures to assess alcohol-related behaviors in a drinking context without making comparisons between self-reported preference and actual observed behavior (i.e., alcohol consumption in a drinking situation), we hope to establish a model that is inclusive to both aspects (social and psychological).

Hypothesis 2.1. Prior to the social drinking task, it is expected that individuals identified as problem drinkers, those who meet screening criteria for a mental health disorder (i.e., Major Depressive Disorder or Antisocial Personality Disorder) as identified by the Computerized Diagnostic Interview Schedule (C-DIS; see Chapter 3), and those who endorse consuming alcohol for celebratory reasons or as a means of coping with negative affect will indicate a preference for an alcoholic beverage.

Hypothesis 2.2. Regardless of the initial drink preference endorsed by participants, it is expected that those high in impulsivity and those who endorse socially-oriented drinking motives will choose an alcoholic beverage during the social drinking task.

Hypothesis 2.3. If social interaction does, in fact, have little influence on an individual's decision as to whether or not to consume alcohol, it is expected that initial self-report of drink preference will predict subsequent beverage choice during the social drinking task.

Exploratory Aim.

Aim 3: The last aim was to explore potential moderators of the drink preference-drink choice relationship. Being that the last research aim is exploratory in nature, we refrain from making any concrete hypotheses. Rather, instead we sought to answer several pertinent questions that would hopefully lead to the elucidation of how these factors may influence alcohol

consumption. Also it was a goal to gather data that will serve as the foundation for future studies.

First, because alcohol typically regarded as a “social lubricant”, it is important to understand the influence of social interaction on an individual’s decision to consume alcohol, outside of individual factors (e.g., personality, alcohol-related beliefs, or mental health issues). In response to this need, we sought to determine the extent to which group processes (i.e., social interaction) influenced individual beverage choice during a social drinking task.

Second, researchers suggest that gender differences in social situations may contribute to the quantity of alcohol one chooses to consume (Bot et al., 2007a) and statistics have shown differences in alcohol consumption patterns based on racial group (Caetano & Kaskutas, 1995; Jones-Webb, 1998). Consequently, it is of interest to understand how these factors contribute to one’s decision to consume alcohol in a social context. We sought to understand to what extent demographic variables—specifically gender and race—influenced beverage choice in a social drinking situation.

CHAPTER 2

A PSYCHOSOCIAL INVESTIGATION OF ALCOHOL USE IN A SOCIAL DRINKING CONTEXT

As prefaced in Chapter 1, alcohol use in young adults is of concern not only because of an increased probability of abuse, but also increased risk of developing chronic alcohol dependence long-term. Understanding the underlying processes of the engagement in problematic drinking, therefore, is central in the prevention and intervention techniques employed by mental health professionals. A substantial body of literature has contributed to the identification and understanding of risk factors associated with problematic drinking, such as personality traits (e.g., Skeel et al., 2008), family history of alcoholism (e.g., Gelernter & Kranzler, 2009), and alcohol-related expectancies (e.g., Simons, Dvorak, & Lau-Barraco, 2009), to name a few. Being that alcohol consumption typically occurs in a social setting, it is alarming how little research has focused on the ways in which risk factors function within the context of social interaction to contribute to individual drinking behavior. And of the limited number of studies examining social drinking behavior, most have used populations in Canada or Europe. A large gap remains in our understanding of social influences on alcohol use behaviors in the United States. The current study sought to narrow this gap by examining previously identified risk factors connected with problematic alcohol use, in addition to observing social drinking behavior in a naturalistic setting.

Models of Alcohol Use.

Traditional addiction theorists have conceptualized alcohol use behaviors through the lens of a primarily psychological, sociological, or biological perspective, but rarely through an

integration of all three. Each of these perspectives will be discussed in turn, highlighting the basic tenets of theories within each domain, followed by pertinent research findings that have contributed to a better understanding of alcohol use behaviors.

Psychological Models of Alcohol Use. Psychological models are amongst the most widely used to conceptualize alcohol-related behaviors. Many of these models rest upon the assumption that alcohol use is maintained primarily for its personal effects, namely the regulation of internal emotional or cognitive experiences (Hull, 1981). Common models of alcohol use that fall within this framework include, but are not limited to, motivational models, social learning models, decision making models, and models of personality.

Early influential theorists, such as Conger (1956), highlighted the tension reduction properties of alcohol, claiming this as the primary reinforcer of alcohol consumption. Based on this conceptualization, an individual must experience an increased state of tension. Then, because of alcohol's physiological anxiolytic properties, if consumed it will likely reduce tension, and ultimately reinforce the response to drink alcohol in future states of tension. This perspective assumes alcohol directly influences affective-motivational processes. However, other theorists (e.g., Hull, 1981) posit that alcohol has a more indirect effect on tension reduction by interfering with higher-order cognitive processes (Hull & Levy, 1979). In this self-awareness model of alcohol use, individuals become less sensitive to negative self-relevant information that would typically lead to negative affect or self-criticism. In this way, alcohol provides a means of inhibiting a negative self-aware state, thereby providing immediate psychological relief.

Social learning theorists (e.g., Bandura, 1969; 1977; Abrams & Niaura, 1987) expanded upon the tension reduction perspective by acknowledging that the development of drinking behaviors may not simply be the result of direct alcohol-related experiences. Rather, through the

process of vicarious learning individuals may develop a desire to consume alcohol via observation of alcohol use by others. That is, individuals develop *expectations*, or anticipations, of the outcome(s) of consuming alcohol (Tolman, 1932). If alcohol serves as a strong positive reinforcer, then the likelihood of engaging in alcohol-related behavior in the future increases. The expectancy theory of alcohol use can be considered an offshoot of the learning theory, in that it similarly purports that beliefs about the effects of alcohol, which are considered to develop over time by indirect social learning processes and/or direct experiences, contribute to individual differences in alcohol use behavior (Goldman, Del Boca, & Darkes, 1999). From these explanations, alcohol use can be considered a learned response precipitated by individual and environmental (social) factors (Maisto, Carey, & Bradizza, 1999).

Closely related to the concept of alcohol-related expectancies is the development of motivation to consume alcohol. This area of research is grounded in the work of Cox and Klinger (1988) and Cooper (1994). Motivational models of alcohol consumption posit two distinct pathways in which alcohol use results: (1) from a desire to enhance positive emotion; and/or (2) to avoid or escape negative emotion. These desires are referred to as enhancement motives and coping motives, respectively. It is important to note that while two other social motives have been identified—drinking to be sociable (social enhancement) or drinking to conform to the group (social conformity)—limited research has explored their contribution to alcohol use behaviors. Thus, motivation to consume alcohol differs from alcohol-related expectancies primarily because its purpose is thought to regulate affective processes.

Problematic drinking falls under the umbrella of risk-taking behavior. Traditional personality perspectives conceptualize this behavior as serving to increase a typically low, under-activated arousal state (e.g., Zuckerman, 1983). Cloninger (1987) introduced three dimensions

of personality related to alcohol abuse. The first, *novelty seeking*, describes the tendency for one to respond strongly to new stimuli which leads to increased pursuit of rewards. The second, *harm avoidance*, describes the tendency for one to respond strongly to aversive stimuli which leads to increased avoidance of new stimuli (and potential punishment). And the third, *reward dependence*, emphasizes the maintenance of behavior associated with previous reward or avoidance of punishment. Each of these dimensions is thought to contribute to alcohol use. Specifically, Cloninger (1987) proposed that individuals high in novelty seeking, low in harm avoidance, and low in reward dependence would engage in more risky alcohol use behaviors. Similarly, Whiteside and Lynam (2001) proposed a detailed theory of impulsivity, combining “acting without thinking or regard to consequences” with “engaging in risky behaviors” (pg. 210). The conceptualization of impulsivity from a personality perspective is beyond that of which is observable, rather it is considered a trait that influences behavior (Eysenck & Eysenck, 1977). Four distinct dimensions of personality associated with impulsivity are included in this model: urgency, lack of premeditation, lack of perseverance, and sensation seeking. Of these four, urgency has been a strong indicator of alcohol use and other risky behaviors (Cyders & Smith, 2008), as well as sensation seeking (Dom, Hulstijn, & Sabbe, 2006). Those high in urgency, in particular, tend to experience and act on their impulses. Moreover, this urgency to act tends to be more frequent in situations that have elicited negative emotion where the drive to alleviate such emotion is strong.

The high prevalence of co-occurring mental and substance use disorders has highlighted the need for understanding the nature of this phenomenon. Key areas of focus have been on emotional regulation and executive functioning (i.e., cognitive) processes. Particularly in the presence of psychological distress, individuals have been shown to engage in impulsive decision-

making during intense states of emotion (Cyders & Smith, 2008). Thus it is important to address how coping styles may help buffer against or contribute to problem drinking. Such differences in coping styles have been divided into active (i.e., problem-focused) or avoidant (i.e., emotion-focused) strategies (Folkman & Lazarus, 1980). Using alcohol to reduce negative affect can be viewed as an avoidant coping strategy, and this behavior has been associated with the presence of increased negative life stress and mental health issues (e.g., depression, anxiety; Windle & Windle, 1996).

From this review of psychological theories, it can be concluded that many psychological dimensions have the propensity to influence alcohol consumption. An abundance of research in the investigating alcohol-related expectancies, motivation, and personality has produced powerful correlations with alcohol use behaviors, particularly in the context of psychological distress.

Sociological Models of Alcohol Use. The focal point of sociological models of alcohol use is on group differences at a systemic level, in contrast to psychological models which focus on individual differences. Similar to tension reduction models of alcohol use, the general strain model (Agnew & White, 1992) of alcohol use conceptualizes problematic alcohol consumption as reflective of the unavailability of more healthy coping mechanisms to deal with tension and anxiety. According to Agnew and White (1992), if alternative coping strategies are not available to an individual, substance use and abuse is more likely as a means of temporarily alleviating despair and producing positive affect. Thus, the defining characteristic of this model is its conceptualization of differential exposure to risks (that have been linked to substance use) based on the influence of existing social systems in the U.S. as the precipitator of substance use.

Recently, Akins, Smith, and Mosher (2010) addressed the need to attend to differences in substance use across race and ethnicity, as much of the literature to date involves samples consisting primarily of European Americans. A growing body of literature has begun to address differences in socioeconomic status, race/ethnicity, and substance use. From these findings, it has been concluded that substance use not only varies across the lifespan based on racial grouping, also race has been found to differentially affect the influence of socioeconomic status on substance use (see Akins et al., 2010, for review). It is well known that coping resources, such as access to health care, counseling, and recreational outlets, are less available to individuals of lower socioeconomic status (Wallace, 1999). People of color are more likely to also experience various forms of “strain,” such as poverty, educational obstacles, and acculturation stress. From this theory, it is presumed that individuals’ who experience greater strain and, consequently, greater negative emotions, will be more likely to turn to substance use as a means of coping because of limited access to alternative, more healthy coping options.

Another important sociological aspect of substance use is the influences of group interaction and societal views of use. Alcohol use has been described as an important aspect of *social identity* (Engels & Knibbe, 2000); that is, it is used in times of celebration and in times of mourning, and to feel connected to others in the group (Kuntsche, Knibbe, Gmel, & Engles, 2005; Larsen et al., 2010). Alcohol has also been described as a *social facilitator*—capable of reducing anxiety in social situations and promoting interaction between people (Hull, 1981). Despite the apparent social aspects of alcohol use, questions still remain such as: To what extent does social interaction influence the decision to drink alcohol, the quantity of use, or consequences as a result of use? What benefits may exist in social interaction (e.g., group cohesiveness) to deter the effectiveness of any negative alcohol-related consequences?

Peer influence on alcohol use behaviors has been conceptualized from a social psychology perspective. The concept of “groupdrink” refers to the effects of alcohol use, in combination with group membership, on self-regulation and level of self-awareness of an individual while under the influence (Hull, 1981). Groupdrink processes have been characterized as both positive and negative. In support for groupdrink, the hypothesis of social monitoring offered by Abrams and colleagues (2006) posits that the group can have a buffering effect for individuals who demonstrate lack of self-awareness or regulation as a result of alcohol consumption. In contrast, it may be that groupdrink facilitates social loafing (i.e., decreased effort toward a task) or de-identification (i.e., a sense of reduced responsibility) as a group member, which ultimately results lowered judgment and a less thorough evaluation of behavior (Karau & Williams, 1993), increased risk-seeking behavior (Sayette, Kirchner, Moreland, Levine & Travis, 2004), and increased intergroup competitiveness (Hopthrow, Abrams, Frings & Hulbert, 2007). Despite the contrasts between these two models, both are in agreement that alcohol use changes group dynamics (and group member behavior) which may result in negative consequences for the collective and/or the individual.

The interactional processes that occur between group members consuming alcohol can be further understood through the use of social learning concepts. The concept of imitation, for example, can be used to understand why individuals tend to drink more in the presence of others than when alone (e.g., Larsen, Engels, Granic, & Overbeek, 2009). Similar to the concept of group monitoring, imitation of another’s drinking behavior can be defined as a person’s sipping of a beverage being contingent on another’s behavior (see Larsen et al., 2010 for review of imitation procedures). The importance of studying imitation in social interaction is that it is as if people may monitor other’s drinking patterns in attempt to match them in the drinking context.

Because alcohol is a salient social motivator, imitation in this sense may serve as an adaptive behavior in order to be perceived as belonging.

From this review of theories, it is evident that—whether it is positive or negative in consequence—social processes have an impact on individual alcohol use behaviors. The extent to which these theories adequately capture the social influence-alcohol relationship, however, remains to be thoroughly investigated.

Biological Models of Alcohol Use. Although not a primary focus of the current study, research based on biological models of alcohol use have produced robust findings of the direct relationship between genetic make-up and alcohol use, namely alcoholism. The defining characteristic of these models is the assumption that a subset of individuals are hard-wired or predisposed to engage in heavier alcohol use (or abuse) based on certain factors—familial history of alcoholism, personality characteristics, race/ethnicity, and gender (Phil & Peterson, 1995). Other biological investigations have ranged from the examination of physiological correlates (e.g., heart rate, galvanic skin conductance) (e.g., Conrod, Peterson, Pihl, & Mankowski, 1997; Fowles, 1983), to pharmacological influences (i.e., neurotransmitter effects) (e.g., Dick et al., 2006; Hodge et al., 2006), to various activated brain areas (i.e., neural pathways) (see Yin, 2008 for review), to neuroadaptive change and plasticity (e.g., Al-Housseini et al., 2008) in response to alcohol exposure.

Historically, one of the most common means of investigating the genetic contribution in the development of addiction has been through “twin” studies. In these studies, monozygotic twins, who share identical genetic make-up, are compared to dizygotic twins, or those who only share approximately half of the same genes (e.g., Agrawal & Lynskey, 2008; Gelernter & Kranzler, 2009). In theory, this method has allowed for the parsing of nature (i.e., genetics) and

nurture (i.e., environmental) influences on the development of alcoholism. Other investigations of this nature versus nurture debate have taken the form of studying adopted individuals with and without family history of alcoholism and multigenerational family studies (see Shih, Belmonte, & Zandi, 2004 for review). Results from twin, adoptive, and family studies have revealed a strong genetic component in the development of alcohol dependence.

More recent methods have been used to investigate the potential neurobiological bases of alcoholism, specifically the neural pathways which may contribute to the progression of addiction. It is thought that chronic exposure to alcohol produces neuroadaptation in the brain; that is, alcohol's properties cause a change in neuronal firing which leads to increased motivation to seek out and consume alcohol (see Gilpin & Koob, 2008 for review). In the incentive sensitization theory of addiction, Robinson and Berridge (1993; 2001) describe generally how recreational substance use can turn into dependence as a function of motivational neural system adaptation. This theory follows as such. Being that one of the properties of alcohol is the production of a euphoric state, it reinforces a "liking" paired with a "wanting" of alcohol-related stimuli. This accounts for the *incentive* salience of alcohol-related stimuli and *motivation* to use alcohol. After repeated use, this liking and wanting of alcohol grows stronger and produces cravings that are characterized as pathological. Also at this time, individuals demonstrate heightened sensitivity (i.e., in brain reward systems) to the effects of alcohol and related-stimuli which contributes to the *wanting* of the substance, but not necessarily the *liking* of it over time.

With the advancement of technology, our understanding of the biological bases of addiction has greatly expanded. As a result, large bodies of work exist in the areas of genetics, psychophysiology, and neuropsychology—all with the intent of better understanding the

hereditary, neural, and physiological factors involved in the development and maintenance of alcohol use disorders.

Investigations into Alcohol-Related Behaviors.

Psychological Findings of Alcohol Use. Perhaps the most longstanding focus in alcohol literature has been on the understanding of various psychological underpinnings in the development of alcohol use behaviors and beliefs. Researchers have examined everything from emotional regulation, to alcohol-related cognitions, to personality factors—some of which have been found to be directly related to alcohol use, whereas others have been considered more distal influences. These distal influences can be thought of as *endophenotypes*; that is, “biological feature[s] which, unlike a phenotype, [are] hidden to direct clinical observation, but [are] genetically determined and closely linked with the disease of interest” (pp. 248; Zimmermann, Blomeyer, Laucht, & Mann, 2007). Both direct and indirect psychological processes as they relate to alcohol use behaviors will be discussed below.

Drinking Motives as Endophenotypes. Unlike the mixed results produced by research on the tension reduction model of alcohol use, there has been a substantial amount of literature in support of motivational models of alcohol use (Cooper, 1994). For instance, as far back as research conducted by Folkman and Lazarus (1980), individual differences in coping behavior have been shown to be differentially related alcohol use in the context of stress. This moderating effect of drinking motives on the alcohol-stress relationship has been further supported in research over the years (Cooper, Russell, Skinner, Frone, & Mudar, 1995; Read, Wood, Kahler, Christopher, Maddock, & Palfai, 2003; Stewart, Zvolensky, & Eifert, 2001).

Internal, or affective, reasons for drinking have been a primary focus of this research, with particular interest in coping motivated drinking. Recall that coping motivated individuals

drink as a means of temporarily reducing the experience of negative emotional states. This type of drinking has been intimately related to problematic drinking behavior (e.g., binge drinking, alcohol abuse) (Lewis et al., 2008; Ham, Bonin, & Hope, 2007). Moreover, while research suggests that individuals who are identified as predominantly enhancement motivated drinkers also endorse higher levels of problematic drinking (i.e., quantity and frequency of use), such reasons for drinking have not been strongly correlated with negative alcohol-related consequences (e.g., legal trouble), whereas coping motivated drinking has (Cooper et al., 1995).

Impulsivity as an Endophenotype. A dominant model of impulsivity (de Wit & Richards, 2004) presumes that individuals high in impulsivity and sensation seeking fail to inhibit a dominant response and are greatly influenced by immediate consequences, thereby making them insensitive to delayed consequences of their actions. In support of this model, research has shown a correlation between binge drinking and impulsive decision-making (Gourdiaan et al., 2007). This builds on previous research where explicit measures of impulsivity and sensation seeking have been correlated with alcohol use behaviors (Beck, Thombs, Mahoney, & Fingar, 1995; Skeel et al., 2008); that is, higher rates of problem drinking and more negative alcohol-related consequences (Cooper et al., 2008; Kuntsche et al., 2006). Furthermore, research indicates a difference in predictive ability of negative consequences as a result of alcohol use based on type of urgency; that is, positive (i.e., to act rashly in the event of extreme positive emotion) or negative (i.e., to act rashly in the event of extreme negative emotion). As reviewed by Cyders and Smith (2008), research suggests that low tolerance for distress paired with negative urgency correlates to risky alcohol use (e.g., binge drinking) in the context of negative affect (Cyders & Smith, 2007; 2008). The same is true for the experience of intense positive emotions and positive urgency and the tendency to engage in risky behavior.

A key characteristic of trait impulsivity is the tendency to engage in behavior without paying mind to consequences or potential risks. Urgency not only has been linked with problem drinking and other risk-taking behaviors, but also personality traits such as antisocial personality disorder (Whiteside & Lynam, 2003). It has been suggested that the impulsivity-alcohol use relationship is just another way of engaging in risky behavior as a means of temporarily coping (Colder, 2001). For instance, impulsivity has been found to interact with various emotional personality characteristics (e.g., extraversion, neuroticism) and has aided in the prediction of engaging in risky behaviors (e.g., binge drinking, risky sexual practices), although not directly (Cooper et al., 2008).

Despite the lack of clarity in the conceptualization and measurement of impulsivity, it is clear from mounting evidence that impulsivity traits influence alcohol use behaviors on an individual level (e.g., Cooper, Agocha, & Sheldon, 2000; Skeel et al., 2008). That being said, whether a direct or indirect relationship exists between risk taking or impulsivity and alcohol use is still open for debate in the literature.

Mental Health and Maladaptive Drinking. The comorbidity of alcohol abuse disorders with other psychiatric disorders is of growing concern in the United States. Underlying contributing factors to comorbidity between substance use disorders with other psychiatric disorders generally involve affectivity and emotional dysregulation of some kind. Some of the most frequently studied co-occurring psychiatric disorders include depressive, anxiety, and antisocial personality disorders. General findings for each diagnosis will be discussed in turn.

Research findings have indicated a relationship between psychological distress and alcohol use facilitated by urgency to alleviate the negative state (Cyders & Smith, 2008). In the context of the self-medication hypothesis (Khantzian, 1985), alcohol and its anxiolytic producing

effects can be seen as a means of self-medication in reducing anxiety. From this, it would follow that more anxious individuals would be motivated to consume more alcohol in anxiety-provoking situations. Chutuape and de Wit (1995) did not find any differences among beverage choice or quantity of alcohol consumed among anxious and control participants; however, it is important to note there was no manipulation to increase stress which could contribute to this finding. In studies with an induced social stressor, it has been found that anxious participants drink no more than non-anxious participants, with non-anxious individuals even drinking slightly more (Holroyd, 1978; Kidorf & Lang, 1999). In naturalistic settings, findings indicate that individuals who report experiencing anxiety earlier in the day demonstrate greater alcohol intake later in the evening (Swendsen et al., 2000). Overall, as noted by Carrigan and Randall (2003), findings in the literature are inconsistent at best, and may reflect the complex nature of “anxiety” (e.g., social, specific, general) and the various aspects of self-medication. That is, while anxious individuals endorse consuming alcohol to cope with anxiety, it may not be effective at actually reducing the anxiety.

Consistently research has established a relationship between anxiety and depressive symptoms (Kessler et al., 2005). Thus, it is not surprising that the same self-medication and affect regulation premises exist when understanding the underlying mechanisms of alcohol use in depressed individuals. Research has found emotion-focused coping and increased life-stress as strong predictors of depressed affect, with coping motivated drinking predicting both alcohol use and related-problems (Rafnsson, Jonsson, & Windle, 2006; Windle & Windle, 1996). Not only do depressed individuals tend to have less healthy coping resources (Kinnunen et al., 1996), it often times is difficult for them to disengage from unhealthy coping behavior, such as smoking (Friendman-Wheeler, Haaga, Gunthert, Ahrens & McIntosh, 2008) and drinking alcohol

(Rafnsson et al., 2006). Those with alcohol use disorders are also more vulnerable to the development of depression (Lynsky, 1998). Innovative research examining the intersection of genetic and environmental influences on the comorbidity of depression and alcohol use disorders indicates that certain genetic factors may increase susceptibility to depression in the event that such an individual uses alcohol chronically (Sjöholm et al., 2010). Thus, from these results, it is evident that either depression or alcohol use may exacerbate the other.

Cluster B personality disorders, which include Antisocial, Borderline, Histrionic, and Narcissistic Personality Disorders, show high comorbidity with alcohol use disorders (e.g., Sher & Trull, 2002; Trasseger, Sher, Trull, & Park, 2007). This cluster is characterized by dramatic, erratic, and/or emotional behavior (DSM-IV-TR; APA, 2000). In particular, not only has Antisocial Personality Disorder (APD) been identified as a risk factor in the development of alcohol dependence (Pihl & Peterson, 1995; Peterson et al., 2005), the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2007) has defined a ‘young antisocial subtype’ of alcoholism. Reportedly, approximately one-fifth of alcoholics are in their 20s and half of these individuals also meet criteria for APD (NIAAA, 2007). Antisocial personality traits have been associated with earlier age of first drink (Lumsden et al., 2005), greater involvement in sensation seeking behavior (Sannibale & Hall, 1998), and more negative alcohol-related consequences (Sannibale & Hall, 1998). Moreover, the association between APD, alcohol abuse, and criminality has been well documented (e.g., Hodgins & Cote, 1993; Hesselbrock, Meyer, & Hesselbrock, 1992; Sampson & Laub, 1990; Teplin, 1994). This has spurred research investigating treatment outcomes in this subset of alcoholics, as it is well known that individuals with APD are not apt to change their behavior. Interestingly, findings suggest that these

individuals are no less likely to comply with treatment than those without APD and could benefit from treatment (Messina, Wish, Hoffman, & Nemes, 2001; Messina et al., 2002).

Sociological Findings of Alcohol Use. As previously mentioned, alcohol is an easily accessible substance that has become part of our social identity (Engels & Knibbe, 2000). Consuming alcohol as an adult over the age of 21 is considered to be a normative behavior in the U.S. For example, individuals frequently congregate and drink in celebration or to relax after a long day of work. Knowing that alcohol is a “social drug,” it should follow that alcohol use behaviors should depend, at least in part, on social processes. Yet, social aspects of alcohol use remain largely untapped by researchers.

Examining Alcohol Use in Social Settings. The role of social interaction on alcohol use behavior has proven to be difficult to measure, as the construct is complex and is influenced by many individual factors. For instance, Peterson, Morey, and Higgins (2005) investigated alcohol consumption and personality within same-sex dyads and found that drinking behavior was significantly influenced by social context (i.e., how much the drinking partner consumed). Furthermore, this relationship was moderated by personality factors, such as openness, agreeableness, and extraversion. Much of the work in this area has focused on same-sex dyads, as they are the simplest of all social interactions; that is, they are not confounded by gender or complex group dynamics. This strength in design is also its greatest weakness, in that it is void of the complexities that may increase or inhibit further drinking behavior. Because of this, little is known of the effects of opposite-sex dyads or drinking behavior of larger peer groups.

Fortunately, researchers have recently begun to investigate the influence peer group processes on individual drinking behavior, namely rate and quantity of alcohol consumption in a drinking session. In studies using adlib drinking paradigms in which beer and wine were freely

available, evidence suggests that imitation (adapting drinking behavior to others), but not persuasion (drinking based on others solicitation), influences individuals to consume alcohol (Bot et al., 2007a). Participants have also shown stronger imitation behavior when both the confederate and participant are drinking alcohol, in contrast to when only the confederate is consuming alcohol (Larsen et al., 2010). Investigations of whether alcohol consumption is influenced by activity-type (i.e., passive interaction vs. active/game interaction) have produced results that indicate, while total alcohol consumption is unaffected by choice in activity, males tend to drink more following an active interaction perhaps as a means of compensation for lost time (Bot et al., 2007b). This finding corroborated with previous findings that gender influences the rate of individual alcohol consumption in a group (Bot et al., 2005).

While much of the literature has focused on the negative effects of alcohol, recent findings on “groupdrink” processes has provided support for the positive compensatory effects of group versus individual decision making (Frings, Hopthrow, Abrams, Hulbert, & Gutierrez, 2008). This is consistent with the group-monitoring hypothesis, where individuals who have consumed moderate levels of alcohol are able to effectively monitor the group and offset individual self-interest that may be negative for the group (Abrams, Hopthrow, Hulbert, & Frings, 2006). While a substantial amount of research indicates individuals are more likely to engage in risky behaviors (e.g., drunk driving; Guppy, 1994), partake in aggression (Pernanen, 1991), and are more likely to drinking heavily (Quigley & Collins, 1999) during social activity, these findings evidence some potential positive consequences of moderate alcohol use in group settings.

Social interaction in all of its complexity evidently has differential effects on alcohol consumption and alcohol-related consequences. Its influence appears to depend largely on

amount of alcohol consumed, individual differences in personality, gender, and engagement in social activity. Many questions regarding the influence of social interaction on drinking behavior loom. For instance, what is the effect of group processes on alcohol consumption if they are opposite-sex dyads, or friends versus strangers? The complexity of this issue lends itself for fruitful investigation in the future.

A Biopsychosocial Approach to Conceptualizing Alcohol Use.

As outlined in Chapter 1, the primary goal of this research is not only to contribute to the existing literature on predictors of problematic alcohol use, but also to begin filling in some notable gaps. It is important to understand the nature of these variables as they co-exist, rather than measuring them discretely; for instance, only focusing primarily on cognitive processes at the expense of social and affective influences on drinking behavior. Also, despite consistently identifying variables correlated with problematic drinking and the use of such factors in the prediction of problematic drinking in the future, these investigations have taken place largely outside of the context in which alcohol is being consumed.

Examining variables thought to influence alcohol use within the context in which it is consumed is of utmost importance. The rationale for this perspective is that context is *everything*. For instance, it is presumed that individuals who report heavy drinking and hold primarily social reasons for drinking would be more apt to drink in a social-oriented drinking task rather than in an individual drinking task. If this were not taken into account, one may draw an inaccurate conclusion that social drinking motives are not connected to problematic alcohol consumption simply because it was assessed independent of a social situation.

A Biopsychosocial Model of Alcohol Use. In response to a general disconnect amongst the assessment of psychological (i.e., cognitive and affective variables), social, and biological

predictors of alcohol use behaviors, a biopsychosocial perspective began to emerge. Simons (2003) outlined a biopsychosocial framework for understanding the ways in which alcohol use and abuse are linked. This biopsychosocial perspective embraces somewhat of a developmental approach, in that environmental (social), psychological, and biological factors interact and evolve over time to contribute to alcohol use and related behaviors.

General Findings of Alcohol Use using a Biopsychosocial Approach. A point of differentiation has been made in the literature between predicting alcohol use and predicting alcohol-related problems. In this fashion, three pathways have been delineated to aid in determining the extent to which a predictor relates to these variables (Stice, Barrera, & Chassin, 1998): (1) a mediational relationship could be present in which a direct relationship exists between the variable and alcohol use, with an indirect relationship between the variable and alcohol-related problems; (2) the predictor could demonstrate a direct relationship with both alcohol use and related problems; and/or (3) the predictor could serve as a moderator between the alcohol use-related problems relationship.

Genetic research has led to the identification of specific genes as contributors to the risk of alcohol dependence. The degree of risk associated with these genes is linked to the rate in which alcohol-metabolizing enzymes—alcohol dehydrogenase [ADH] and aldehyde dehydrogenase [ALDH]—are encoded (see Foroud, Edenberg, & Crabbe, 2010, for review). Interestingly, genetic variants of these same genes also have been shown to *buffer* against the development of alcohol dependence in certain ethnic populations, particularly in Asian Americans (e.g., Eng, Luczak, & Wall, 2007) and African Americans (e.g., Edenberg, 2007). These ethnic populations produce higher levels of acetaldehyde (the product of metabolized alcohol) as a result of a genetic mutation which renders the alcohol metabolizing enzyme ADH

nearly inactive, even after a very small amount of alcohol. Therefore, these mutated variants are thought to be protective against the development in alcoholism primarily due to the aversive reactions (e.g., nausea, flushing, increased heart rate) caused by acetaldehyde build-up (Foroud et al., 2010).

A comprehensive review of common biological, psychological and social etiology of substance use has been offered by Shaffer and colleagues (2004). Research has demonstrated that alcohol stimulates neurobiological networks. Since its conception, the investigation of motivational brain systems proposed by Gray (1987) has produced a rich body of literature in the area of substance use. This model consists of two dimensions: the behavioral inhibition system (BIS) which is sensitive to punishment and responsible for stopping action, and the behavioral activation system (BAS) which is sensitive to reward and responsible for goal-directed behavior. Activity levels of the BAS, in particular, have proven to be a strong predictor of substance use (O’Conner & Colder, 2005; Simons, Gabor, Correia, Hansen & Christopher, 2005) and robustly correlate with global substance use expectancies (Simons & Arens, 2007). Specific brain areas implicated in emotion-based action and substance use include the amygdala and orbitofrontal cortex (see Cyders & Smith, 2008 for review). Damage to these areas has been found to result in affective lability and low insight into consequences of actions, potentially contributing to impulsive substance use during times of intense emotion.

Neurotransmitter systems and reward neural circuitry have been implicated as contributors to rash decision making and alcohol abuse. These systems, reviewed by Gilpin and Koob (2008), include the dopamine, opioid, GABA, glutamate, and serotonin systems. Chronic alcohol exposure produces alterations in these transmitters, which can be characterized as “neuroplasticity”. In effect, depending on the stage of alcohol dependence, this can be seen in the

form of sensitization (Robinson & Berridge, 2001), tolerance (Walker & Koob, 2007), or withdrawal (Koob, 2003; Valdez et al., 2002).

Further, it is noted that psychosocial influences contribute greatly to the heterogeneous ways in which alcohol impacts biological systems. The presence of anxiety and depression, in addition to other psychological symptoms, amongst substance abuse treatment populations is high (Silk & Shaffer, 1996; Shaffer, 1996). Moreover, such individuals also are more likely to be impulsive and engage in delinquent behavior (Brenner & Collins, 1998; Vitaro, Brendgen, Ladouceur, & Tremblay, 2001), all which have biological consequences (i.e., neuroadaptation and plasticity; Zinberg, 1984).

Perhaps due to the complex nature of the biopsychosocial approach, cumulative research in this area has produced somewhat mixed results in terms of what variables mediate, moderate, or directly relate to alcohol use and related-problems (Carey & Correia, 1997; Simons, 2003; Wood, Read, Palfai, & Stevenson, 2001). Some have also criticized this approach for its focus primarily on individual biopsychological factors at the expense of environmental influences (Littlejohn, 2004). The reality is that addiction is a complicated area of study, filled with idiosyncrasies, which does not lend itself well to simplistic study. In order to further our understanding of addiction, an inclusive approach is our best bet (Amodia, Cano, & Eliason, 2005). Over time, more precise (and standardized) methods of design and replication will likely lend support for such an inclusive model of alcohol use behaviors.

CHAPTER 3

METHODS

This chapter provides an overview of the current study in terms of participant make-up, research design, instruments used to assess the dependent and independent variables, data collection methods, the statistical analysis plan, and assumptions made about the sample.

Participants.

Of the 346 of individuals screened over the phone, 51 participants consisting of individuals from the community surrounding the University of Georgia (Women: $n = 23$; Men: $n = 28$) were invited to participate the study. The ages of the participants ranged from 21 to 25, with an average age of 23.78 ($SD = 2.70$). Self-reported race/ethnicity was European American ($n = 33$; 64.7%), African American ($n = 17$; 33.3%), and Bi/Multiracial ($n = 1$; 2.0%).

Participants were recruited for this study by advertisements placed on flyers, newspapers, and buses in the community, as well as online via Craig's List. The study was conducted over two separate phases (see Procedures for further details). An initial phone screening identified European American and African American participants that met criteria for "social drinking" (i.e., those with AUDIT score of 7 or less; $n = 29$) and "heavy drinking" (i.e., those with an AUDIT score of 8 or greater; $n = 22$). The mean AUDIT score for the sample was 7.18 ($SD = 4.49$). Those who participated in Phase I were compensated \$10.00 in cash, and those who participated in Phase II received an additional \$20.00.

General exclusion criteria included those taking prescription medications, those who were found to be pregnant, and those suffering from unremitted psychological problems (e.g., alcoholism, depression). Further, the reported demographics do not include participants ($n = 295$)

that were not invited to participate in Phase II after completing Phase I of the study. Reasons for this ranged from difficulty contacting participants (to schedule follow-up sessions), to evidence of mania or hypomania, to meeting the maximum number of participants in a given group (e.g., heavy drinking European American males) needed for Phase III, a functional magnetic resonance imaging (fMRI) paradigm that is beyond the scope of this study.

Research Design.

The current study utilized a mixed-methods model. The primary reason for this was capture the influence of social interaction on ultimate beverage choice, in addition to influences of psychological and behavioral factors gathered by self-report measures and a clinical interview. Qualitative methodology was used to code the important social interactions; however, all variables were analyzed quantitatively (see Procedures section for more details). The primary dependent variable of interest is problematic drinking behavior. Problem drinking is identified with measures that assess quantity and frequency of alcohol use and severity of negative alcohol-related consequences (e.g., health, legal, relational). The independent variables of interest are drinking motives, trait impulsivity, mental health problems (i.e., depression, antisocial personality), and social interaction. Potential moderating variables are gender and race.

Eight groups were identified based on three distinctions: race, gender and severity of alcohol consumption. Race included European American and African American; sex was separated by males and females; and alcohol consumption was differentiated based on self-report social (light) drinking and heavy drinking patterns. The eight groups were broken down as follows: (1) heavy drinking European American males, (2) heavy drinking European American females, (3) heavy drinking African American males, (4) heavy drinking African American females, (5) social drinking European American males, (6) social drinking European American

females, (7) social drinking African American males, and (8) social drinking African American females.

A major strength of this design is that it allows for a variety of statistical analyses to be used, including analysis of variance, regression, and odds-ratio predictions. This flexibility provides space for a wide variety of research questions—both experimental and exploratory in nature—to be investigated.

Instruments.

Demographics. Participants completed two measures of demographics. During the Screening Phase, the participants verbally answered questions related to personal history with the following issues: psychological (e.g., use of psychological services and nature of mental health problem/s), medical (e.g., prescribed medicines, significant health problems), and alcohol use (e.g., age of first drink, involvement in substance use treatment) issues. These items were constructed by Ezemenari M. Obasi, Ph.D., for the purpose of this study. Potential participants also verbally completed the AUDIT (see below for further details) to determine the group in which they belonged (i.e., social or heavy drinkers) and provided information related to race/ethnicity, gender, age, and employment status. In Phase I, participants completed a more in-depth assessment of demographics independently on the computer. In order to tailor drink options for the Social Drinking Task of Phase II, each participant was asked to list his/her three favorite nonalcoholic beverages, as well as alcoholic beverages.

Alcohol Use Severity. To assess the severity of alcohol use in participants, the Alcohol Use Disorder Identification Test (AUDIT; Saunders, Aasland, Babor, De La Feunte, & Grant, 1993) was administered during the Screening Phase, and again in Phase I. The AUDIT is a 10-item measure of alcohol use across behavioral, physical, and social dimensions. All items are in

Likert-scale format. Specifically, 8 of the 10 items ask participants to rate the severity in which they engage in alcohol use and experience various negative outcomes as a result of alcohol consumption (e.g., neglecting responsibilities, feeling hung over, “blacking out”) on a scale ranging from "Never" (0) to "Daily or Almost Daily" (4). Two additional items ask participants to endorse if harm to self or others has occurred as a result of drinking, and if it has been suggested that they reduce or quit drinking. These response options for these items included: "no" (0), "yes, but not in the last year" (2), and "yes, during the last year" (4). All responses are summed, and a total of ≥ 8 indicates engagement in hazardous drinking behaviors. The AUDIT has demonstrated considerable validity and reliability across various samples in the identification of and discrimination between hazardous drinkers and social drinkers in nonclinical samples. Specifically, research has established adequate test-retest reliability coefficients, ranging from a Pearson r of 0.60 to 0.88 (Daepfen, Yersin, Landry, Pécoud, & Decrey, 2000; Selin, 2003), as well as adequate internal consistency with Cronbach’s α ranging from 0.76 to 0.85 (Daepfen et al., 2000; Selin, 2003). Within the current study, the AUDIT produced scores with adequate internal consistency, with a Cronbach’s α of 0.78.

Drinking Motives. Participants’ reasons for drinking were assessed using the Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994). The DMQ-R is a 20-item self report measure that assesses four distinct drinking motives across two dimensions: internal (i.e., enhancement of affect; coping with affect) and external (i.e., social conformity; social enhancement). Each item is rated on a 5-point Likert-scale, ranging from "never/almost never" (1) to "almost always" (5). The DMQ-R has demonstrated adequate internal consistency (α ranging from 0.82 to 0.89) and validity (i.e., structural and criterion-related) (Cooper, 1994; Kuntsche, Stewart, & Cooper, 2008). The current study yielded scores with good internal

consistency, with Cronbach's α of 0.88 for Enhancement, 0.83 for Coping, 0.88 for Social, and 0.78 for Conformity motives.

Trait Impulsivity. The UPPS Impulsive Behavioral Scale-Revised (UPPS-R; Whiteside & Lynam, 2001) measures four "dimensions" (or factors) of impulsivity across 45-items. These factors include: Urgency, Premeditation (lack of), Perseverance (lack of), and Sensation Seeking. Each item is rated on a 4-point Likert-scale, ranging from "not at all" (0) to "very much" (4). Whiteside & Lynam (2001) reported adequate internal consistency in the measures construction, with α ranging from 0.82 to 0.91. Moreover, its reliability has been replicated in other studies investigating the link between impulsivity and alcohol use, yielding α between 0.81 and 0.88 (Magid & Colder, 1997). The current sample produced good internal consistency, with Cronbach's α of 0.85 for Negative Urgency, 0.83 for Lack of Preservation, 0.88 for Lack of Premeditation, and 0.87 for Sensation Seeking.

Substance Use Related-Problems. The Inventory of Drug Use Consequences (InDUC; Tonigan & Miller, 2002) provides a measure of lifetime and recent consequences of substance use. It is comprised of 50 items that assess five distinct domains: (1) Physical, (2) Interpersonal, (3) Intrapersonal, (4) Impulse Control, and (5) Social Responsibility. Participants first complete the lifetime items in which they indicate if a given consequence has ever occurred (0 = no, 1 = yes). Then participants rate recent [last 3 months] consequences they might have incurred, with responses ranging from "never" (0) to "daily or almost daily" (3). In research, the InDUC has demonstrated good internal consistency, test-retest reliability, and positive correlations with other measures of substance use consequences (Blanchard et al., 2003; Gillapsy & Campbell, 2006; Tonigan & Miller, 2002). The current study yielded excellent internal consistency, with a Cronbach's α of 0.93.

Structured Clinical Interview. The Computerized Diagnostic Interview Schedule (C-DIS IV; Robins et al., 2000) was administered in Phase I by a graduate-level research assistant to assess for the presence of a variety of psychological disorders based on the criteria of the Diagnostic Statistical Manual for Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). The “screening” function of the C-DIS was used for this study, which allowed for more detailed follow-up questions only if participants endorsed symptoms on any given scale. The following disorders were screened: Mania/Hypomania, Major Depression, Anxiety (General Anxiety, Social Phobia, Specific Phobia), Conduct, Antisocial Personality, Post-traumatic Stress, Alcohol Abuse/Dependence, Nicotine Dependence, and other Substance Abuse/Dependence syndromes. Findings on the efficacy of computerized structured interviews suggest modest diagnostic accuracy, with overall reliabilities ranging from 0.49 to 0.68 (Butcher, Perry, & Atlis, 2000). Moreover, levels of agreement between computerized interviews and paper-pencil interviews have yielded the highest kappa values (inter-rater agreement) for substance use disorders (i.e., ranging from 0.71 to 0.81; see Butcher et al., 2000 for review).

Social Interaction. Qualitative methods were used to code behaviors identified as important in the social interaction. Methods outlined by Bot and colleagues (2010) were used to code involvement (i.e., amount of time spent) in activities by each participant (e.g., being alone vs. carrying on conversation with others), in addition to rate of beverage consumption during each activity. Specifically, engagement in a given activity was coded as: being alone, watching TV, using cell phone, making conversation, and visiting restroom. Unlike Bot et al. (2010) who included active and passive activities, all behaviors coded in the current study are passive in nature. Time spent engaging in each activity was also recorded.

Data Collection.

Data was collected in accordance with the University of Georgia's Research Foundation (UGARF). In the Fall of 2008, Dr. Ezemenari M. Obasi was awarded a UGARF grant to collect data in three waves from community members in Athens, Georgia and the surrounding area. Individuals over the age of 21 attending the University of Georgia were also eligible to participate in this study and were compensated with course credit for psychology courses. Data was collected from Fall of 2008 to Spring of 2010 in the Hwemudua Alcohol and Health Disparities Lab (HAHDL) at the University of Georgia. All data was entered into SPSS 17.0, a comprehensive statistical analysis program used in this study for all analysis procedures.

Data was collected in various forms. Self-report measures were administered and completed on a computer. The main advantage of using MediaLab software is the assurance that participants must complete all questions, resulting in minimal missing data points. Clinical data was collected through a structured interview. The computer laboratory of the HAHDL is comprised of 6 Dell computers, all equipped with MediaLab v2008 and C-DIS software. Within the bar lounge, a video camera and four microphones attached to the ceiling recorded all participant interactions throughout the social drinking task. Qualitative methods were used to code participant behaviors related to social interaction during the 15-minute mingling period of the task, prior to their deciding on beverage choice. Social behavior included level of engagement and entertainment choice. Social engagement was defined as taking part in socializing (as opposed to sitting alone) and frequency of verbally talking during social interaction. Entertainment choice was defined as participant choosing to listen to music, watch a movie, or deciding on neither. Ultimately, coding of social interaction variables allowed for quantitative comparisons with other important quantitative variables during statistical analysis.

Primary activity was determined by the dominant social activity each participant was engaged over the course of 15 minutes.

Procedures.

Initial Screening. This phase took approximately 10 minutes to complete over the phone and was conducted for two reasons. The first was to rule out individuals who would not be able to fully participate from Phase I to Phase II of this study. Exclusion criteria included those who abstain from alcohol, those who were trying to reduce their alcohol consumption, those who had a significant psychiatric history, and those taking medications that are contraindicated with the use of alcohol. The second was to ensure a well characterized sample of African American and European American social and heavy drinkers that would make for easier group comparisons.

Phase I. Those that met inclusion criteria were invited to come into the HAHDL for Phase I. Each participant completed Phase I individually. After informed consent was completed, a graduate-level research assistant conducted a structured interview using the C-DIS. Following the interview, each participant completed a battery of instruments and then the participant was briefed of the general nature of the study. This phase took approximately 1 hour and 30 minutes to complete.

Phase II. Multiple participants were invited into the laboratory during Phase II. Following the informed consent process, each participant was asked to verify their age of birth with a driver's license and then take to an initial breathalyzer (women participants also were required to consent to a pregnancy test). Each participant then completed several implicit computer tasks [not reported in this study] and a battery of instruments.

Following the completion of these tasks, all participants were invited into the laboratory's bar lounge for the remainder of the study where they completed a Social Drinking Task. The

lounge consisted of a bar, art décor, chairs, and entertainment (e.g., television, stereo). Participants were encouraged to mingle for 15 minutes after the research assistant left the room. All interactions were video recorded to allow for coding of behavior. After 15 minutes elapsed, the research assistant would offer a range of alcoholic and nonalcoholic beverages from which to choose. No matter what the beverage choice, all participants were required to remain in the bar lounge for 30 minutes. Participants were allowed to finish as much of the beverage as they wished. Those who chose alcoholic beverages were required to remain in the bar lounge an additional 15 minutes to allow for a decrease in breath alcohol content to occur.

Hypotheses.

Recall this study has two primary aims, as well as an exploratory aim. The first primary aim focused on identifying a host of psychosocial variables linked to problematic drinking behaviors in young adults. It was expected that those participants who meet criteria for a psychiatric disorder (depression, antisocial personality), endorse coping-motivated reasons for drinking, and/or are high in impulsivity would also report problematic drinking patterns.

The second primary aim investigated what variables contribute to an individual's choice to drink in a social drinking context by comparing self-reported beverage preference and actual beverage choice in a social drinking task. It was hypothesized that problem drinkers would indicate a preference for alcohol prior to the task, as well as those endorsing internal drinking motives and those with mental health disturbances. It was also expected that, regardless of self-reported preference, individuals who reported high trait impulsivity and endorsed socially-motivated reasons for drinking would choose alcohol in the social drinking task. Lastly, it was predicted that self-reported beverage preference would predict subsequent beverage choice.

The third aim was exploratory in nature and tested potential moderators of the initial drink preference-drink choice relationship, including: (1) the extent to which group processes influence this relationship; and (2) the extent to which differences in gender and race influence this relationship.

The Statistical Plan.

Hypothesis 1.1: An odds ratio analysis was used to test this hypothesis based on having multiple categorical independent variables (i.e., depression, antisocial personality) in the prediction of the continuous dependent variable (AUDIT score). This statistic provides information on the strength of relationships (probability levels) between the independent and dependent variables.

Hypothesis 1.2: Multiple regression analyses were used to determine the simultaneous test of all regression equations (i.e., enhancement and coping motives) in the prediction of alcohol consumption (i.e., quantity and frequency) and alcohol problems (i.e., InDUC). An advantage to using MMR is that the correlation between alcohol consumption and alcohol problems will be taken into account.

Hypothesis 1.3: Similar to the methods used in Hypotheses 1.2, a multiple regression was conducted to determine the structure and importance of relationships between impulsivity and alcohol consumption and related-problems.

Hypothesis 2.1: To determine the probability that an individual would indicate a preference for alcohol from knowledge of mental health issues and drinking motives, odds ratio analysis and logistic regression analysis were used. These methods of statistical analysis are most appropriate based on the continuous nature of the independent variables, and the categorical nature of the dependent variable.

Hypothesis 2.2: Similar to the analysis in Hypothesis 2.1, logistic regression was used to predict alcohol preference based on impulsivity and drinking motives.

Hypothesis 2.3: To test this hypothesis, an odds ratio analysis was used to investigate the likelihood of self-report predicting actual drink choice.

Exploratory 1.1: To determine the extent to which group process (i.e., social interaction) influences individual beverage choice during a social drinking task, coding methods were employed to quantify social interaction during the 15 minute mingling prior to beverage choice. An odds ratio analysis was employed to determine the extent to which social influence may accurately predict beverage choice.

Exploratory 1.2: An odds ratio analysis investigated the likelihood that gender and/or race predicted drink choice from scenario 1 (i.e., self-report preference on computer) to scenario 2 (i.e., actual drink choice in bar lounge) during Phase II.

Assumptions.

Several assumptions were made in the designing of this research study. The first statistical assumption was that participants in each cell are rather homogenous. For instance, African Americans identified as “problem drinkers” are assumed (to some extent) to be similar on certain dimensions of alcohol use. This type of consistency within cells yields stronger statistical power; that is, it is more likely that significant relationships would be identified when they do exist. Based on this assumption, the findings of this study can be thought to be representative of those groups representing the cells included in the design (i.e., African American men and women, high and low in problematic drinking; European American men and women, high and low in problematic drinking).

CHAPTER 4

RESULTS

Influence of Mental Health on Problematic Drinking.

One-way analyses of variances (ANOVA) were computed to determine the potential influence of mental health issues on drinking behavior. From the total sample, 24% of subjects met criteria for Major Depressive Disorder, as identified with the C-DIS (26% female; 25% male). The results of the ANOVA showed that the presence of depressive symptomology was significantly related to problematic drinking, $F(2, 47) = 3.88$ $p = .027$. That is, individuals who met criteria for Major Depressive Disorder were also more likely to report engagement in problematic drinking behavior as assessed by the AUDIT ($M = 9.19$; $SD = 5.55$). In contrast, those who did not endorse a significant level of depression produced lower AUDIT scores ($M = 6.16$; $SD = 3.82$).

Another 48% of the total sample also met criteria for Antisocial Personality Disorder (APD) (50% male; 43.5% female). The ANOVA results indicated a significant difference between individuals meeting criteria for APD and those without antisocial traits, $F(1, 48) = 8.82$, $p = .005$. Specifically, individuals with APD consistently reported higher levels of alcohol use and problems on the AUDIT ($M = 9.00$; $SD = 5.10$), than individuals without antisocial personality ($M = 5.46$; $SD = 3.12$).

Relationship between Drinking Motives and Alcohol Use.

Multiple regression analyses and correlations were conducted to examine the relationship between problem drinking and various potential predictors. First analyzed in the prediction of heavy alcohol consumption were internal drinking motives (i.e., enhancement and coping).

Table 1 summarizes the descriptive statistics and analysis results. As can be seen, both predictors are significantly correlated with the criterion, AUDIT score. The regression model with both predictors produced $R^2 = .22$, $F(2, 48) = 6.60$, $p = .003$. Results showed that enhancement motives for drinking significantly predict higher AUDIT scores (i.e., problematic drinking), $t(48) = 3.100$, $p = .003$. Counter to the hypothesis, coping motives were not found to significantly predict AUDIT scores despite its correlation with AUDIT scores.

The second analysis focused on the prediction of alcohol-related problems using coping and enhancement drinking motives. Table 2 summarizes the descriptive statistics and analysis results. The regression model with both predictors produced $R^2 = .30$, $F(2, 48) = 10.10$, $p < .001$. Results showed that both enhancement and coping motives for drinking significantly predict greater alcohol-related problems. The positive b-weights of both coping motives, $t(48) = 2.16$, $p = .036$, and enhancement motives, $t(48) = 3.12$, $p = .003$, indicate that individuals with higher scores are expected to also have greater alcohol-related problems as a result of use.

Relationship between Trait Impulsivity and Alcohol Use.

First analyzed in the prediction of heavy alcohol consumption were various traits of impulsivity (i.e., Urgency, Premeditation (lack of), Perseverance (lack of), and Sensation Seeking). Table 1 summarizes the descriptive statistics and analysis results. As can be seen, only Negative Urgency significantly correlated with AUDIT score. The regression model with all four predictors produced $R^2 = .12$, $F(4, 46) = 1.50$, $p = .219$. Counter to the hypothesis, trait impulsivity were not found to significantly predict AUDIT scores overall; however, individuals who tend to act rashly were also are more likely to engage in problematic drinking.

The second analysis focused on the prediction of alcohol-related problems using various impulsivity traits. Table 2 summarizes the descriptive statistics and analysis results. The

regression model with all four predictors produced $R^2 = .24$, $F(4, 46) = 3.56$, $p = .013$. In line with the hypothesis, results showed that trait impulsivity broadly and significantly predicts greater alcohol-related problems. Specifically, the negative b-weight of Urgency in relation to alcohol problems indicates that individuals higher in Negative Urgency are also expected to report greater alcohol-related problems as a result of drinking, $t(46) = -3.758$, $p < .001$. No other traits of impulsivity were found to be significantly correlated with alcohol-related problems, nor were they found to be significant in the prediction of negative consequences as a result of alcohol use.

Examining Preference for Alcohol.

To determine the probability that an individual would indicate a preference for alcohol from knowledge of mental health issues, odds ratio analyses were used. First analyzed was the association between alcohol preference and Major Depressive Disorder (MDD). Table 3 includes a summary of the odds ratio analysis. While the odds ratio for alcohol preference produced a value above 1 (OR = 3.33), the 95% confidence interval (.90, 12.38) failed to support a significant strength in probability at $\alpha = .05$. In other words, the results suggest a trend for individuals who meet criteria for MDD being more likely to indicate a preference for alcohol than those without MDD. However, despite the trend approaching significance, the strength of the association cannot be said with confidence.

The second odds ratio analysis examined the association between alcohol preference and Antisocial Personality Disorder (APD). Table 4 includes a summary of the odds ratio analysis. Again, while the odds ratio for alcohol preference produced a value above 1 (OR = 2.25), the 95% confidence (.71, 7.14) failed to support significant strength of probability at $\alpha = .05$. The results suggest individuals who meet criteria for APD are likely to indicate a preference for

alcohol and nonalcoholic beverages equally in comparison to those without APD. Unfortunately, because of the lower level confidence interval being below 1, this association cannot be said with confidence in support for the hypothesis.

Logistic regression was conducted to determine the probability that an individual would indicate a preference for alcohol based on drinking motives. First, a chi-square goodness-of-fit was performed to determine whether alcohol and non-alcohol were equally preferred amongst subjects. Preference for the beverages were not equally distributed across the sample, $\chi^2(2, N = 51) = 27.89, p < .001$, indicating that the model is significant. Review of results indicate that the model correctly classified individuals' preference to drink non-alcoholic beverages 83.3% of the time, whereas it correctly classified the preference for an alcoholic beverage 66.7% of the time when taking into account drinking motives. Overall prediction success of the model was 76.5%. The Wald criterion demonstrated that both enhancement and coping motives for drinking made a significant contribution to the prediction of beverage preference at the $p = .001$ level and $p = .01$ level, respectively. Table 5 includes a summary of statistics from both variables used in the regression equation.

Predicting Beverage Choice.

Logistic regression was used to determine if alcohol choice can be predicted based on impulsivity and social drinking motives. Table 6 includes a summary of statistics for the model of fit for all variables included in the regression. First, a chi-square goodness-of-fit was performed to determine whether alcohol and non-alcohol were equally chosen amongst subjects. Beverage choices were not equally distributed across the sample, $\chi^2(5, N = 51) = 3.30, p = .654$, indicating that the model was not significant. Overall prediction success of the model was 66.0%. Specifically, the model correctly classified individuals' choice to drink non-alcoholic

beverages only 27.6% of the time, whereas it correctly classified the choice for an alcoholic beverage 89.7% of the time when taking into account traits of impulsivity and social drinking motives. Evaluation of the Wald criterion across variables indicated that none of the traits of impulsivity, nor social motives for drinking, made a significant contribution to the prediction of beverage choice. Therefore the hypothesis was not supported.

If social interaction has little influence on an individual's decision as to whether or not to consume alcohol, it would be expected that initial self-report of drink preference would predict subsequent beverage choice during the social drinking task. An odds ratio analysis was used to examine the likelihood of self-reported beverage preference predicts actual beverage choice. Review of the data assessing the probability of self-reported preference accurately predicting beverage choice produced a value significantly above 1 (OR = 8.18; 95% CI = 1.92, 34.84). The data indicates that individuals who endorse a preference for alcohol typically do not change their mind when given a choice, whereas those who originally endorsed a preference for a non-alcoholic beverage are more apt to shift their decision once given an option (see Table 7). The strength of these associations indicates that other variables contribute to decision to drink alcohol in a social situation outside of original beverage choice.

Inter-rater Reliability of Social Interaction.

The average time engaging in social interaction (versus social isolation) was compared to drink choice using methods outlined by Bot et al. (2007). From this a primary activity was determined amongst the following options: being alone, watching television, using cell phone, and being in conversation. Inter-rater reliability was calculated to determine consistency amongst raters to ensure accuracy. Raters were in consensus 89.4% of the time, demonstrating good consistency (Kappa = .70).

A final consensus amongst raters of behavioral data revealed that most subjects within the sample primarily engaged in conversation with one another (61.9%), followed by watching television (28.6%), sitting alone (7.1%), and using cell phones (2.4%). Of the 51 participants, 9 data points were classified as missing due to technical difficulties or participants sitting outside of view for most of the task.

Influence of Social Interaction on Beverage Choice.

An odds ratio analysis was conducted to determine the influence of social interaction on the probability of choosing an alcoholic beverage. Thus, in order to calculate the probability, primary activity was parceled into two levels: engaging in social interaction and not engaging in social interaction (i.e., watching television, listening to music, sitting alone, using cell phone). The analysis revealed an association between type of primary activity (social interaction vs. no interaction) and beverage choice (OR = 2.25; 95% CI = .62, 8.14) that approached significance; however, with the lower bound of the 95% confidence interval being less than 1, the strength of association cannot be said with confidence and interpretation of these results should be taken with caution. A review of the summary statistics in table 8 indicates that social interaction appears to influence decision to consume alcohol in a social setting. A trend was seen in individuals who engaged in social interaction, in that they were more likely to choose an alcoholic beverage when given the option, whereas those who engage in activities outside of conversation with other participants tended to choose alcoholic and nonalcoholic beverages equally.

Influence of Gender and Race on Decision to Consume Alcohol.

Odds ratio analyses were conducted to determine the probability of gender and race influencing beverage choice in a social drinking situation. The analysis revealed a nonsignificant

association between race and beverage choice (OR = 1.263; 95% CI = .346, 4.608). While the hypothesis was not supported, a review of the summary statistics (see Table 9) indicates that both European Americans and African Americans chose alcoholic beverages at a higher rate. The data suggests that individuals who endorse a preference for alcohol typically do not change their mind when given a choice, whereas a trend was revealed in those who originally endorsed a preference for a non-alcoholic beverage in that they are more apt to shift their decision once given an option. The strength of these associations may be indicative that other variables contribute to decision to drink alcohol in a social situation outside of original beverage choice.

The odds ratio analysis of gender by beverage choice produced nonsignificant findings (OR = .857; 95% CI = .263, 2.792). The exploratory hypothesis that gender might influence the probability of beverage choice was not supported. Statistics shown in Table 10 revealed a trend of both genders being more likely to choose an alcoholic beverage during the social drinking task.

Table 1. Summary statistics, correlations and analysis from multiple regressions for heavy alcohol consumption.

Predictor	M	SD	AUDIT <i>r</i>	B-weight	β
DMQ-E	15.59	5.09	.451**	.37**	.416
DMQ-C	9.63	3.94	.242*	.13	.117
UPPS-Urg	33.33	6.37	.50*	-.24*	-.34*
UPPS-Premed	21.39	5.67	.42	-.19	-.25
UPPS-Persev	18.49	4.65	.19	.15	.15
UPPS-SS	23.10	7.43	.32	-.15	-.25

Note: DMQ-E = Enhancement Motives; DMQ-C = Coping Motives; UPPS-Urg = Negative Urgency; UPPS-Premed = Lack of Premeditation; UPPS-Persev = Lack of Preservation; UPPS-SS = Sensation Seeking (* $p < .05$, ** $p < .01$, *** $p < .001$)

Table 2. Summary statistics, correlations and analysis from multiple regressions for alcohol-related problems.

Predictor	M	SD	InDUC <i>r</i>	B-weight	β
DMQ-E	15.59	5.09	.48***	.61	.394**
DMQ-C	9.63	3.94	.39**	.54	.275*
UPPS-Urg	33.33	6.37	-.39**	-.71	-.58
UPPS-Premed	21.39	5.67	-.032	-.43	-.31
UPPS-Persev	18.49	4.65	.00	-.02	-.01
UPPS-SS	23.10	7.43	.01	-.13	-.13

Note: DMQ-E = Enhancement Motives; DMQ-C = Coping Motives; UPPS-Urg = Negative Urgency; UPPS-Premed = Lack of Premeditation; UPPS-Persev = Lack of Preservation; UPPS-SS = Sensation Seeking (* $p < .05$, ** $p < .01$, *** $p < .001$)

Table 3. Association between beverage preference and Major Depressive Disorder.

Preference	Without MDD	With MDD	Total
Non-Alcohol	25	5	30
Alcohol	12	8	20
	37	13	50

Table 4. Association between beverage preference and Antisocial Personality Disorder.

Preference	Without APD	With APD	Total
Non-Alcohol	18	12	30
Alcohol	8	12	20
	26	24	50

Table 5. Summary of model statistics from logistic regression for alcohol preference.

Predictor	B-weight	S.E.	Wald	df	Sig
DMQ-E	.37	.12	10.12***	1	.001***
DMQ-C	.32	.13	6.07**	1	.014**

Note: DMQ-E = Enhancement Motives; DMQ-C = Coping Motives (**p < .01, ***p < .001)

Table 6. Summary of model statistics from logistic regression for beverage choice.

Predictor	B-weight	S.E.	Wald	df	Sig
UPPS-Premed	-.07	.09	.72	1	.397
UPPS-Urg	-.08	.06	1.57	1	.210
UPPS-SS	.03	.05	.38	1	.536
UPPS-Presev	.00	.10	.00	1	.993
DMQ-S	-.01	.09	.02	1	.904

Note: UPPS-Premed = Lack of Premeditation; UPPS-Urg = Negative Urgency; UPPS-SS = Sensation Seeking
UPPS-Presev = Lack of Preservation; DMQ-S = Social Motives (*p < .05, **p < .01, ***p < .001)

Table 7. Association between beverage preference and beverage choice.

Beverage Preference	Non-Alcoholic Choice	Alcoholic Choice	Total
Non-Alcohol	15	11	26
Alcohol	3	18	21
	18	29	47

Table 8. Association between primary activity and beverage choice.

Primary Activity	Non-Alcohol	Alcohol	Total
No Interaction	8	8	16
Social Interaction	8	18	26
	16	26	42

Table 9. Association between race and beverage choice.

Beverage Preference	European Americans	African Americans	Total
Non-Alcohol	12	5	17
Alcohol	19	10	29
	31	15	46

Table 10. Association between gender and beverage choice.

Beverage Preference	Females	Males	Total
Non-Alcohol	8	10	18
Alcohol	14	15	29
	22	25	47

CHAPTER 5

DISCUSSION

A biopsychosocial approach to understanding drinking behavior provides a bridge for the many aspects of the human experience that contribute to the development and maintenance of addictive behavior. While alcohol researchers have developed a breadth of research in the areas of psychological, biological, and social aspects of alcohol abuse and dependence independently, little research has been aimed at understanding these elements concurrently. This has resulted in a neglected area of understanding: Under what conditions do these variables lead to the prediction of alcohol use behaviors, particularly within a social context? In order to answer this research question, a mixed-model design was employed to assess various psychosocial variables within a context that allowed for the tracking of potential psychological and social influences.

Examining Psychosocial Variables Associated with Problem Drinking.

A host of psychosocial variables were identified in the investigation of problematic drinking behaviors in young adults, rooted in a biopsychosocial model of alcohol use. The variables under consideration included mental health issues (depression and antisocial personality), drinking motives, and various traits that characterize impulsivity.

Drinking to manipulate emotion has been commonly linked to heavy alcohol use and alcohol related problems; however, the hypothesis that problematic drinking behavior would be associated with individuals who endorse strong coping motives for drinking was not supported. Only drinking to enhance positive mood was significantly associated with problematic, heavier drinking. As stated previously, coping motives have not been consistently linked to frequency and quantity of alcohol use (see Kuntsche et al., 2005 for review), thus this finding is not

particularly surprising. Furthermore, both coping and enhancement motives were found to be associated with negative consequences as a result of use (e.g., interpersonal problems, legal issues, physical concerns, etc.). This adds to the literature which has shown individuals who drink to cope with negative emotion also tend to have greater alcohol-related problems (Comasco, Berglun, Orelund, & Nilsson, 2010; Fossos, Kaysen, Neighbors, Lindgren, & Hove, 2011; Martens, Neighbors, Lewis, Lee, Oster-Aaland, & Larimer, 2011). Similarly, individuals who tend to drink to increase positive emotion do so in more discrete, binge drinking episodes that lead to alcohol-related problems (Kutsche et al., 2005; Kuntsche et al., 2006). Overall these findings are consistent with a bulk of research that differentiates the impact of drinking motives on alcohol use behaviors and consequences.

One of the more prominent features of individuals with alcohol use disorders is impulsivity (Grant et al., 2006; Tragesser et al., 2007). As such, it was expected that impulsivity (i.e., negative urgency, lack of premeditation, lack of perseverance, and sensation seeking) would predict problematic drinking behavior and alcohol-related problems. Impulsivity was shown to predict alcohol-related problems, particularly the trait negative urgency. These findings are consistent with previous research that has found correlations between urgency and pathological alcohol use (Fischer & Smith, 2008; Shin, Hong, & Jeon, 2012; Whiteside & Lynam, 2009). It follows that individuals high in urgency engage in rash decision making (Cyders et al., 2007) and, as such, have difficulty controlling their drinking (Magrid et al., 2007). Impulsivity, however, was insufficient in predicting heavy drinking. Unlike previous studies which have found sensation seeking to be specifically associated and predictive of alcohol use (quantity and frequency) (e.g., Zuckerman & Kulman, 2000), the present study was unable to provide evidence of support.

Researchers have also purported that sensation seeking and negative urgency differentially predict alcohol use and related problems as a result of use (see Curcio & George, 2011 for review of a two-factor model). Specifically, urgency has been found to predict quantity of use, and sensation seeking to predict frequency of use (Cyders et al., 2009). This study, however, supports recent findings by Shin, Hong and Jeon (2012) that urgency is not only correlated with alcohol-related problems, but also alcohol consumption and alcohol use disorders. These findings highlight the importance of studying impulsivity and its many facets, rather than simply lumping qualities together as one overarching concept, in order to create a more comprehensive understanding the effects of impulsivity on alcohol use and related problems.

Results of the current study revealed a similar trend that provides evidence that comparable patterns exist between mood disorders, characteristics of antisocial personality, and alcohol use in the general population. Individuals who met criteria for diagnoses of depression and antisocial personality in the current study endorsed heavier alcohol use and negative alcohol-related consequences as a result of use. Moreover, individuals suffering from depression reported higher levels of heavy drinking in comparison to those with antisocial personality. While drinking to alleviate negative emotion has not been consistently associated with binge drinking and heavy alcohol consumption in the literature like impulsiveness and sensation seeking, which are characteristics of antisocial personality (Grant et al., 2006; Slutske et al., 2002), this study provides evidence that individuals who experience depressive symptoms also engage in problematic drinking behaviors. These results highlight potential commonalities between mental health issues and their influence on alcohol use behaviors.

The current findings substantiate the claim that individuals suffering from mental health distress and particular characterological disorders are at increased risk for alcohol misuse. Several traits found to account for alcohol use disorders include negative affectivity (or affect lability), impulsivity (Tragesser, Sher, Trull, & Parl, 2007), low conscientiousness, low agreeableness and high neuroticism (Malouff, Thorsteinsson, Rooke, and Schutte, 2007). Impulsivity has been linked to Cluster B personality symptoms (e.g., antisocial personality, borderline, histrionic) and drinking to enhance positive emotion, whereas negative affectivity is also a common symptom of mood disorders and has been found to be more prevalent in individuals who meet criteria for alcohol use disorders (Östlund, Spak, & Sundh, 2004; Tragesser et al., 2007).

Predicting Beverage Preference and Beverage Choice in a Social Context.

Potential variables that contribute to an individual's beverage preference and choice to drink in a social context were also examined. It was hypothesized that those with mental health distress would report a preference for alcohol prior to the drinking task, assuming that depression and/or antisocial characteristics influence one's desire to consume alcohol. For those suffering from depression a trend of preferring alcohol was observed. In contrast, antisocial personality traits appeared to have little influence on beverage preference. This might be understood as a function of characterological traits of those with antisocial personality. That is, presumably for individuals to be influenced by social elements they must care about a variety of factors including, but not limited to, impression management and need to belonging. However, individuals with antisocial personality have been found to be less conscientious and less agreeable (Malouff et al., 2007), and ultimately less influenced by the behavior of others within the current social drinking task.

A growing body of research has confirmed that individuals characterized as impulsive are prone to engage in pathological drinking, particularly those who are high in negative urgency or sensation seeking (Curcio & George, 2011; Fischer & Smith, 2008; Magid, MacLean, & Colder, 2007; Whiteside & Lynam, 2009). From this it follows that these traits would likely play a role in predicting alcohol use in an experimental situation. In the current sample, however, traits of impulsivity were not found to be significant predictors of alcohol consumption. Similar findings were obtained with respect to social drinking motives, which align with previous research that fails to show a significant contribution of social drinking motives in understanding alcohol use behaviors (e.g., Curcio & George, 2011). From this it can be concluded that impulsivity traits and social motives are not sufficient in capturing the variance needed to predict alcohol use in a real-time drinking context.

As previously discussed, correlational research has strongly linked internal drinking motives with alcohol use behaviors. Consistent with the hypothesis, coping and enhancement drinking motives were found to be significant predictors of beverage preference prior to the experimental social drinking task. An implication of this finding goes beyond simple correlations between drinking motives and retrospective alcohol use, which has been well established over the years (Stewart & Devine, 2000; Stewart, Loughlin, & Rhyno, 2001). Previous findings have been largely non-experimental and thus causation cannot be established. This current finding illustrates drinking motives play a role in the decision to consume alcohol within a real-time drinking context.

During the social drinking task, participants were observed to change their minds when given an option between alcoholic and nonalcoholic beverages. Overall, initial beverage preference was successful in predicting actual beverage choice. Interestingly, however,

individuals who indicated an initial preference for alcohol were less likely to choose alcohol when given the option, whereas those who indicated preference for non-alcoholic beverages were more likely to choose alcohol during the social drinking task. With minimal research done in this area little can be said about this outcome outside of speculation, although it appears that variables outside of individual factors are at work. If social processes influence decisions to drink alcohol than beverage preference would not expect to solely predict beverage choice, which is confirmed by the current findings. The question left to be answered, then, is what social processes impact an individual to consume an alcohol or nonalcoholic beverage when given the option, and to what extent?

Examining Influence of Social Interaction and Demographic Variables on Beverage Choice.

An exploratory analysis of potential influences on the initial drink preference-drink choice relationship was conducted, including the extent to which social interaction and differences in gender and race influence this relationship. Results failed to reveal significant associations between race or gender in relation to beverage choice. Research has produced inconsistent findings with respect to the gender-alcohol use relationship. For example, women have been shown to have a greater prevalence of personality disorders and alcohol and drug use disorders (Grant et al., 2006), whereas college-aged men have been found to steadily increase their alcohol consumption over a four-year period in contrast to women (LaBrie, Atkins, Neighbors, Mirza, & Larimer, 2012). In the current sample, both sexes were more likely to choose alcohol during the social drinking task. Similar results were seen with respect to race; European Americans and African Americans tended to choose alcohol during the social drinking task. The reason for this trend is unknown, particularly because it provides evidence to the contrary of what has been established in the literature. In relation to ethnicity and social drinking

norms, people of color have been found to drink less than European Americans (Larimer et al., 2009; Rice, 2007). Further research in this area is needed in order to draw any definitive conclusions.

It appeared that primary choice in activity during the mingling phase of the social drinking task had influence on beverage choice, albeit falling short of significance. That is, a trend was revealed that suggests that engagement in social interaction increases the likelihood of choosing an alcoholic beverage. This impact of social interaction on drinking behavior may be understood through social norms (see Williams Jr. et al., 2006 for review). Through this lens, researchers have provided support for the importance of social norms (e.g., attitudes toward particular behaviors) on the shaping of alcohol-related expectations and behavior (see Borsari & Carey, 2003 for review).

Social norms have been found to strong predictors of drinking (Bullers, Cooper, & Russel, 2001; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). Recent research conducted by Cullum and colleagues (2012) found social norms to be influential on decisions to drink alcohol outside of individual factors (e.g., social drinking motives) over time. That is, within contexts considered to be strongly “pro-drinking”, college students have demonstrated a greater tendency to receive and accept offers to drink alcohol. These findings provide support for the importance of social influence on alcohol use. Although not directly assessed in the current study, it could be posited that participants perceived the bar lounge to be a situational context in which drinking is expected, therefore participants often choose alcohol regardless of initial beverage preference. Whereas much of the existing literature has used college samples to assess the impact of social factors on drinking behavior, this was one of the first to establish the influence of social interaction on drinking behavior in a non-clinical, community-based sample. This study, which

assessed the influence of social interaction within a natural drinking context in real time, provides a direct assessment of social influence on drinking behavior and expands upon recently published longitudinal work on social aspects of alcohol use (e.g., Cullum, O'Grady, Armeli, & Tennen, 2012).

Strengths and Limitations.

This study has a number of strengths. A diverse community sample was used, consisting of European Americans and African Americans (21 to 35 years old), whose drinking consumption ranged from light to heavy; participants also experienced a range of mental health issues, some being relatively free from psychological distress to those who met criteria for anxiety, depressive, and/or antisocial personality disorders. Of note, the relatively large number of participants meeting criteria for APD, in particular, may be related to the qualities of those recruited who were classified as heavy drinkers (i.e., characteristics of impulsivity). Additionally, the mixed-method design allowed for examination of complex relationships amongst psychosocial variables as they relate to alcohol use behaviors, specifically as it relates to decisions to consume alcohol in a social context (an area largely overlooked).

While this study is thought to contribute new information to a growing body of research on the biopsychosocial underpinnings of alcohol use, it is not without limitations. In hindsight, it may have been useful to ask participants some probing questions following the social drinking task. Specifically, it would have been useful to know if the participant changed his or her beverage choice during the social task and, if so, what had precipitated this change. By doing so, coding and interpretation of behavior would be based on qualitative inferences, but also self-reported reasons for beverage choice. Additionally, although participants in this study consisted of university students and community members to provide a broader scope of alcohol use

behaviors in the larger population, there may be biases associated with those who chose to volunteer for the study. Further, a common threat to validity of data when using self-report measures is the potential for participants to report behaviors in such a way as to be viewed positively.

Another potential limitation of this study is its small sample size. Justification for this, however, is twofold. For one, being that it is an exploratory study a large sample size is not a necessity. Second, this study was designed ultimately as a functional Magnetic Resonance Imaging study with a target of 24 participants as a larger part of an institutional grant. Within such a design, a large subject pool is not required because of the large quantities of data gathered for each individual. Thus, given that this is a relatively new topic of research, this small sample can be considered a “pilot” in which future studies can format their experimental designs. Furthermore, despite the small sample size, the participant pool has sufficient numbers of individuals who met criteria for mental health disorders in question (depression, antisocial personality), and the design was mindful of recruiting a balanced number of social drinkers and problematic drinkers alike.

Future Directions.

While the current study focused primarily on psychosocial aspects of alcohol use behaviors, it did so in such a way that introduced a new element: measurement of real-time social influence on alcohol use choices and behaviors. Even though assessing drinking behaviors within a social context comes with its set of challenges, the current design allowed for examination of psychological and social variables in a unique way. Historically, social behavior has been assessed primarily in the format of same sex dyads (see Bot et al. 2007a, Bot et al., 2007b). Truthfully, the relationship between alcohol use behaviors, individual factors, and social

aspects is a complex phenomenon and the current research design reflects this. As we move forward, researchers must honor the complexity of alcohol use behaviors and design research studies that allow for the assessment of psychological, social, and biological aspects simultaneously.

Beyond simple correlational research of affective, cognitive, biological, and social elements associations with alcohol use, more research must begin focusing on explaining the conditions which these factors *influence* decisions to consume and abuse alcohol. Use of the biopsychosocial model can help explain these complex relationships in a meaningful way that can also lead to more inclusive models of treatment (preventative and reactive in nature). With regard to measuring social aspects of drinking behavior, future research should also focus not only on how social interaction influences one's decision to consume alcohol, but also how drinking behavior is influenced by social norms during times when people are actually in the process of consuming alcohol. This is a rich area that, once a foundation of basic knowledge is established, can be better understood and more thoroughly researched. To date, much of the research that exists focuses on same-sex dyads (Bot et al., 2007a; 2007b) that, while stripped of nuances (e.g., gender, multiple interactions), does not adequately represent the various influences within a social context (i.e., race, gender, group dynamics). Specifically with relation to change in drink choice during the mingling period of the social drinking task, it would be interesting to include in future studies a qualitative question that seeks to understand *why* or *what* influenced their decision personally, and see how this may relate to individual characteristics (e.g., drinking motives, personality factors, alcohol expectancies, historical drinking behavior, etc). Also of interest would be to include a more thorough assessment of social norms to provide corroborative information for the behavioral observations made during the social drinking task.

Conclusion.

From these findings, overall it can be gleaned that complex relationships exist among social and psychological variables in their contribution to alcohol use and alcohol-related problems. Results revealed that individuals who endorsed significant levels of depression were more likely to choose alcohol in relation to their counterparts. Furthermore, participants with depression and antisocial personality were more likely to endorse problematic alcohol use, as well as those who endorsed internal motives, particularly those geared towards enhancing positive affect. Perhaps most interestingly, traits of impulsivity and social drinking motives were not able to significantly predict decision to drink alcohol in a social context, whereas results revealed that individuals who engaged in social interaction during the mingling phase of the social drinking task were more likely to choose an alcoholic beverage when given the option, regardless of initial beverage preference. This suggests that social interaction influences not only drinking behavior (which has been examined in previous studies), but also decisions to drink alcohol—an area that has been largely overlooked in the literature.

In summary, the current study used an experimental design to further understand the influence of psychological factors and social interaction on drinking behavior. Through a carefully designed mixed-method study, detailed information was gathered related to mental health issues, personality factors, drinking motives, and historical drinking behaviors. This information was then used to determine what was most salient in understanding alcohol-related decision-making in a real-time situation. In doing so, this study was able to begin filling a research gap related to identifying underlying processes that contribute to alcohol use within a social context. Hopefully this study and its findings can act as a springboard for future research geared towards a more comprehensive understanding of the conditions in which alcohol use

occurs, is maintained, and is abused. As this is one of the first studies to examine psychosocial variables within an experimental context to better understanding decisions to consume alcohol, these findings must be replicated in order to draw sound, reliable conclusions.

REFERENCES

- Abrams, D., Hothrow, T., Hulbert, L., & Frings, D. (2006). "Groudrink"? The effect of alcohol on risk attraction among groups versus individuals. *Journal of Studies on Alcoholism*, 67, 628-636.
- Abrams, D. B. & Niaura, R.S. (1987). Social learning theory. In: Blane, H. T., & Leonard, K. E. (Eds.), *Psychological Theories of Drinking and Alcoholism*, pp. 131-177. New York: Guilford Press.
- Agnew, R., & White, H. R. (1992). An empirical test of general strain theory. *Criminology*, 30, 475-499.
- Agrawal, A., & Lynskey, M. T. (2008). Are there genetic influences on addiction: Evidence from family, adoption, and twin studies. *Addiction*, 103, 1069-1081.
- Akins, S., Smith, C. L., & Mosher, C. (2010). Pathways to adult alcohol abuse across racial/ethnic groups: An application of general strain and social learning theories. *Journal of Drug Issues*, 40, 321-351.
- Al-Housseini, A. M., Sivanandam, T. M., Bradbury, E. L., Tannenber, R. K., Dodd, P. R., & Gu, Q. (2008). Upregulation of β -Catenin Levels in superior frontal cortex of chronic alcoholics. *Alcoholism: Clinical and Experimental Research*, 32, 1080-1090.
- Amodia, D. S., Cano, C., & Eliason, M. J. (2005). An integral approach to substance abuse. *Journal of Psychoactive Drugs*, 34, 363-371.
- Bandura, A. (1969). *Principles of behavior modification*. Oxford, England: Hold, Rinehard, & Winston.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.

- Beck, K. H., Thombs, D. L., Mahoney, C. A., & Fingar, K. M. (1995). Social context and sensation seeking: Gender differences in college student drinking motivations. *Substance Use & Misuse, 30*, 1101-1115.
- Blanchard, K. A., Morgenstern, J., Morgan, T. J., Labouvie, E. W., & Bux, D. A. (2003). Assessing consequences of substance use: Psychometric properties of the Inventory of Drug Use Consequences. *Psychology of Addictive Behaviors, 17*, 328-331.
- Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol, 64*, 331-341.
- Bot, S. M., Engels, R. C. M. E., Knibbe, R. A., Meeus, W. H. J. (2007a). Pastime in a pub: Observations of young adults' activities and alcohol consumption. *Addictive Behaviors, 32*, 491-504.
- Bot, S. M., Engels, R. C. M. E., Knibbe, R. A., Meeus, W. H. J. (2007b). Sociometric status and social drinking: Observations of modeling and persuasion in young adult peer groups. *Journal of Abnormal Child Psychology, 35*, 929-941.
- Bazargan-Hejazi, S., Ani, C., Gaines, T., Ahmadi, A., & Mazargan, M. (2010). Alcohol misuse and depressive symptoms among males and females. *Archives of Iranian Medicine, 13*, 324-332.
- Brener, N. D., & Collins, J. L. (1998). Co-occurrence of health-risk behaviors among adolescents in the United States. *Journal of Adolescent Health, 22*, 209-213.
- Bullers, S., Cooper, M. L., & Russell, M. (2001). Social network drinking and adult alcohol involvement: A longitudinal exploration of the direction of influence. *Addictive Behaviors, 26*, 181-199.

- Butcher, J. N., Perry, J. N. & Atlis, M. M. (2000). Validity and utility of computer-based test interpretation. *Psychological Assessments*, 12, 6-18.
- Carey, K. B., & Correia, C. J. (1997). Drinking motives predict alcohol-related problems in college students. *Journal of Studies on Alcohol*, 58, 100-105.
- Carrigan, M. H., & Randall, C. L. (2003). Self-medication in social phobia: A review of the alcohol literature. *Addictive Behaviors*, 28, 269-284.
- Caetano, R., & Kaskutas, L. (1995). Changes in drinking patterns among Whites, Blacks and Hispanics, 1984-1992. *Journal of Studies on Alcohol*, 56, 558-565.
- Chutuape, M. A., & de Wit, H. (1995). Preferences for ethanol and diazepam in anxious individuals: An evaluation of the self-medication hypothesis. *Psychopharmacology*, 121, 91-103.
- Cloninger, C. R. (1987). A systematic method for clinical description and classification of personality variants: A proposal. *Archives of General Psychiatry*, 44, 573-588.
- Colder, C. R. (2001). Life stress, physiological and subjective indexes of negative emotionality, and coping reasons for drinking: Is there evidence for a self-medication model of alcohol use? *Psychology of Addictive Behaviors*, 15, 237-245.
- Comasco, E., Berglund, K., Orelund, L., & Nilsson, K. W. (2010). Why do adolescents drink? Motivational patterns related to alcohol consumption and alcohol-related problems. *Substance Use & Misuse*, 45, 1589-1604.
- Conger, J. (1956). Theory, problem and challenge, II. Reinforcement theory and the dynamics of alcohol. *Quarterly Journal of Alcohol*, 13, 296-305.

- Conrod, P. J., Peterson, J. B., Pihl, R. O., & Mankowski, S. (1997). Biphasic effects of alcohol on heart rate are enhanced by alcoholic family history and rate of alcohol ingestion. *Alcoholism: Clinical and Experimental Research, 21*, 140-149.
- Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology, 69*, 990-1005.
- Cooper, M. L., Agocha, V. B., & Sheldon, M. S. (2000). A motivational perspective on risky behaviors: The role of personality and affect regulatory processes. *Journal of Personality, 68*, 1059-1088.
- Cooper, M. L., Krull, L., Agocha, V. B., Flanagan, M. E., Orcutt, H. K., Grabe, S., & Dermen, K.H., & Jackson, M. (2008). Motivational pathways to alcohol use and abuse among Black and White adolescents. *Journal of Abnormal Psychology, 117*, 485-501.
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*, 117-128.
- Cox, W. M., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*, 168-180.
- Cullum, J., O'Grady, M., Armeli, S., & Tennen, H. (2012). Change and stability in active and passive social influence dynamics during natural drinking events: A longitudinal measurement-burst study. *Journal of Social and Clinical Psychology, 31*, 51-80.
- Cyders, M. A., & Smith, G. T. (2007). Mood-based rash action and its components: Positive and negative urgency. *Personality and Individual Differences, 43*, 839-850.
- Cyders, M. A., & Smith, G. T. (2008). Emotion-based dispositions to rash action: Positive and negative urgency. *Psychological Bulletin, 134*, 807-828.

- Cyders, M. A., Smith, G. T., Spillane, N. S., Fischer, S., Annus, A. M., & Peterson, C. (2007). Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychological Assessment, 19*, 107-118.
- Cyders, M. A., Flory, K., Rainer, S., & Smith, G. T. (2009). The role of personality dispositions to risky behavior in predicting first-year college drinking. *Addiction, 104*, 193-202.
- Daepfen, J. B., Yersin, B., Landry, U., Pécoud, A., & Decrey, H. (2000). Reliability and validity of the Alcohol Use Disorders Identification Text (AUDIT) imbedded within a general health risk screening questionnaire: Results of a survey in 332 primary care patients. *Alcoholism: Clinical & Experimental Research, 24*, 659-665.
- Demers, A., Kairouz, S., Adlaf, E. M., Gliksman, L., Newton-Taylor, B., & Marchand, A. (2002). Multilevel analysis of situational drinking among Canadian undergraduates. *Social Science & Medicine, 55*, 415-424.
- de Wit, H., & Richards, J. R. (2004). Dual determinants of drug abuse: Reward and impulsivity. In: Bevens R. A., Bardo, M. T. (Eds.), *Nebraska Symposium on Motivation*, pp. 19-55. Lincoln, NE: University of Nebraska Press.
- Dick, D. M., Plunkett, J., Wetherill, L. F., et al. (2006). Association between GABRA1 and drinking behaviors in the collaborative study on the genetics of alcoholism sample. *Alcoholism: Clinical and Experimental Research, 30*, 1101-1110.
- Dom, G., Hulstijn, W., Sabbe, B. (2006). Differences in impulsivity and sensation seeking between early- and late-onset alcoholics. *Addictive Behaviors, 31*, 298-308.
- Edenberg, H. J. (2007). The genetics of alcohol metabolism: Role of alcohol dehydrogenase and aldehyde dehydrogenase variants. *Alcohol Research & Health, 30*, 5-13.

- Eng, M. Y, Luczak, S. E., & Wall, T. L. (2007). ALDH2, ADH1B, and ADH1C genotypes in Asians: A literature review. *Alcohol Research and Health, 30*, 22-27.
- Engels, R. C. M. E., & Knibbe, R. A. (2000). Alcohol use and intimate relationships: When love comes to town. *Addictive Behaviors, 435-439*.
- Eysenck, S. B. G., & Eysenck, H. J. (1977). The place of impulsiveness in a dimensional system of personality description. *British Journal of Social and Clinical Psychology, 16*, 57-68.
- Fischer, S. & Smith, G. T. (2008). Binge eating, problem drinking, and pathological gambling: Linking behavior to shared traits and social learning. *Personality and Individual Differences, 44*, 789-800.
- Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior, 21*, 219-239.
- Fossos, N., Kaysen, D., Neighbors, C., Lindgren, K. P., & Hove, M. C. (2011). Coping motives as a mediator of the relationship between sexual coercion and problem drinking in college students. *Addictive Behaviors, 36*, 1001-1007.
- Foroud, T., Edenberg, H. J., & Crabbe, J. C. (2010). Genetic Research: Who is at risk for alcoholism? *Alcohol Research & Health, 33*, 64-75.
- Fowles, D. C. (1983). Appetitive motivational influences on heart rate. *Personality and Individual Differences, 4*, 393-401.
- Frings, D., Hothrow, T., Abrams, D., Hulbert, L., & Gutierrez, R. (2008). Groupdrink: The effects of alcohol and group process on vigilance errors. *Group Dynamics: Theory, Research, and Practice, 12*, 179-190.
- Gelernter, J. & Kranzler, H. R. (2009). Genetics of alcohol dependence. *Human Genetics, 126*, 91-99.

- Giancola, P. (2000). Executive functioning: A conceptual framework for alcohol-related aggression. *Experimental Clinical Psychopharmacology*, 8, 576-597.
- Gillapsy, J. A., & Campbell, T. C. (2006). Reliability and validity of scores from the Inventory of Drug Use Consequences. *Journal of Addictions and Offender Counseling*, 27, 17-27.
- Goldman, M. S., Del Boca, F. K., & Darkes, J. (1999). Alcohol expectancy theory: The application of cognitive neuroscience. In Leonard, K. E., & Blane, H. T. (Eds.). *Psychological Theories of Drinking and Alcoholism*, 2nd Edition. New York: Guilford Press.
- Gourdiaan, A. E., Grekin, E. R., & Sher, K. J. (2007). Decision making and binge drinking: A longitudinal study. *Alcoholism: Clinical and Experimental Research*, 31, 928-938.
- Grant, B. E., Stinson, F. S., Dawson, D. A., Chou, S. P., Ruan, W. J., & Pickering, R. P. (2006). Co-occurrence of 12-month Alcohol and Drug Use Disorders and Personality Disorders in the United States. *Alcohol Research & Health*, 29, 121-130.
- Gray, J. A. (1987). The neuropsychology of emotion and personality. In Stahl, S. M., Iverson, S. D., & Goodman, E. C. (Eds.), *Cognitive Neurochemistry*. Oxford, London: Oxford University Press.
- Gilpin, N. W., & Koob, G. F. (2008). Neurobiology of Alcohol Dependence: Focus on motivational mechanisms. *Alcohol Research & Health*, 31, 185-195.
- Guppy, A. (1994). At what blood alcohol concentration should drink-driving be illegal? *British Medical Journal*, 308, 1055-1056.
- Ham, L. S., Bonin, M., Hope, D. A. (2007). The role of drinking motives in social anxiety and alcohol use. *Journal of Anxiety Disorders*, 21, 991-1003.

- Harwood, A. J. (2000). Updating estimates of the economic costs of alcohol abuse in the United States: Estimates, update methods, and data. *National Institute on Alcohol Abuse and Alcoholism*, 1-13.
- Hasin, D. S., Stinson, F. S., Ogburn, E., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*, 64, 830-842.
- Hesselbrock, V., Meyer, R., & Hesselbrock, M. (1992). Psychopathology and addictive disorders: The specific case of Antisocial Personality Disorder. In Jaffe, J. H., & O'Brien, C. P (Eds.). *Addictive States*. Raven Press: New York.
- Hodge, C. W., Grant, K. A., Becker, H. C., Besheer, J., Crissman, A. M., Platt, D. M., Shannon, E. E., & Shelton, K. L. (2006). Understanding how the brain perceives alcohol: Neurobiological basis of ethanol discrimination. *Alcoholism: Clinical and Experimental Research*, 30, 203-213.
- Hodgins, S., & Cote, G. (1993). The criminality of mentally disordered offenders. *Criminal Justice and Behavior*, 20, 115-129.
- Holroyd, K. A. (1978). Effects of social anxiety and social evaluation on beer consumption and social interaction. *Journal of Studies on Alcohol*, 39, 737-744.
- Hopthrow, T., Abrams, D., Frings, D., & Hulbert, L. G. (2007). Groupdrink: The effects of alcohol on intergroup competitiveness. *Psychology of Addictive Behaviors*, 21, 272-276.
- Hull, J. G. (1981). A self-awareness model of the causes and effects of alcohol consumption. *Alcohol and Alcoholism*, 35, 471-477.

- Hull, J. G. & Levy, A.S. (1979). Organizational functions of the self: An alternative to the Duval and Wicklund Model of self-awareness. *Journal of Personality and Social Psychology*, 37, 756-768.
- Jones-Webb, R. (1998). Drinking patterns and problems among African-Americans: Recent findings. *Alcohol Health & Research World*, 22, 260-264.
- Karau, S. J., & Williams, K. D. (1993). Social loafing: A meta-analytic review and theoretical integration. *Journal of Personality and Social Psychology*, 65, 681-706.
- Kerr, J.S. (1996). Two myths of addiction: The addictive personality and the issue of free choice. *Human Psychopharmacology: Clinical & Experimental*, 11, S9-S13.
- Kessler, R. C., Nelson, C. B., McGonagle, K. A., et al. (1996). Epidemiology of co-occurring addictive and mental disorders: Implications for prevention and service utilization. *American Journal of Orthopsychiatry*, 66, 867-872.
- Khantzian, E. J. (1985). The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *American Journal of Psychiatry*, 142, 1259-1264.
- Kidorf, M. K., & Lang, A. L. (1999). Effects of social anxiety and alcohol expectancies on stress-induced drinking. *Psychology of Addictive Behaviors*, 13, 134-142.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. C. M. E. (2005). Why do young people drink? A review of drinking motives. *Clinical Psychology Review*, 25, 841-861.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. C. M. E. (2006). Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behaviors*, 31, 841-861.
- Kuntsche, E., Stewart, S. H. & Cooper, M. L. (2008). How stable is the motive-alcohol use link? A cross-national validation of the Drinking Motives Questionnaire Revised among

- adolescents from Switzerland, Canada, and the United States. *Journal of Studies on Alcohol and Drugs*, 69, 388-396.
- LaBrie, J. W., Atkins, D. C., Neighbors, C., Mirza, T., & Larimer, M. E. (2012). Ethnicity specific norms and alcohol consumption among Hispanic/Latino/a and Caucasian students. *Addictive Behaviors*, 37, 573-576.
- Larimer, M. E., Kaysen, D., Lee, C. M., Lewis, M. A., Killworth, T., Montoya, H. D., & Neighbors, C. (2009). Evaluating level of specificity of normative referents in relation to personal drinking behavior. *Journal of Studies on Alcohol and Drugs*, 16, 115-121.
- Larsen, H., Engels, R. C. M. E., Souren, P. M., Granic, I., & Overbeek, G. (2010). Peer influence in a micro-perspective: Imitation of alcoholic and non-alcoholic beverages. *Addictive Behaviors*, 35, 49-52.
- Larsen, H., Engels, R. C. M. E., Granic, I., & Overbeek, G. (2009). An experimental study on imitation of alcohol consumption in same-sex dyads. *Alcohol and Alcoholism*, 44, 250-255.
- Lewis, C. E., & Bucholz, K. K. (1991). Alcoholism, antisocial behavior, and family history. *British Journal of Addiction*, 86, 177-194.
- Lewis, M. A., Hove, M. C., Whiteside, U., Lee, C. M., Kirkeby, B. S., Oster-Aaland, L., Neighbors, C., & Larimer, M. E. (2008). Fitting in and feeling fine: Conformity and coping motives as mediators of the relationship between social anxiety and problematic drinking. *Psychology of Addictive Behaviors*, 22, 58-67.
- Littlejohn, C. (2004). Rediscovering the 'social' in the biopsychosocial perspective. *Mental Health Practice*, 8, 14-17.

- Lumsden, J., Hadfield, J., Littler, S., & Howard, R. (2005). The prevalence of early onset alcohol abuse in mentally disordered offenders. *The Journal of Forensic Psychiatry & Psychology, 16*, 651-659.
- Magid, V. & Colder, C. R. (2007). The UPPS Impulsive Behavioral Scale: Factor structure and associations with college drinking. *Personality and Individual Differences, 43*, 1927-1937.
- Magid, V., MacLean, M. G., & Colder, C. R. (2007). Differentiating between sensation seeking and impulsivity through their mediated relations with alcohol use and problems. *Addictive Behaviors, 32*, 2046-2061.
- Maisto, S. A., Carey, K. B., & Bradizza, C. M. (1999). *Social learning theory*. In Leonard, K. E., & Blane, H. T. (Eds.). *Psychological Theories of Drinking and Alcoholism*, 2nd Edition. New York: Guilford Press.
- Malouff, J., Thorsteinsoson, E., Rooke, S., & Schutte, N. (2007). Alcohol involvement and the five factor model of personality: A meta-analysis. *Journal of Drug Education, 37*, 277-294.
- Martens, M. P., Neighbors, C., Lewis, M. A., Lee, C. M., Oster-Aaland, L., & Larimer, M. E. (2011). The roles of negative affect and coping motives in the relationship between alcohol use and alcohol-related problems among college students. *Journal of Studies on Alcohol & Drugs, 69*, 412-419.
- Messina, N. P., Wish, E., Hoffman, J., & Nemes, S. (2001). Diagnosing Antisocial Personality Disorder among substance abusers: The SCID versus the MCMI-II. *American Journal of Drug and Alcohol Abuse, 27*, 699-717.

- Messina, N. P., Wish, E. D., Hoffman, J. A., & Nemes, S. (2002). Antisocial Personality Disorder and TC treatment outcomes. *American Journal of Drug and Alcohol Abuse, 28*, 197-212.
- Naimi, T. S., Brewer, M. D., Mokdad, A., Denny, C., Serdula, M. K., & Marks, J. S. (2003). Binge drinking among US adults. *Journal of the American Medical Association, 289*, 70-75.
- National Institute of Alcohol Abuse and Alcoholism. (2004). NIAAA council approves definition of binge drinking. *NIAAA Newsletter, 3*, http://pubs.niaaa.nih.gov/publications/Newsletter/winter2004/Newsletter_Number3.pdf.
- National Institute of Alcohol Abuse and Alcoholism. (2007). Alcoholism subtypes could change assessment and Rx landscape: Targeted treatment may become the norm. *Getting Paid in Behavioral Healthcare, 12*, 5-6.
- Neighbors, C., Lee, C. M., Lewis, M. A., Fossos, N., & Larimer, M. E. (2007). Are social norms the best predictor of outcomes amongst heavy-drinking college students? *Journal of Studies on Alcohol and Drugs, 68*, 556-565.
- O'Conner, R. M., & Colder, C. R. (2005). Predicting alcohol patterns in first-year college students through motivational systems and reasons for drinking. *Journal of Studies on Alcohol, S14*, 91-100.
- Okasaka, Y., Morita, N., Nakatani, Y., & Fujisawa, K. (2008). Correlation between addictive behaviors and mental health in university students. *Psychiatry and Clinical Neurosciences, 62*, 84-92.

- Östlund, A., Spak, F., & Sundh, V. (2004). Personality traits in relation to alcohol dependence and abuse and psychiatric comorbidity among women: A population-based study. *Substance Use & Misuse, 39*, 1301-1318.
- Pernanen, K. (1991). *Alcohol in human violence*. New York: Guildford Press.
- Peterson, J. B., Morey, J., & Higgins, D. M. (2005). You drink, I drink: Alcohol consumption, social context, and personality. *Individual Differences Research, 3*, 50-58.
- Petrakis, I. L., Gonzalez, G., Rosenheck, R., & Krystal, J. H. (2002). Comorbidity of alcoholism and psychiatric disorders: An overview. *Alcohol Research and Health, 26*, 81-89.
- Pihl, R. O., & Peterson, J. B. (1995). Alcoholism: The role of different motivational systems. *Journal of Psychiatric Neuroscience, 20*, 372-396.
- Quigley, B. M., & Collins, L. R. (1999). The modeling of alcohol consumptions: A meta-analytic review. *Journal of Studies on Alcohol, 60*, 90-99.
- Rafnsson, F. D., Jonsson, F. H., & Windle, M. (2006). Coping strategies, stressful life events, problem behaviors, and depressed affect. *Anxiety, Stress, and Coping, 19*, 241-257.
- Read, J. P., Wood, M. D., Kahler, C. W., Maddock, J. E., Palfai, T. P. (2003). Examining the role of drinking motives in college student alcohol use and problems. *Psychology of Addictive Behaviors, 17*, 13-23.
- Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., & Patra, J. (2009). Global burden of disease and injury and economic attributable to alcohol use and alcohol-use disorders. *The Lancet, 373*, 2223-2233.
- Rice, C. (2007). Misperception of college drinking norms. *Journal of Human Behavior in the Social Environment, 14*, 17-30.

- Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: an incentive-sensitization theory of addiction. *Brain Research Reviews, 18*, 247-291.
- Robinson, T. E., & Berridge, K. C. (2001). Incentive-sensitization and addiction. *Addiction, 96*, 103-114.
- Sampson, R. J., & Laub, J. H. (1990). Crime and deviance over the life course: The salience of adult social bonds. *American Sociological Review, 55*, 609-627.
- Sannibale, C., & Hall, W. (1998). An evaluation of Cloninger's typology of alcohol abuse. *Addiction, 93*, 1241-1249.
- Saunders, J. B., Aasland, O. G., Babor, T. F., De La Feunte, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption—II. *Addiction, 88*, 791-804.
- Sayette, M. A., Kirchner, T. R., Moreland, R. L., Levine, J. M., & Travis, T. (2004). Effects of alcohol on risk-seeking behavior: A group-level analysis. *Psychology of Addictive Behaviors, 18*, 190-193.
- Schall, M., Kemeny, A., & Maltzmann, I. (1992). Factors associated with alcohol use in university students. *Journal of Studies on Alcohol, 53*, 122-136.
- Selin, K. L. (2003). Test-retest reliability of the Alcohol Use Disorder Identification Test in a general population sample. *Alcoholism: Clinical and Experimental Research, 27*, 1428-1435.
- Shaffer, H. J. (1996). Understanding the means and objects of addiction: Technology, the internet, and gambling. *Journal of Gambling Studies, 12*, 461-469.

- Shaffer, H. J., LaPlante, D. A., LaBrie, R. A., Kidman, R. C., Donato, A. N., & Stanton, M. V. (2004). Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry, 12*, 367-374.
- Sher, K. J., & Trull, T. J. (2002). Substance use disorder and personality disorder. *Current Psychiatry Reports, 4*, 25-29.
- Shih, R. A., Belmonte, P. L., & Zandi, P. P. (2004). A review of the evidence from family, twin, and adoption studies for a genetic contribution to adult psychiatric disorders. *International Review of Psychiatry, 16*, 260-283.
- Shin, S. H., Hong, H. G., & Jeon, S-M. (2012). Personality and alcohol use: The role of impulsivity. *Addictive Behaviors, 37*, 102-107.
- Silk, A., & Shaffer, H. J. (1996). Dysthymia, depression, and a treatment dilemma in a patient with substance abuse. *Harvard Review of Psychiatry, 3*, 279-284.
- Simons, J. S. (2003). Differential prediction of alcohol use and problems: The role of biopsychological and social-environmental variables. *The American Journal of Drug and Alcohol Abuse, 29*, 861-879.
- Simons, J. S., & Arens, A. M. (2007). Moderating effects of sensitivity to punishment and sensitivity to reward on associations between marijuana effect expectancies and use. *Psychology of Addictive Behaviors, 21*, 409-414.
- Simons, J. S., & Dvorak, R. D., & Lau-Barraco, C. (2009). Behavioral inhibition and activation systems: Differences in substance use expectancy organization and activation in memory. *Psychology of Addictive Behaviors, 23*, 315-328.

- Simons, J. S., & Gaher, R.M., Correia, C.J., Hansen, C.L., & Christopher, M.S. (2005). An affective-motivational model of marijuana and alcohol problems among college students. *Psychology of Addictive Behaviors, 19*, 326-334.
- Slutske, W. S., Heath, A. C., Madden, P. A. F., Bucholz, K. K., Stratham, D. J., & Martin, N. G. (2002). Personality and genetic risk for alcohol dependence. *Journal of Abnormal Psychology, 111*, 124-133.
- Sjöholm, L. K., Kovanen, L., Saarikoski, S. T., Schalling, M., Lavebratt, C., & Partonen, T. (2010). CLOCK is suggested to associate with comorbid alcohol use and depressive disorders. *Journal of Circadian Rhythms, 8*, 1-9.
- Skeel, R. L., Pilarski, C., Pytlak, K., & Neudecker, J. (2008). Personality and performance-based measures in the prediction of alcohol use. *Psychology of Addictive Behaviors, 22*, 402-409.
- Stewart, S. H., & Devine, H. (2000). Relations between personality and drinking motives in young people. *Personality and Individual Differences, 29*, 495-511.
- Stewart, S. H., Loughlin, H.L., & Rhyno, E. (2001). Internal drinking motives mediate personality domain – drinking relations in young adults. *Personality and Individual Differences, 30*, 271-286.
- Stewart, S. H., Zvolensky, M. J., Eifert, G. H. (2001). Negative-reinforcement drinking motives mediate the relation between anxiety sensitivity and increased drinking behavior. *Personality and Individual Differences, 31*, 157-171.
- Stice, E., Barrera, J. M., & Chassin, L. (1998). Prospective differential prediction of adolescent alcohol use and problem use: Examining the mechanisms of effect. *Journal of Abnormal Psychology, 107*, 616-629.

- Swendsen, J. D., Tennen, H., Carney, M. A., Affleck, G., Willard, A., & Hromi, A. (2000). Mood and alcohol consumption: An experience sampling test of the self-medication hypothesis. *Journal of Abnormal Psychology, 109*, 198-204.
- Teplin, L. A. (1994). Psychiatric and substance abuse disorders among male urban jail detainees. *American Journal of Public Health, 84*, 290-293.
- Tonigan, J. S., & Miller, W. R. (2002). The Inventory of Drug Use Consequences (InDUC): Test-retest stability and sensitivity to detect change. *Psychology of Addictive Behavior, 16*, 165-168.
- Tragesser, S. L., Sher, K. J., Trull, T. J., & Park, A. (2007). Personality disorder symptoms, drinking motives, and alcohol use and consequences: Cross-sectional and prospective mediation. *Experimental and clinical Psychopharmacology, 15*, 282-292.
- Valdez, G. R., Roberts, A. J., Chan, K., et al. (2002). Increased ethanol self-administration and anxiety-like behavior during acute withdrawal and protracted abstinence: Regulation by corticotrophin-releasing factor. *Alcoholism: Clinical and Experimental Research, 26*, 1494-1501.
- Vitaro, F., Brendgen, M., Ladouceur, R., & Tremblay, R. E. (2001). Gambling, delinquency, and drug use during adolescence: Mutual influences and common risk factors. *Journal of Gambling Studies, 17*, 171-190.
- Walker, B. M., & Koob, G. F. (2007). The γ -aminobutyric acid- β receptor agonist baclofen attenuates responding for ethanol in ethanol-dependent rats. *Alcoholism: Clinical and Experimental Research, 31*, 11-18.
- Wallace, J. M. (1999). The social ecology of addiction: Race, risk, and resilience. *Pediatrics, 103*, 1122-127.

- Webb, T. L., Sniehotta, F. F., & Michie, S. (2010). Using theories of behaviour change to inform interventions for addictive behaviours. *Addiction, 105*, 1879-1892.
- West, R. (2001). Theories of addiction. *Addiction, 96*, 3-13.
- West, R. J. (2006). *Theory of Addiction*. Oxford: Blackwell Publishing.
- Williams Jr., R. D., Perko, M. A., Belcher, D., Leaver-Dunn, D. D., Usdan, S. L., & Leeper, J. D. (2006). Use of social ecology model to address alcohol use among college athletes. *American Journal of Health Studies, 21*, 228-237.
- Windle, M., & Windle, R. C. (1996). Coping strategies, drinking motives, and stressful life events amount adolescents: Associations with behavioral and emotional problems, and academic functioning. *Journal of Abnormal Psychology, 105*, 551-660.
- Whiteside, S. P., & Lynam, D. R. (2001). The Five Factor Model and impulsivity: using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*, 669-689.
- Whiteside, S. P., & Lynam, D. R. (2006). Understanding the role of impulsivity and externalizing psychopathology in alcohol abuse: Application of the UPPS Impulsive Behavior Scale. *Personality Disorders: Theory, Research, and Treatment, 5*, 69-79.
- Whiteside, S. P., & Lynam, D. R. (2009). Understanding the role of impulsivity and externalizing psychopathology in alcohol abuse: Application of the UPPS Impulsive Behavior Scale. *Personality Disorders: Theory, Research, and Treatment, S(1)*, 69-79.
- Wood, M. D., Read, J. P., Palfai, T. P., & Stevenson, J. F. (2001). Social influence processes and college student drinking: The mediational role of alcohol outcome expectations. *Journal of Studies on Alcohol, 62*, 32-43.

- Yin, H. H. (2008). From actions to habits: Neuroadaptations leading to dependence. *Alcohol Research & Health, 31*, 340-344.
- Zimmermann, U. S., Blomeyer, D., Laucht, M., & Mann, K. F. (2007). How gene-stress-behavior interactions can promote adolescent alcohol use: The roles of predrinking allostatic load and childhood behavior disorders. *Pharmacology, Biochemistry and Behavior, 86*, 246-262.
- Zinberg, N. E. (1984). *Drug, set, and setting: The basis for controlled intoxicant use*. New Haven, CT: Yale University Publishing.
- Zuckerman, M. (1983). *Biological bases of sensation seeking, impulsivity, and anxiety*. Hillsdale, NJ: Erlbaum.
- Zuckerman, M., & Kuhlman, D. M. (2000). Personality and risk-taking: Common biosocial factors. *Journal of Personality, 68*, 999-1029.