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The Psychometric Evaluation and Validation of a Measure Assessing Pharmacological and Social Alcohol Expectancies in Adolescents

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The Psychometric Evaluation and Validation of a Measure Assessing Pharmacological and
Social Alcohol Expectancies in Adolescents

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
Department of Psychology
with a concentration in Clinical Psychology
College of Arts and Sciences
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Abstract

Extending prior alcohol expectancy measurement research, this researcher (McMurray, 2013) recently developed the Pharmacological and Social Alcohol Expectancy Scale (PSAES). The PSAES is the only alcohol expectancy measure to date that provides adequate coverage of both social expectancies and the anticipated positive pharmacological effects resulting from alcohol consumption, and was developed and validated in a sample of young adults (aged 18-23). Research has shown that adolescents at high risk for alcohol use disorder (AUD) hold higher expectations of reward from alcohol, suggesting that expectancy patterns may help distinguish at-risk youth. Building upon the previous PSAES validation study, the primary purpose of the current study was to examine whether a version of the PSAES adapted for adolescents (the PSAES-A) provided a valid measure of pharmacological and social alcohol expectancies in adolescents. Results demonstrated that a respecified model of the PSAES-A adequately fit the proposed two-dimensional factor structure and provided justification for the items representing two distinguishable domains: social and pharmacological. The PSAES-A was then used to 1) examine patterns of alcohol expectancies and drinking behaviors in adolescents and 2) investigate whether risk (e.g., sensation seeking personality) was differentially associated with pharmacological and social expectancies in adolescents. Results indicated that pharmacological and social expectancies were differentially associated with various drinking behaviors (e.g., quantity, frequency) and that sensation seeking was significantly associated with both social and pharmacological expectancies in adolescents. The fact that alcohol expectancies differentially predicted quantity and frequency of drinking suggests that different expectancy processes affect

adolescent's decisions about how often they drink versus how much alcohol they consume on a given occasion. Implications and limitations are discussed.

Introduction

Adolescents suffer many acute adverse consequences from alcohol use (Hingson & Zha, 2009), and alcohol consumption during adolescence is linked to the development of alcohol use disorder (AUD; Grant et al., 2004; Knight et al., 2002). The processes of adolescent development may encourage the development of alcohol involvement. Indeed, there are significant developmental patterns of alcohol-related behaviors (e.g., alcohol use, abuse, and dependence) in the general population (Masten et al., 2008), with the rate of AUD decreasing over essentially all demographic strata with age (Grant et al., 2004). During adolescence, alcohol consumption tends to increase until peaking during late adolescence and young adulthood, and then steadily decreases into adulthood (Sher, Grekin, & Williams, 2005). The risks associated with alcohol use during adolescence are cause for concern, as the earlier individuals initiate drinking, the more likely they are to drive after drinking, ride with drunk drivers, experience automobile accidents and fatalities, engage in risky sexual behaviors, have alcohol-related injuries, and develop AUD at some point across the lifespan (Hingson & Zha, 2009). While many individuals who develop AUD during adolescence or early adulthood tend to “mature out” of disordered drinking as they make the transition into adulthood, a substantial number demonstrate more chronic forms of AUD across the lifetime (Sher, Grekin, & Williams, 2005).

Over the past thirty years, cognitive processes have gained recognition as a critical element in the etiological matrix of alcohol initiation, alcohol use trajectories, problematic alcohol use, and AUD. The expectancy-learning model represents one particular version of a

number of related theories, each of which is concerned with the cognitive mechanisms by which previous learning experiences shape subsequent behavior (e.g., Bagozzi, 1992). Alcohol expectancies are conceptualized as memory associations in the brain related to alcohol use that create anticipatory schema designed to prepare an individual for upcoming situations involving alcohol (Goldman 1999, 2002). Alcohol expectancies are crucial to understanding AUD because what individuals expect to happen when they consume alcohol determines their drinking behavior. In fact, the available evidence indicates that alcohol expectancies measured via questionnaires are among the strongest predictors of drinking and are well-supported mediators of the relationship between other known antecedents of drinking and variance in drinking outcomes (Darkes et al., 2004; Goldman, Darkes, & Del Boca, 1999; Goldman, Reich, & Darkes, 2006). Research demonstrated that alcohol expectancies predict alcohol use cross-sectionally (e.g., Leigh, 1989; Goldman et al., 1999) and longitudinally over months and years (Baer, 2002; Stacy et al., 1991). Patrick et al. (2010) found that alcohol expectancies measured during adolescence predict alcohol use as much as two decades later (Patrick et al., 2010). Researchers from various fields are now considering alcohol expectancies and closely associated concepts (e.g., motivations, reasons for drinking or not drinking, drinking attitudes) as one possible “final common pathway” for drinking decisions (Goldman et al., 2010; Goldman & Reich, 2013).

Given that anticipatory processes are strongly implicated in drinking outcomes, one of the primary goals of alcohol expectancy research is to gain sufficient understanding of the specific patterns of anticipated alcohol effects that influence drinking behavior so that prevention and intervention efforts may be subsequently informed. Expectations of pharmacological brain effects was identified as the primary motivation for consuming substances in a review of models of addiction by Redish, Jensen, and Johnson (2008). These anticipated pharmacological effects

include various subjective experiences, including feeling “drunk,” “wasted,” “high,” “buzzed,” etc. Over the last 30 to 40 years, however, a substantial amount of research has demonstrated that the pharmacological effects of alcohol do not completely determine alcohol-related behavior. Numerous variables not directly related to alcohol pharmacology (e.g., contextual factors, personality/temperament, peers’ alcohol-related cognitions) appear to influence alcohol initiation during adolescence as well as the drinking trajectory after onset. Social factors are widely noted to have a considerable influence on drinking behaviors, particular during the adolescent years. Positive social expectancies are, in fact, most associated with drinking behavior in the general population when compared to other alcohol expectancies (Smith et al., 1995). Attempting to reflect the themes of social and pharmacological rewards present in the alcohol literature, this author recently developed and validated a two-dimensional instrument in a sample of young adults (aged 18 to 23) to measure both pharmacological and social alcohol expectancies called the Pharmacological and Social Alcohol Expectancy Scale (PSAES; McMurray, 2013). It was hoped that the newly developed PSAES would contribute to subsequent research in the alcohol expectancy area by providing a reliable measure of rewarding pharmacological alcohol expectancies.

Given that alcohol expectancies develop before alcohol use and have been identified as contributing factors to alcohol initiation, it was anticipated that adapting the PSAES for use for adolescents and validating the instrument in an adolescent sample would be highly beneficial. Recent research with both animals and humans associates adolescence with increased risk taking and increased valuation of social rewards (Steinberg, 2007; Steinberg et al., 2008). Given that adolescent alcohol use typically involves both risk taking and social contexts, drinking may be particularly compatible with normal adolescent development. Alcohol use may also be

appealing to adolescents given the sensations involved, as adolescents demonstrate decreased sensitivity to the sedating and intoxicating effects of alcohol (Spear, 2000) as well as a general increase in appetitive behavior (Somerville, Jones, & Casey, 2010). From the perspective of expectancy theory, adolescence may provide optimal developmental conditions for the acquisition of alcohol-related reward expectations. Consequently, the current study aimed to develop and validate an adapted version of the PSAES in an adolescent sample and utilize that measure to define risk for alcohol use disorder (AUD).

Adolescent Alcohol Expectancies and Drinking Behavior

Expectancies are conceptualized as memory associations that create anticipatory schema intended to prepare an individual for upcoming situations. In the alcohol field these memory associations have been studied extensively, are referred to as alcohol expectancies. Explicit measures (i.e., introspective self-report using traditional paper-and-pencil questionnaires) have been used to assess alcohol expectancies as well as implicit measures using modified Stroop tasks, free associates, and false memory tasks (e.g., Kramer & Goldman, 2003; Reich, Below, & Goldman, 2010; Reich, Goldman, & Noll, 2004). Individuals with more positive and arousing expectancies tend to drink more frequently and in higher quantities, while individuals who endorse more negative and sedating expectancies tend to be lighter drinkers (Darkes, Greenbaum, & Goldman, 1996). Drinking behavior is significantly and positively associated with positive expectations about alcohol (e.g., the belief that alcohol will make a person energized or cheerful) and inversely associated with negative expectations about alcohol (e.g., the belief that alcohol will make a person nauseated or depressed) (Brown, Christiansen & Goldman, 1987; Fromme, Stroot, & Kaplan, 1993; Stacy, 1997). Research by Leigh and Stacy (1993) has suggested that negative expectancies may be protective factors against the development of problematic drinking.

Alcohol expectancies play a particularly important role during the developmental period when experiences with alcohol are less advanced. Research has demonstrated that children develop alcohol expectancies long before drinking onset (Noll, Zucker, & Greenberg, 1990; Dunn & Goldman 1996, 1998, 2000). Many factors influence the formation of alcohol expectancies, including parental drinking behavior, interaction with peers, and media portrayal of alcohol (Martino et al., 2006). Expectancies measured in early adolescence predict drinking onset as well as drinking behaviors during adolescence (Smith et al., 1995). Adolescent alcohol expectancies also predict the development of problematic alcohol use later in adolescence and early adulthood (Christiansen et al., 1989). A prospective longitudinal study by Patrick et al. (2010) found that greater positive expectancies at age 16 predicted greater alcohol consumption and misuse at age 35. Alcohol expectancies shift from being largely negative to primarily positive around the start of adolescence, and this change coincides with alcohol initiation (Bekman et al., 2011; Dunn & Goldman, 1998). Expectancies about the effects of alcohol on drinkers are generally negative in childhood (Johnson & Johnson, 1995; Noll, Zucker, & Greenberg, 1990), but become more positive as children get older (Miller, Smith, & Goldman, 1990) and as they move into adolescence (Cumsille, Sayer, & Graham, 2000; Dunn & Goldman, 1996, 1998).

Alcohol expectancies appear to crystallize with age (Miller, Smith, & Goldman, 1990). The more first-hand drinking experience an individual has, the more likely that individual is to have positive alcohol expectancies, and thus the more likely he or she is to drink alcohol more frequently and in greater quantities (Smith et al., 1995). Alcohol expectancies therefore affect not only drinking behavior but also the perception of subsequent experiences with alcohol. An individual's original expectancies may then, in turn, be strengthened (i.e., crystallized) as he/she

accumulates drinking experience (Oei & Morawska, 2004). Experimental studies (i.e., “expectancy challenge” studies) have even demonstrated that lowering positive alcohol expectancies results in decreased alcohol consumption (Darkes & Goldman, 1993, 1998), and a recent meta-analysis (Scott-Sheldon et al., 2012) found that expectancy challenge interventions reduce positive alcohol expectancies, the amount of alcohol consumed per occasion, and the frequency of heavy drinking for as long as one month after the intervention in college drinkers. Although the majority of expectancy challenge studies were conducted with college students, there is good evidence that alcohol expectancies measured during adolescence predict future drinking and may play a causal role in alcohol consumption. It therefore seems reasonable that adolescents’ alcohol expectancies are potentially malleable.

Adolescent Development and Reward Sensitivity

As previously mentioned, adolescence is characterized by an increase in risky behaviors, including substance use. Based on studies of adolescent brain development, various neurophysiological factors appear to influence the increased probability of substance use in individuals 14 to 17 years old (Nixon & McClain, 2010; Spear, 2011; Steinberg et al., 2008; Steinberg, 2010). Adolescents experience considerable alterations in the dopaminergic system, as well as proliferation and refinement of prefrontal and limbic circuitry (Bava & Tapert, 2010; Doremus-Fitzwater et al., 2010; Galvan, 2010; Koob & Volkow, 2010; McCutcheon et al., 2012; Naneix et al., 2012; Spear, 2015; Yetnikoff et al., 2014). During adolescence the prefrontal control systems and their connections to other brain regions tend to mature slowly while the mesolimbic system experiences early enhanced activity; these changes in the adolescent brain may amplify risk taking behaviors during this developmental window compared to earlier and later phases of human maturation. These changes may, in other words, result in reduced

cognitive control of the reward system in the brain in early to mid-adolescence, leading to increased risk for substance use and related problems.

In fact, research focused on adolescent brain development and the consequences for adolescent behavior indicate a “window of vulnerability” in early adolescence for sensation seeking propensity to result in risk-taking behavior, including substance use and abuse. Reward sensitivity appears to be most prominent during adolescence (Friedel et al., 2010) and is typified by increased physiological, emotional, and cognitive reactivity to signals of reward (Depue & Collins, 1999). Reward sensitivity is correlated with increased responsiveness in the brain reward system, which also leads to increased behavioral response (e.g., Hahn et al., 2009). Primary neural structures of this reward system network include the anterior cingulate cortex, the ventral pallidum, the ventral striatum, the orbitofrontal cortex, and the dopaminergic midbrain neurons; and the amygdala, thalamus, orbital prefrontal cortex and hippocampus are additional components implicated in reward regulation (Haber & Knutson, 2010).

Reward sensitivity is also associated with increased alcohol responding, heightened heart rate response to alcohol intoxication and higher alcohol craving (Franken, 2002), stronger physiological responses to alcohol and higher conditioning to alcohol cues (Brunelle et al., 2004). Many studies focus on the neural underpinnings of reward processing. However, both psychological and biological mechanisms may affect these processes and should be taken into account for a complete understanding of reward processing and sensitivity. This is especially important during adolescence, a period that is characterized by a normative increase in risk-taking behavior, and during which the onset of alcohol use has often been observed. Personality, and specifically temperament as well as cognition guide human behavior, and have been

associated with reward processing and have a major contribution to the development of alcohol use.

Alcohol Expectancies and Risk for Alcohol Consumption during Adolescence

As previously mentioned, adolescents appear less risk averse than younger children and adults, although their ability to evaluate risk is almost commensurate with adults (Dahl & Spear, 2004). What appears responsible for risky decisions by teens is not a lack of logical reasoning capacity, but the overriding of such reasoning by emotional stimulation, particularly in the presence of same-aged peers (e.g., Dahl, 2004; Steinberg, 2004; Chambers et al, 2003). More specifically, adolescence appears to be associated with increases in sensation seeking, or “the need for varied, novel, and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experiences” (Zuckerman, 1979, p. 10).

One prevalent theory is that the increases in sensation seeking seen in adolescents are due to decreased sensitivity to stimulation (Martin et al., 2002; Spear, 2000). Sensation seeking is associated with early alcohol onset and frequency of alcohol use (e.g., Earleywine & Finn, 1991). Initial levels of sensation seeking have also been associated with more “risky” trajectories of alcohol use that include more rapid alcohol onset and escalation in consumption (Crawford et al., 2003). Higher levels of sensation seeking correlated with higher rates of alcohol use across a national sample of youths ages 14 to 22 (Romer & Hennessy, 2007).

Although researchers debate whether basic temperament and personality change over time, it is evident that some temperament/personality characteristics may become exaggerated during adolescence, including social motivation, emotionality, sensation seeking, and risk taking. For instance, recent longitudinal studies have offered some preliminary evidence that increased

sensation seeking in early adolescence is associated with pubertal tempo (Guller, Zapolski, & Smith, 2015; McMurray et al., 2013)

Sensation seeking personality may increase risk for alcohol use or other deviant behavior. One route which risk may be increased is that of alcohol expectancies; that is, expectancies for alcohol effects may reflect these personality characteristics (McCarthy et al., 2001). Personality variables and alcohol-related cognitions likely interact with other developmental factors during the transition to adolescence to shape expectancy formation. Research with adolescent and young adult samples has demonstrated that personality and expectancy risk factors correlate with and predict alcohol-related behaviors. In a recent cross-sectional study, Gunn and Smith (2010) found that children who had experienced pubertal onset had higher levels of positive urgency, negative urgency, and sensation seeking. Gunn and Smith (2010) tested whether correlations and tests of mediation were consistent with the acquired preparedness model proposing that personal characteristics of children play a role in whether they initiate drinking prior to adolescence. They found that the relationship between negative urgency (i.e., the tendency to act rashly under perceived distress) and drinker status was fully mediated by expectancies for positive, social effects from drinking. In addition, the relationships between positive urgency (i.e., the tendency to act rashly when in a very good mood) and drinker status, and between sensation seeking and drinker status, were both fully mediated by expectancies for wild and crazy effects from alcohol in that study.

Rewarding Pharmacological Effects of Alcohol Consumption

Alcohol-seeking behavior is considered to be a special form of exploratory appetitive behavior (Cloninger, 1987). Low doses of ethanol have a strong excitatory effect on ventral tegmental area neurons (Brodie, Pesold, & Appel, 1999), suggesting that this action of ethanol

may provide a pharmacological reward that would facilitate alcohol-seeking behavior. In their review of addiction models, Redish, Jensen, and Johnson (2008) focus on anticipated pharmacological brain effects as the main incentive for consuming alcohol. These pharmacological effects are in fact primary – that is, they can be conceptualized as the immediate subjective effects of alcohol “hitting the brain” and impacting brain neurophysiology. Thought of in a different way, the pharmacological effects of alcohol are those that one might be able to experience even in a solitary drinking setting. Much of the research examining the pharmacological effects of alcohol has used animal models, largely because animal models allow researchers to use methods that cannot ethically be used with human subjects. The majority of animal models of alcohol-seeking behavior attempt to demonstrate the reinforcing (pleasurable) pharmacological properties of alcohol (Tabakoff & Hoffman, 2000), which are thought to play a key role in human alcohol use. A set of experiments has shown that P-rats consume alcohol for its reinforcing actions on the central nervous system. In those studies, the animals self-administered small amounts of alcohol via a special infusion device directly into a brain region thought to be critically involved in initiating the reinforcing effects of substance abuse (Gatto et al., 1994; Rodd-Henricks et al., 2000).

Despite their utility, a major issue with animal model studies is whether the behavior that is measured in the animals is relevant to human motivation for consuming alcohol. Most animal studies use adult models, despite the onset of drinking during adolescence in humans. Many animal models force or encourage alcohol consumption using external manipulations, and the animals generally do not self-administer their initial exposure; in some instances, the alcohol is even injected directly into the stomach by the animal using surgically implanted tubes (i.e., intragastric self-administration). This method is used to avoid the influence of taste and assure

that alcohol is being administered by the animal for its pharmacological properties, but is not relevant to standard routes of human alcohol consumption.

Each animal model of drinking behavior mimics only certain aspects of human drinking behavior, and given the complexity surrounding human alcohol consumption, one can see the inherent difficulty in fully modeling those human circumstances in animals. The limitation of alcohol animal studies perhaps most relevant to the current study is that animal models typically use organisms that are unaware of the effects of alcohol until alcohol exposure; that is, animals generally do not have pre-existing knowledge of alcohol effects prior to their first exposure. Results of balanced-placebo design studies in humans have demonstrated that the anticipated effects of alcohol are often as powerful as the actual pharmacological effects of alcohol in determining alcohol behavior. Over the last 30 years, alcohol expectancy research has demonstrated that many alcohol-related behaviors in humans are actually the result of alcohol-related anticipatory cognitions that have no direct basis in pharmacology.

Rewarding Social Effects of Alcohol Consumption

Given the well-established body of literature demonstrating that pharmacological mechanisms of alcohol do not completely determine alcohol-related behavior in humans, it is important to highlight some of the factors that motivate individuals to consume alcohol. Many factors unrelated to alcohol pharmacology (e.g., personality, family environment, alcohol use of peers) are thought to influence the onset of drinking in humans during adolescence as well as the trajectory of drinking after onset (Sher, Grekin, & Williams, 2005). Social factors appear to strongly influence human drinking behavior, especially during adolescence. Adolescents and young adults resemble their peers with respect to substance use: drinking attitudes and the behavior and influence of peers are among the strongest correlates of adolescent alcohol use and

abuse (Hawkins, Catalano, & Miller, 1992). The belief that alcohol enhances social interactions, the ability to make friends, and increases positive moods in social situations seem to play an important part in alcohol initiation and alcohol consumption thereafter.

Some recent studies with adolescent rats have attempted to model social influences on drinking behavior by demonstrating that rats will exhibit a greater preference for alcohol when they are allowed to observe another rat that has been exposed to the substance (Galef, Whiskin, & Bielavska, 1997). Using this demonstrator-observer paradigm, animal alcohol researchers have shown that adolescent rats are more likely to drink alcohol after interacting with an alcohol-intoxicated peer than an anesthetized peer that had also received alcohol (Fernandez-Vidal & Molina, 2004). Animal researchers have also used this paradigm to demonstrate that alcohol preference increases in adolescent male rats that are allowed to observe and interact with an intoxicated familiar peer, but decreases when allowed to observe and interact with an intoxicated unfamiliar peer (Maldonado, Finkbeiner, & Kirstein, 2008). In contrast, the relationship does not appear to be important for female adolescent rats; they exhibit an increased preference for alcohol after exposure to either a familiar peer or an unfamiliar peer. As highly innovative as these demonstrator-observer animal models of drinking consumption may be, they are limited in their relevance to human consumption in that the demonstrator is typically force-fed alcohol, eliminating the possibility of interactions during drinking that may affect alcohol intake, and they do not account for the effect of specific social affiliations on social drinking.

Both the human and animal literature regarding psychosocial influences on alcohol consumption suggest that psychosocial factors play a critical part in the initiation and developmental trajectory of alcohol use. These social factors include the influence of parents and peers, positive social expectancies, and perceived drinking norms. While popularity with

one's peers at the elementary school level is associated with low risk for alcohol use (Zucker, 2006), peer popularity in high school may put students at higher risk for alcohol use (Diego, Field, & Sanders, 2003). Popular adolescents are more likely to be invited to parties, and exposure to alcohol at parties increases in adolescence, which may account for some of this increased risk (Masten et al., 2008). Parents and youths in the United States tend to view underage drinking as a normal socialization that occurs with adolescence (Cullum et al., 2010; Wood et al., 2001).

Social learning theory (Bandura, 1977) has been utilized as a theoretical framework for understanding the role of social influences on drinking, indicating that adolescent alcohol consumption is a learned behavior acquired through a process of observation, modeling, mimicking, and social reinforcement (Epstein, Griffin, & Botvin, 2008). The alcohol expectancy literature has demonstrated that positive social expectancies (e.g., social enhancement, social facilitation) are most strongly correlated with drinking behavior when compared to other specific alcohol expectancies (e.g., sexual enhancement, attractiveness, happiness).

Pharmacological versus Social Alcohol Expectancies

Additional research is needed to determine which alcohol expectancies are most predictive of alcohol-related problems and AUD. Continuing to work toward identifying these “risky” alcohol expectancy patterns will facilitate the efforts of prevention and intervention programs hoping to limit premature and excessive drinking. The literature presented above indicates the importance of both the pharmacological and social rewarding effects of alcohol on drinking motivation and behavior, and making a distinction between the anticipated rewarding pharmacological and social effects of alcohol could offer important information in defining risk for problematic alcohol use and AUD. Research on drinking motives, which are closely related

to alcohol expectancies, has demonstrated that drinking is motivated by what these researchers call internal rewards (e.g., enhancement of a desired emotional state) and external rewards (e.g., social approval). Internally focused motives, specifically mood enhancement and internal coping, have been associated with heavy drinking (Cooper et al., 1992; Cooper et al., 1995; Park & Levenson, 2002), which suggests that different cognitive processes may be associated with individual's decisions about drinking.

Researchers have applied various psychometric methods (e.g., multidimensional scaling, exploratory and confirmatory factor analysis) in the development of self-report expectancy measures devised to assess specific types of cognitions about drinking and to examine their relationships (i.e., correlations) with alcohol-related behaviors (Sher, Grekin, & Williams, 2005). Results from previous correlational studies have demonstrated robust associations between alcohol expectancies and measures of alcohol use and alcohol-related problems across various developmental stages (i.e., including adolescents, college students, and adults) and spanning drinking patterns ranging from abstinence to alcohol dependence (e.g., Goldman et al., 1999). The use of self-report measures allows more flexibility than other methods because the researcher is measuring preexisting phenomena. Because they involve measuring variables as they exist in nature, correlational studies often have greater external validity than experimental studies, which means that results obtained in correlational research are more likely to generalize outside of the constraints of the study.

Over the past 35 years researchers have investigated alcohol expectancies using diverse explicit approaches, including positive and negative expectancies, valence and arousal, circumplex models, drinking motivation, reasons for drinking, and many others. Despite literature indicating the importance of both the pharmacological and social rewarding effects of

alcohol on drinking motivation and behavior, alcohol expectancies had never been examined by separating the anticipated rewarding pharmacological effects from the rewarding social effects resulting from drinking alcohol. Moreover, although some existing alcohol expectancy measures assessed pharmacological alcohol expectancies, items concentrated largely on the negative pharmacological effects of alcohol consumption (e.g., feeling nauseous, woozy). An inclusive inventory of the rewarding alcohol effects should include both the direct chemical effects (i.e., pharmacological expectancies), as well as those effects that enhance individuals' social effectiveness and social status (i.e., social expectancies).

This researcher (McMurray, 2013) recently extended previous research on alcohol expectancy measurement via the development of the first alcohol expectancy instrument to provide adequate coverage of both social expectancies and the anticipated positive pharmacological effects resulting from alcohol consumption. This measure, the Pharmacological and Social Alcohol Expectancy Scale (PSAES), was developed and validated in a sample of young adults (aged 18-23). During the development of this measure pharmacological expectancies were conceptualized as internal, purely subjective effects that individuals could even experience in solitary drinking, while social expectancies were conceptualized as expectancies that involve expectations of increased social status and effectiveness in social situations.

The aforementioned study was conducted with the aim to develop a two-dimensional measure designed to assess both rewarding pharmacological and social alcohol expectancies in young adults. Another primary objective of that study was to utilize the newly developed instrument to investigate patterns of alcohol expectancies at various drinker levels and determine whether notable risk factors for AUD (e.g., sensation seeking) could differentiate scores on the

two factors in the young adult sample. Results demonstrated that a respecified model (items with low loadings were removed) adequately fit the proposed two-dimensional factor structure and provided justification for the items representing two distinguishable domains: social and pharmacological. However, for expectancy theory to demonstrate utility in the understanding of the mechanisms that influence drinking behavior, there should be reliably strong relationships between the alcohol-related anticipatory cognitions that individuals possess and the alcohol they consume (Brown et al., 1980; Christiansen et al., 1989). Indeed, individuals who participated in this study who held higher social and pharmacological expectancies reported higher quantity of drinks consumed per typical occasion, frequency of drinking occasions, and frequency of binge drinking, on average. These results were in line with previous alcohol expectancy research demonstrating that positive social expectancies are associated with increased alcohol consumption. The findings expanded the alcohol expectancy literature by demonstrating that pharmacological expectancies provided incremental validity in the prediction of drinking behavior, supplying evidence for the validity of the pharmacological expectancies subscale of the PSAES. Finally, the results of this study suggested that sensation seeking is a significant predictor of pharmacological alcohol expectancies, but not social alcohol expectancies, indicating that pharmacological and social expectancies may be differentially associated with risk factors for AUD.

The Current Study

The original PSAES was developed and validated in a young adult sample with participants ranging from 18 to 23 years old. Investigating alcohol expectancy patterns and drinking behaviors of individuals within this age group is especially important considering that alcohol consumption, alcohol-related problems, and the prevalence of AUD peak during this

developmental window (Grant et al., 2004). The extent to which the results would generalize to other age groups was unclear, however, which warranted additional research in this area. It was hoped that evaluating the psychometric properties of an adapted version of the PSAES in an adolescent sample might help determine whether the interpretation of PSAES scores from the prior study (McMurray, 2013) would generalize to adolescents. An adolescent sample would include a larger percentage of individuals who have not yet initiated alcohol use and individuals who have, on average, had less exposure to alcohol than young adults. Given that alcohol expectancies develop before alcohol use and have been identified as contributing factors to alcohol initiation, it was anticipated that adapting the PSAES for use for adolescents and validating the instrument in an adolescent sample would be highly beneficial. One important question was whether adolescents who have initiated drinking, and have therefore experienced firsthand some of the pharmacological effects of alcohol use, endorse more pharmacological expectancies than their non-drinking peers. Indeed, research suggests that attitudes developed from first-hand experience are more robust predictors of subsequent behavior than attitudes developed without direct experience (Fazio & Zanna, 1978). Although longitudinal in nature, one fundamental question of interest was how the two expectancy domains influence the acquisition of drinking habits.

Another remaining question was whether risk factors for AUD (e.g., personality characteristics, family history of AUD) would be associated with positive pharmacological expectancies in an adolescent sample. Due to the researcher being limited to data that were already collected by the local public school system, sensation seeking was used as the primary indicator of risk in the current study. As mentioned previously, sensation seeking tends to peak during adolescence, so it is possible that adolescents high in sensation seeking may endorse more

positive pharmacological outcomes of alcohol consumption than their less sensation seeking peers, even if they have not yet initiated alcohol use. Alcohol use might be particularly appealing to adolescents given the psychopharmacological sensations involved and because alcohol is often used to facilitate social interactions. This interweaving of drinking with adolescent development may also be encouraged by adolescents' decreased sensitivity to the sedating and intoxicating effects of alcohol (Spear, 2000) and the connection of motivation to use alcohol to generalized development in brain regions associated with motivation and impulsivity (Chambers et al., 2003), as well as by a general increase in appetitive behavior. In combination, these processes might naturally lead to increases in the reward value of alcohol use during adolescence.

It was hoped that these increases in the reward value of alcohol use could be assessed using measurement methods developed in connection with alcohol expectancy research. Research has shown that youth at high risk for AUD hold higher expectations of reward from alcohol, suggesting that expectancy patterns may help distinguish at-risk youth. Although defining risk can only be accomplished by employing a longitudinal risk paradigm, looking at cross-sectional associations between sensation seeking and alcohol expectancy patterns could help determine whether high sensation seeking adolescents (i.e., youth who are already at elevated risk for AUD) anticipate more pharmacological effects from alcohol. Future studies could investigate whether endorsing more pharmacological expectancies might result in an accelerated and problematic drinking trajectory. If expectancies are potentially malleable (Del Boca & Darkes, 2001), understanding which variables most contribute to increased reward value of alcohol may lead to enhanced prevention strategies.

Statement of Purpose

Building upon a previous PSAES validation study (McMurray, 2013), the primary purpose of the current study was to examine whether the PSAES-A provides a valid measure of pharmacological and social alcohol expectancies in adolescents. Previous research suggests that early experience with alcohol alters perceptions about alcohol's effects and indicates a notable shift from negative-sedating to positive-arousing expectancies between 6th and 9th grades (Dunn & Goldman, 1996, 1998, 2000). This "critical period" of expectancy development is particularly important given that initiation of alcohol consumption also begins to occur during early adolescence (Johnston et al., 2012). Because alcohol expectancies change as drinking experience accumulates, this study examined the relationship of expectancy to drinking in 9th graders, which is the developmental period when about half of the population has initiated alcohol use. The PSAES-A was therefore used in the current study to 1) assess patterns of alcohol expectancies and drinking behaviors in adolescents and 2) investigate whether risk (e.g., sensation seeking personality) is differentially associated with pharmacological and social expectancies in adolescents.

Specific Aims

1) It was expected that when the proposed two-dimensional model was formally tested in an adolescent sample, the PSAES-A alcohol expectancy items would adequately fit two correlated factors of social and pharmacological expectancies. 2) In line with previous alcohol expectancy research, it was expected that adolescents' social expectancies would predict drinker level (as measured by quantity of drinks consumed per typical occasion). 3) Expanding on the current alcohol expectancy literature, it was hypothesized that adolescents' pharmacological expectancies would predict drinker level. 4) It was hypothesized that pharmacological and social

expectancies would differentially predict drinking behavior (e.g., quantity, frequency, frequency of getting drunk), as expectancy patterns may differentially reflect the acquisition of potentially problematic drinking behaviors. 5) Based on previous alcohol expectancy research, it was predicted that adolescents who had already initiated drinking would endorse more social expectancies than those who had not yet initiated. 6) Expanding on the current alcohol expectancy literature, it was predicted that adolescents who had already initiated drinking would endorse more pharmacological expectancies than those who had not yet initiated. 7) Based on prior research, it was hypothesized that there would be a positive, linear relationship between sensation seeking and social expectancies. 8) Expanding prior research, it was predicted that there would be a positive, linear relationship between sensation seeking and pharmacological expectancies.

Method

Participants

A small number of high school-aged adolescents, ages 13 to 17, served as pilot subjects in the development of the Pharmacological and Social Alcohol Expectancy Scale for Adolescents (PSAES-A).

The current study involved analysis of existing data that were originally collected for non-research purposes. Original data were collected as part of normal educational practices from students enrolled in the Health Opportunities through Physical Education (HOPE) course that is part of the graduation requirement for Physical Education in Hillsborough County Schools. As a result, the current research met requirements for USF IRB Exempt Certification (IRB#: Pro00020286; see Appendix A for USF IRB Exempt Certification Approval Letter). The organizers of this course (located in the Tampa Bay area) were aware for many years of the research our laboratory had been conducting and had incorporated material derived from our investigations into their regular program. Consequently, we were able to capitalize on data that they had collected.

Part of the curriculum for the HOPE course includes a variety of assessments that were built into the course so that the instructors could evaluate progress and provide educational instruction based on the data collected. Data for the current study were originally collected for the purposes of this course-related content. The data were collected at the end of the first semester of the HOPE course (November 2014). Some children were exempted from this course based on parental request, and all surveys were made available to parents for review at the sites.

During the second semester (Unit Five) students learned about tobacco, alcohol, drugs, stress, as well as depression and suicide. The section on alcohol included curricula on the influences of alcohol use, effects of alcohol, binge drinking, alcoholism, Fetal Alcohol Syndrome, alcohol-related consequences, and driving under the influence. The data for the current study were originally collected from HOPE students with the purpose of integrating aggregate results into the course curriculum for educational purposes.

The sample size for the original dataset was $N = 1006$ students. The mean age of the overall sample was 15.12 years old ($SD = 1.23$) with students ranging from 13 to 19 years old. 54.1% of the sample was male ($n = 544$). 63.2% of students in the dataset were 9th graders ($n = 636$), 15.2% of students were 10th graders ($n = 153$), 9.6% of students were 11th graders ($n = 97$) and 10.1% of students were 12th graders ($n = 102$). Students identified as Hispanic/Latino (31.0%), White, not of Hispanic origin (23.4%), Black, not of Hispanic Origin (21.6%), Asian or Pacific Islander (2.7%), American Indian or Alaskan Native (2.3%), Other (8.4%), or indicated they preferred not to answer (5.7%).

Although data collected from HOPE classrooms came from all grades, the focus of the current study was the 9th graders in their program ($n = 636$). Although there is currently no consensus on the minimum sample size required for factor analysis and structural equation modeling, with some statistical pundits recommending at least 100 (Gorsuch, 1983), 150 (Hutcheson & Sofroniou, 1999), 200 (Guilford, 1954), 250 (Cattell, 1978), and even 500 cases (Comrey & Lee, 1992), the 9th grade sample was sufficient to conduct the statistical analyses (e.g., factor analysis and latent multinomial regression) for the current study. The mean age of the 9th grade sample was 14.48 years old ($SD = 0.74$) with students ranging from 13 to 16 years old. 54.6% of the 9th grade sample was male ($n = 346$). 9th grade students identified as

Hispanic/Latino (32.9%), White, not of Hispanic origin (27.0%), Black, not of Hispanic Origin (21.3%), Asian or Pacific Islander (2.0%), American Indian or Alaskan Native (2.3%), Other (8.0%), or indicated they preferred not to answer (6.5%). See Table C1 for self-reported demographic information.

The current study included both drinkers and non-drinkers. Of the 9th graders surveyed, 50.8% indicated that they had never consumed alcohol, with 49.2% indicating that they had consumed at least one alcoholic beverage in their lifetime (i.e., more than just one sip). Based on a recent nationwide study conducted by the CDC (Eaton et al., 2012), the prevalence of having ever drunk alcohol (i.e., consumed at least one drink of alcohol on at least 1 day during their life) was 61.7% among 9th grade students. Thus, the prevalence of ever use of alcohol among the current sample of 9th grade students appeared to be below that of general U.S. 9th grade students.

Measures

Background/Demographics Form

Participants selected for inclusion in the current data analysis had completed a form developed to assess relevant demographic and background variables including age, sex, ethnicity, grade in school, and whether or not this was their first time taking the HOPE course.

Respondents chose from 9 ethnic categories: 1) Native American/American Indian, 2) Asian, 3) Pacific Islander, 4) African-American/Black and not of Hispanic origin, 5) African-American/Black and of Hispanic origin, 6) Caucasian/White and not of Hispanic origin, 7) Caucasian/White and of Hispanic origin, 8) Hispanic/Latino origin, 9) Other, and 10) Prefer Not to Answer.

The Pharmacological and Social Alcohol Expectancy Scale for Adolescents (PSAES-A)

The PSAES-A emerged from items from the PSAES (McMurray, 2013), which had been tailored for adolescents before being incorporated into the Hillsborough County program. Multiple investigators reviewed candidate items, and those items that could be adapted for use with or were appropriate for adolescents were retained. Items that contained colloquialisms (i.e., “slang terms”) or mentioned activities likely to be unfamiliar to contemporary adolescents were avoided. The instrument contained 17 items designed to assess both pharmacological and social alcohol expectancies. Ten items were intended to assess the participants’ anticipated rewarding pharmacological effects from alcohol consumption, and 7 items were intended to assess the participants’ anticipated rewarding social effects resulting from alcohol use. A complete list of PSAES-A items can be found in Appendix B along with participant instructions. Items were presented in the same order to each respondent. Participants were asked to respond to the set of items in the way that best describes them. Each item began with the stem, “When a person drinks alcohol...” and ended with an anticipated effect of alcohol (e.g., “he/she feels energized”, “he/she fits in better with a group he/she likes”, etc.). Responses were indicated on a five-point Likert scale labeled, “strongly disagree”, “disagree”, “neither disagree nor agree”, “agree”, and “strongly agree.” Participants’ pharmacological expectancy scores were determined by calculating the mean of the responses for all items that load onto the pharmacological expectancies factor. Participants’ social expectancy scores were determined by calculating the mean of the responses for all items that load onto the social expectancies factor.

Alcohol Experiences Form (AEF)

This form assessed drinking behavior and experience, including typical patterns of alcohol use (e.g., quantity, frequency, and frequency of binge drinking) and history of drinking (e.g, age of first use).

Brief Sensation Seeking Scale – Eight-Item Version (BSSS-8)

The BSSS-8 is an 8-item self-report measure of sensation seeking that retains Zuckerman’s conceptualization of sensation seeking (Zuckerman, 1979) as being comprised of four components – thrill and adventure seeking, experience seeking, disinhibition, and boredom susceptibility, but with the added benefit of brevity. Sensation seeking was originally assessed in HOPE students in order to use aggregated data during course instruction about risk factors for alcohol use and abuse. The measure includes two items for each of the aforementioned components. The BSSS-8 demonstrates solid psychometric characteristics that are robust across sex, age, and ethnic categories (Hoyle et al., 2002). Extensive psychometric analyses of the BSSS-8 indicate that the internal consistency of the scale is sufficient to conclude that items are good indicators of the sensation seeking construct and that the measure is both a reliable and valid predictor of variables in the nomological network of adolescent substance use (Hoyle et al., 2002). Consequently, the BSSS-8 is considered a valid measure of sensation seeking for adolescents and young adults and appropriate for use in the study.

Procedure

Measure Development

Most items comprising the original Pharmacological and Social Alcohol Expectancy Scale (PSAES; McMurray, 2013) were derived from alcohol expectancy, alcohol motives, and reasons for drinking questionnaires, including the Alcohol Expectancy Questionnaire (Brown,

Christiansen, & Goldman, 1987), the Alcohol Expectancy Multi-Axial Assessment (AEMax; Goldman & Darkes, 2004), the Alcohol Outcome Expectancy Questionnaire (Leigh & Stacy, 1993), the Comprehensive Effects of Alcohol Questionnaire (Fromme, Stroot, & Kaplan, 1993), the Drinking Motive Questionnaire – Revised (DMQ-R; Cooper, 1994), and the Reasons for Drinking Scale (RDS; Carpenter & Hasin, 1998). Additional pharmacological items were generated for the original PSAES due to the relative lack of rewarding pharmacological expectancy items in existing expectancy, motives, and reasons for drinking measures. These additional pharmacological items were generated using the criteria of whether or not one could feel the effects in the absence of others, as well as some of the words or phrases used to describe the pharmacological effects of alcohol consumption in the animal literature. Items were modified to ensure similar formatting.

The process of developing items for the PSAES included literature review, focus groups, and individual cognitive interviews. Among the qualitative methods, cognitive interviewing allowed direct input from respondents regarding item content, format, and understandability. This method has emerged as an essential component in the development of a number of standardized measures. The cognitive interviewing methodology for the adolescent version of the PSAES (PSAES-A) was designed to elicit input from respondents on all items under consideration for the PSAES-A item bank. The adolescent cognitive interviewing methodology followed the general principles of the document “Cognitive Interviewing and Questionnaire Design: A Training Manual” (Willis, 1994), with the necessary adaptations required for children as young as 13 years of age, relying in part on the cognitive methodology utilized in the development of the original PSAES. The cognitive interviewing methodology was designed to assess the cognitive processes underlying respondents’ comprehension and generation of answers

to survey items. The goal of cognitive interviewing is to elucidate what the respondent thinks or comprehends a particular item is asking (e.g., what specific words and phrases in the item stem might mean to the respondent). Cognitive interviews were conducted with high school-aged adolescents to gain feedback on PSAES-A instructions and items.

Original Data Collection

Part of the curriculum for the HOPE course included a variety of assessments that had been built into the course so that the instructors could evaluate progress and provide interventions based on the data collected. Data used in the current study were originally collected for the purposes of this course-related assessment. The current data had been collected at the end of the first semester of the HOPE course (November 2014) before the unit about drugs and alcohol.

Participants completed the surveys during regularly scheduled class time via pencil and paper questionnaires. Surveys embedded into the course curriculum were typically administered months prior to the delivery of the curriculum to students so that aggregate data could be used in course instruction. Participants had completed the measures in the following order: the PSAES-A, the BSSS, the AEF, and the background/demographics form. No researchers attached to our laboratory were present during the administration of the assessments, as these data had been collected as part of normal classroom activities. The district did request, however, that this research analyze portions of the data that had been collected so that the aggregate-level results could be used in delivery of course curriculum in the course the following year. The researcher collected packets of surveys from the county's Supervisor of Physical Education. The surveys were provided to the researcher in an aggregate format. Following data analysis, this researcher

provided data to instructors in an aggregate (i.e., anonymous) format so that the information could eventually be used for instructional purposes.

Results

Specific Aim 1: Confirming the PSAES-A Factor Structure

Data obtained from the Hillsborough County program were subjected to statistical analysis to refine the included items into an instrument that could be used in the future for more widespread research purposes. Confirmatory Factor Analysis (CFA) was used to evaluate whether the proposed two-factor measurement model (Pharmacological and Social) of the PSAES-A produced adequate fit. CFA was used as the analysis method because the scales on the PSAES-A have a theoretical base established in prior work on its parent instrument, the PSAES (McMurray, 2013). See Figure C1 for a visual display of this measurement model. The data were first screened for univariate outliers and there were no out-of-range values. The CFA was performed using Mplus version 7.2 (Muthén & Muthén, 2012) because of the program's ability to handle characteristics of the data appropriately, such as the clustering of student respondents in various classrooms within different high schools, missing data, and ordinal variables.

The data had a naturally occurring hierarchical structure with three levels: children (level 1 units) were nested within classrooms (level 2 units), which were nested within schools (level 3 units). Failure to account for intra-cluster correlation at each level in statistical models for clustered data can result in faulty inferences (Goldstein, 2003). In the current study, the three levels of nesting (i.e., students, classroom, and school) were considered by computing standard errors and chi-square tests of model fit taking into account complex sampling features (i.e., clustering). Non-normality robust standard errors (e.g., Huber-White) using a sandwich

estimator were examined. Using this approach, observed dependent variables could be continuous, ordinal, nominal, or combinations of these types. A robust method for dealing with the clustering variables was appropriate for the current study because the specific aims did not indicate modeling the clustering; the clustering variable was a “nuisance” variable in this case. The weighted least squares means and variances adjusted (WLSMV) estimator was used because the variables of interest were ordinal (Likert scale data). Studies suggest that WLSMV, a robust weighted least squares approach, produces accurate estimates and standard errors under a variety of conditions (Flora & Curran, 2004).

Latent factor means were set to 0 and latent factor variances to 1 for model identification, such that all item intercepts, factor loadings, and residual variances were then estimated. A five-point Likert response scale was used for all 17 PSAES-A items. Weighted least squares means and variance adjusted (WLSMV) estimation was used to compensate for potential bias stemming from the categorical nature of the items. The first-order measurement model for the 17-item PSAES, consisting of two correlated factors, adequately fit the data from the sample, $\chi^2(118, N = 636) = 316.82, p < .001, CFI = .95, TLI = .94, RMSEA = .05$. However, upon further examination, one of the measuring items did not have an acceptable factor loading for the latent construct of pharmacological expectancies (i.e., the factor loading for that item was too low), indicating that unidimensionality of this construct was not achieved in the first-order measurement model.

The item with the unacceptable low factor loading was removed (see Table C2 for factor loadings from the standardized solution for the first order measurement model) and a new measurement model was run without this item (i.e., model respecification). This one item was removed from the pharmacological subscale of the original PSAES-A, and the items from the

social scale remained intact. See Table C3 for a list of the items that remained following the above item analysis and reduction.

When this item was removed, the CFA on the remaining 16 items resulted in a slight improvement in the values of all fit indices, $\chi^2 (103, N = 636) = 299.88, p < .001, CFI = .95, TLI = .94, RMSEA = .05$. That is, the modification resulted in good model fit for the sample data with regard to the proposed two-dimensional model of the PSAES-A. Based on the good fit indices resulting from model respecification, the remaining 16 items appeared to measure two separate but related constructs, as originally hypothesized. Further examination of local fit via normalized residual covariances and modification indices yielded no interpretable remaining relationships, and consequently this two-factor model was retained.

Table C4 provides the estimates and their standard errors for the item factor loadings from the standardized solution. All factor loadings were high and statistically significant. There were similar factor loadings among items loading on any one factor, indicating unidimensionality of the respective constructs. As shown in Table C4, standardized loadings for the pharmacological factor items ranged from .39 to .68 (with R^2 values for the amount of item variance accounted for by the factor ranging from .15 to .47), and standardized loadings for the social factor ranged from .59 to .74 (with R^2 values ranging from .35 to .54). The correlation coefficient between the pharmacological and social factors was .80. See Figure C2 for a visual display of this respecified model with factor loadings and the correlation between the two factors. The adequate fit of the respecified model provided justification for the theoretical model of the PSAES-A, indicating that the items represent two distinguishable domains: social expectancies and pharmacological expectancies.

Specific Aim 2: Relationship between Drinker Level and Social Expectancies

To test the hypothesis that there would be a positive, linear relationship between drinker level and social expectancies, a linear regression was conducted with social expectancies as the independent variable and drinker level as the dependent variable. Drinker level was measured by quantity of alcoholic beverages consumed per typical drinking occasion and treated as a continuous variable. Linear regression analysis revealed a significant effect of social expectancies on drinker level, $R^2 = .05$, $F(1, 597) = 28.87$, $p < .001$, indicating that social expectancies were positively associated with drinking behavior. See Table C5 for a summary of these regression results. These results replicated past research that had demonstrated an association between social expectancies and alcohol consumption and provided additional evidence for the validity of the social expectancies subscale of the PSAES-A.

Specific Aim 3: Relationship between Drinker Level and Pharmacological Expectancies

To test the hypothesis that there would be a positive, linear relationship between drinker level and pharmacological expectancies, a linear regression was conducted with pharmacological expectancies as the independent variable and drinker level as the dependent variable. Drinker level was measured by quantity of alcoholic beverages consumed per typical drinking occasion and treated as a continuous variable. The linear regression analysis revealed a significant effect of pharmacological expectancies on drinker level, $R^2 = .05$, $F(1, 588) = 33.50$, $p < .001$, indicating that pharmacological expectancies were positively associated with drinking behavior. See Table C6 for a summary of these regression results. These results add to previous alcohol expectancy research by demonstrating that pharmacological expectancies, which have not been explicitly measured in adolescents in any existing alcohol expectancy instrument to date, are

positively associated with alcohol consumption. These results provide additional evidence for the validity of the pharmacological expectancies subscale of the PSAES-A.

Incremental Validity of the Pharmacological Expectancy Subscale

A hierarchical multiple regression analysis was performed to examine the unique contribution of pharmacological expectancies in the explanation of drinking behavior. The variables that explain drinking behavior were entered in two steps. In step 1, quantity of drinks consumed per typical occasion was the dependent variable and the social expectancies subscale was the independent variable. In step 2, the pharmacological expectancies subscale was entered into the step 1 equation. It should be noted that the steps were entered in this order to establish the incremental validity of the pharmacological expectancies scale since there was no pre-existing pharmacological expectancies scale in the research literature. When the steps were reversed, however, the results were comparable. Results of the variance inflation factor (less than 2.0) and the collinearity tolerance (greater than .5) suggest that the estimated β s are well established in the following regression model.

The results of step 1 indicated that the variance accounted for (R^2) with the first variable (the social expectancies subscale) equaled .05 (adjusted $R^2 = .05$), which was significantly different from zero, $F(1, 575) = 29.00, p < .001$. In step 2, the pharmacological expectancies subscale of the PSAES-A was entered into the regression equation. The change in variance accounted for (ΔR^2) was equal to .01, which was significantly different from zero, $F(1, 574) = 6.02, p < .05$. The unstandardized regression coefficients (B) and associated standard errors, as well as the standardized regression coefficients (β) for the full model are reported in Table C7. These results provided additional evidence for the validity of the pharmacological expectancies subscale of the PSAES-A by demonstrating that the pharmacological expectancies subscale

provided incremental validity in the prediction of drinking behavior in this sample of adolescents. When social expectancies were entered first in this model the results were comparable, as social expectancies also offered incremental validity in the prediction of drinking behavior over pharmacological expectancies.

Specific Aim 4: Relationships between Expectancies and other Drinking Variables

Multiple linear regression analysis was used to test the hypothesis that pharmacological and social expectancies would differentially predict drinking behavior (i.e., quantity, frequency, frequency of getting drunk, frequency of going out with intention to get drunk, frequency of drinking more than intended, most recent alcohol use, and rate/speed of drinking alcohol). Before the following multiple regression analyses were performed, the independent variables were examined for collinearity. Examination of the variance inflation factor statistics (all less than 1.8) and collinearity tolerance (all greater than .58) suggested that the estimated β s are well established in the following regression model.

A two-predictor model with pharmacological and social expectancies as predictors was able to account for 4.0% of the variance in frequency of alcohol use, $R^2 = .04$, $F(2, 577) = 10.55$, $p < .01$. Basic descriptive statistics and regression coefficients are shown in Table C8. When individual beta weights were examined, only social expectancies had a significant positive regression weight, indicating that individuals with more social expectancies drink more frequently. Pharmacological expectancies were not a significant contributor to the multiple regression model, indicating that social expectancies are more associated with frequency of alcohol use than pharmacological expectancies.

A two-predictor model with pharmacological and social expectancies as predictors accounted for 6.0% of the variance in frequency of getting drunk, $R^2 = .06$, $F(2, 580) = 18.29$, p

< .01. Basic descriptive statistics and regression coefficients are shown in Table C9. When individual beta weights were examined, only social expectancies had a significant positive regression weight, indicating that individuals with more social expectancies got drunk more frequently. Pharmacological expectancies were not a significant contributor to the multiple regression model, indicating that social expectancies were more associated with frequency of getting drunk than pharmacological expectancies.

A two-predictor model with pharmacological and social expectancies as predictors accounted for 7.0% of the variance in frequency of going out with the intention to get drunk, $R^2 = .07$, $F(2, 580) = 21.42$, $p < .01$. Basic descriptive statistics and regression coefficients are shown in Table C10. When individual beta weights were examined, only social expectancies had a significant positive regression weight, indicating that individuals with more social expectancies go out with the intention to get drunk more frequently. Pharmacological expectancies were not a significant contributor to the multiple regression model, indicating that social expectancies were more associated with frequency of going out with the intention to get drunk than pharmacological expectancies.

A two-predictor model with pharmacological and social expectancies as predictors accounted for 5.4% of the variance in frequency of drinking more than intended, $R^2 = .05$, $F(2, 581) = 16.39$, $p < .01$. Basic descriptive statistics and regression coefficients are shown in Table C11. When individual beta weights were examined, only social expectancies had a significant positive regression weight, indicating that individuals higher in social expectancies drank more than they intended than those lower in social expectancies. Pharmacological expectancies were not a significant contributor to the multiple regression model, indicating that social expectancies were more associated with drinking more than intended than pharmacological expectancies.

A two-predictor model with pharmacological and social expectancies as predictors accounted for 3.4% of the variance in most recent alcohol use, $R^2 = .03$, $F(2, 543) = 9.52$, $p < .01$. Basic descriptive statistics and regression coefficients are shown in Table C12. When individual beta weights were examined, only pharmacological expectancies had a significant positive regression weight, indicating that individuals with more pharmacological expectancies drank alcohol most recently. Social expectancies were not a significant contributor to the multiple regression model, indicating that pharmacological expectancies were more associated with most recent alcohol use than social expectancies.

Finally, a two-predictor model with pharmacological and social expectancies as predictors accounted for 9.2% of the variance in rate or speed of alcohol consumption, $R^2 = .09$, $F(2, 579) = 29.31$, $p < .01$. Basic descriptive statistics and regression coefficients are shown in A13. When individual beta weights were examined, both social and pharmacological expectancies had significant positive regression weights, indicating that individuals higher in social and pharmacological expectancies drank alcohol more quickly.

Overall, both pharmacological and social alcohol expectancies were significant predictors of quantity of drinks consumed on a typical occasion and the rate or speed of drinking alcohol. Only social expectancies appeared to be a significant predictor of frequency of drinking alcohol, frequency of getting drunk, frequency of going out with the intention to get drunk, and frequency of drinking more than intended. Only pharmacological expectancies appeared to be a significant predictor of most recent alcohol use. These results indicated that pharmacological and social expectancies are differentially related to drinking patterns, and these expectancy patterns may differentially reflect the acquisition of potentially problematic drinking behaviors.

Specific Aim 5: Relationship between Initiation Status and Social Expectancies

To test the hypothesis that adolescents who have already initiated drinking would endorse more social expectancies than those who have not yet initiated, a *t*-test was conducted to compare social expectancies in initiated and non-initiated adolescents. There was a significant difference in social expectancy scores for initiated ($M = 19.31$, $SD = 4.98$) and non-initiated ($M = 17.33$, $SD = 5.08$) adolescents, $t(573)$, -4.71 , $p < .001$. These results indicated that adolescents in this sample who had initiated alcohol use endorsed significantly more social expectancies than those who had not initiated alcohol use.

Specific Aim 6: Relationship between Initiation Status and Pharmacological Expectancies

To test the hypothesis that adolescents who had already initiated drinking would endorse more pharmacological expectancies than those who had not yet initiated, a *t*-test was conducted to compare pharmacological expectancies in initiated and non-initiated adolescents. There was a significant difference in the pharmacological expectancy scores for initiated ($M = 27.75$, $SD = 5.57$) and non-initiated ($M = 25.41$, $SD = 5.83$) adolescents, $t(565)$, -4.89 , $p < .001$. A summary of these regression results is available in Table C13. These results indicated that adolescents in this sample who had initiated alcohol use endorsed significantly more pharmacological expectancies than those who had not initiated alcohol use.

Specific Aim 7: Relationship between Social Expectancies and Sensation Seeking

To test the hypothesis that there would be a positive, linear relationship between social expectancies and sensation seeking, a linear regression was conducted with sensation seeking as the independent variable and social expectancies as the dependent variable. Linear regression analysis revealed a significant effect of sensation seeking on social expectancies, $R^2 = .12$, $F(1, 595) = 77.61$, $p < .001$, indicating that sensation seeking was positively associated with social

expectancies. See Table C14 for a summary of these regression results. These results replicated past research demonstrating an association between sensation seeking and social expectancies and provided additional evidence for the validity of the social expectancies subscale of the PSAES-A.

Specific Aim 8: Relationship between Pharmacological Expectancies and Sensation Seeking

To test the hypothesis that there would be a positive, linear relationship between sensation seeking and pharmacological expectancies, a linear regression was conducted with sensation seeking as the independent variable and social expectancies as the dependent variable. The linear regression analysis revealed a significant effect of sensation seeking on pharmacological expectancies, $R^2 = .10$. $F(1, 587) = 66.99$, $p < .001$, indicating that sensation seeking was positively associated with pharmacological expectancies. See Table C15 for a summary of these regression results.

Discussion

Building upon a previous PSAES development and validation study (McMurray, 2013), the primary purpose of the current study was to examine whether the PSAES-A provided a valid measure of pharmacological and social alcohol expectancies in adolescents. The measure was then used to 1) assess patterns of alcohol expectancies and drinking behaviors in adolescents and 2) investigate whether risk (e.g., sensation seeking personality) was differentially associated with pharmacological and social expectancies in adolescents.

Results supported the hypothesis that the items comprising the Pharmacological and Social Alcohol Expectancy Scale for Adolescents (PSAES-A) would adequately fit the proposed two-dimensional factor structure. These findings provide justification for the model categorizing these items into social and pharmacological alcohol expectancies. The pharmacological factor is the most noteworthy structural component of the PSAES-A. Although various alcohol expectancy instruments have demonstrated effectiveness in measuring positive social alcohol expectancies in adolescents, no other measure of alcohol expectancies to date has explicitly measured positive pharmacological expectancies in adolescents. A comprehensive inventory of rewarding alcohol expectancies should include both expectations regarding individuals' enhanced social effectiveness and increased social status (i.e., social expectancies) as well as expectations of direct chemical effects (i.e., pharmacological expectancies).

Results of the current study suggested that social and pharmacological alcohol expectancies were differentially associated with various drinking behaviors in adolescents. Both

social and pharmacological expectancies were positively associated with quantity of drinks consumed per typical occasion. Adolescents who endorsed more social or pharmacological expectancies reported drinking more per typical occasion, on average. These results replicated previous expectancy research that positive social expectancies are associated with increased alcohol consumption in adolescents. In addition, the results of the current study suggested that pharmacological expectancies provided incremental validity in the prediction of drinking behavior, offering further evidence for the validity of the pharmacological expectancies subscale of the PSAES-A. It should be noted that when social expectancies were entered first in this model the results were comparable in that social expectancies offered incremental validity in the prediction of drinking behavior over pharmacological expectancies. Therefore both social and pharmacological expectancies contributed unique variance in the prediction of quantity of drinks consumed per typical occasion in this sample.

Only social expectancies, however, emerged as a significant predictor of all of the frequency variables in this study (e.g., frequency of drinking alcohol, frequency of getting drunk, frequency of going out with the intention to get drunk, and frequency of drinking more than intended). Pharmacological expectancies were not a significant predictor of frequency variables. One reason for this finding may be that alcohol experimentation and use typically occurs in a social context during adolescence. The most frequently reported settings for alcohol consumption by high school students are at a party with friends or a friend's home (Beck et al., 1991; Stewart & Power, 2002). In other words, adolescents at this age appear to drink primarily for social reasons (Kuntsche et al., 2005). Nonetheless, if a youth is consuming alcohol on a certain occasion to obtain specific desired effects, pharmacological expectancies appear to be an important predictor of the amount consumed. In the present study, restricted access to alcohol

for underage youth may have limited number of occasions on which an adolescent could drink, even if he or she had very positive pharmacological expectations about drinking.

In addition, only pharmacological expectancies were significantly associated with the most recent alcohol use in this sample. One explanation for this finding may be that pharmacological expectancies increase in an ascending trajectory as adolescents gain more experience with alcohol. Because the current study was cross-sectional, pharmacological expectancies' positive association with most recent use may serve as a proxy for what might be a longitudinal process outside of the methodological scope of the design of this study.

Finally, both social and pharmacological expectancies were significantly associated with the rate or speed of drinking alcohol in the current study. Adolescents may drink quickly in an attempt to “keep up” when drinking with peers in social environments (which, as stated previously, is the context in which most drinking occurs in this developmental time frame). But given that pharmacological expectancies were also significantly associated with drinking rate in this study, it appears that adolescents may also be motivated to dose themselves with alcohol quickly in order to experience the rewarding psychopharmacological effects of alcohol impacting brain neurophysiology (which they conceivably believe will, in turn, facilitate social interactions).

One important question in the current study was whether adolescents who have initiated drinking, and have therefore experienced firsthand some of the pharmacological effects of alcohol use, endorsed more pharmacological expectancies than their non-drinking peers. Indeed, adolescents in this sample who had initiated alcohol use endorsed significantly more social and pharmacological expectancies than those who had not initiated alcohol use. This finding is particularly significant given that prior research has demonstrated that alcohol expectancy

formation precedes alcohol use and predicts drinking initiation. If expectancies are potentially malleable (Del Boca & Darkes, 2001), understanding which variables most contribute to increased reward value of alcohol may lead to enhanced prevention and intervention strategies.

Finally, the current study posited that sensation seeking (used as a proxy for risk for AUD in this study), would predict higher endorsement of pharmacological expectancies. Furthermore, a secondary aim that was exploratory in nature predicted that sensation seeking would be more predictive of pharmacological expectancies than social expectancies. The results partly supported these stated hypotheses as they were measured in the present study in that sensation seeking emerged as a significant predictor of both social and pharmacological expectancies, indicating that pharmacological and social expectancies may not be differentially associated with sensation seeking during this developmental time frame. Individuals who score high on sensation seeking may be looking for physical sensation and excitement, which is pharmacological in nature. Because sensation seeking personality has demonstrated effectiveness at defining adolescents at risk for future drinking problems, it was expected that adolescents high in sensation seeking would endorse high levels of pharmacological alcohol expectancies, even though their actual drinking behavior may reflect limited drinking experience.

Consistent with previous studies, adolescents in this study who scored higher on a measure of sensation seeking reported more social alcohol expectancies than adolescents who scored lower in sensation seeking (Darkes, Greenbaum, & Goldman, 2004; Urbán, Kökönyei, & Demetrovics, 2008). Expanding on prior research, adolescents who scored higher on a measure of sensation seeking reported more pharmacological expectancies of alcohol consumption than individuals who scored lower in sensation seeking. These results add to previous alcohol expectancy research by demonstrating that sensation seeking is positively associated with

pharmacological expectancies, which have not been explicitly measured in adolescents in any existing alcohol expectancy instrument to date. These results also provide additional evidence for the validity of the pharmacological expectancies subscale of the PSAES-A.

Limitations and Directions for Future Research

Although the current study exhibits various strengths, several methodological limitations should be considered when interpreting the results. The current study utilized self-report data to develop and validate the proposed PSAES-A factor structure. Despite robust evidence supporting the use of self-report measures (Del Boca & Noll, 2000), the measures administered in the current study may have been limited by participants' willingness to respond honestly. Furthermore, the current study employed a cross-sectional design. Adolescence represents a dynamic stage in human development and is marked by multiple transitions in various domains. A prospective longitudinal design would likely offer a more complete picture of the diverse biological, psychological, and social transitions that interface to influence alcohol expectancies and alcohol-related behaviors during this period of rapid change. Future research should attempt to examine all outcomes of interest in the current study over time using a longitudinal design in order to establish temporal precedence. For instance, subsequent studies could investigate whether endorsing more pharmacological than social alcohol expectancies in adolescence might result in an accelerated and problematic drinking trajectory.

This study was limited to analyzing those measures included in the questionnaires administered to students as part of the course curriculum for a high school health and physical education course. Thus, the current study did not examine other potential predictors of adolescent alcohol use, such as family history of AUD or peer drinking.

Another direction for future research involves investigating the mechanisms behind the positive association between sensation seeking personality and positive alcohol expectancies. Adolescents higher in sensation seeking endorsed more positive social and pharmacological alcohol expectancies in the current study than their less sensation seeking peers. Identifying the factors that lead sensation seekers to anticipate more positive effects from alcohol would be useful in identifying markers of risk for AUD. Sensation seekers may be more sensitive to alcohol's effects and therefore continued use may lead to great crystallization of their positive expectancies. Another possibility is that sensation seekers selectively utilize information about the consequences of alcohol consumption and are biased toward the positive messages from the media and from interactions with peers.

Alcohol expectancies differentially predicted quantity and frequency of drinking in this study, which suggests that different expectancy processes affect adolescent's decisions about how often they drink versus how much alcohol they consume on a given occasion. This finding is consistent with previous research in this area and indicates that prevention and intervention programs should consider the drinking behaviors they are trying to target during the program development phase. Interventions that attempt to reduce pharmacological alcohol expectancies, for instance, may be less effective in reducing the frequency of drinking than in reducing the quantity of alcohol consumed per typical occasion.

Conclusions

In summary, the current study utilized psychometric methodology to separate positive pharmacological alcohol expectancies from positive social alcohol expectancies in adolescents. Results supported the use of the PSAES-A with adolescents and suggest that assessment of adolescents' social and pharmacological alcohol expectancies may provide valuable information

for understanding alcohol-related behavior in this age group. Associations between expectancy patterns, drinking behavior, and sensation seeking (a risk variable related to the development of AUD) were examined to determine whether individuals who are already at elevated risk for AUD anticipate more pharmacological effects from alcohol. Results suggested that social and pharmacological expectancies are differentially associated with drinking behavior. While both pharmacological and social expectancies were associated with quantity of drinks consumed per typical occasion and rate or speed of alcohol consumption, only social expectancies emerged as a significant predictor of all frequency variables, and only pharmacological expectancies were significantly associated with most recent alcohol use. Sensation seeking was positively associated with both positive pharmacological and social alcohol expectancies. Subsequent research in the alcohol field should continue to work toward identifying specific patterns of alcohol expectancies in adolescence that indicate increased risk for alcohol use disorder so that prevention and treatment efforts may be advanced. The PSAES-A appears to provide a reliable measure of both social and pharmacological alcohol expectancies and it is hoped that this newly developed measure will contribute to future work in this direction.

References

- Baer, J. S. (2002). Student factors: Understanding individual variation in drinking. *Journal of Studies on Alcohol*, 14(Suppl.), 40-53.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions, and behavior. *Social Psychology Quarterly*, 55(2), 178-204.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191-215. doi:10.1037/0033-295X.84.2.191
- Bava, S., & Tapert, S. F. (2010). Adolescent brain development and the risk for alcohol and other drug problems. *Neuropsychology Review*, 20(4), 398-413.
- Beck, K. H., Summons, T. G., & Thombs, D. L. (1991). A factor analytic study of social context of drinking in a high school population. *Psychology of Addictive Behaviors*, 5(2), 66-77.
- Bekman, N. M., Goldman, M. S., Worley, M. J., & Anderson, K. G. (2011). Pre-adolescent alcohol expectancies: Critical shifts and associated maturational processes. *Experimental and Clinical Psychopharmacology*, 19(6), 420-432.
- Brodie, M. S., Pesold, C., & Appel, S. B. (1999). Ethanol directly excites dopaminergic ventral tegmental area reward neurons. *Alcoholism: Clinical and Experimental Research*, 23(11), 1848-1852.
- Brown, S. A., Christiansen, B. A., & Goldman, M. S. (1987). The Alcohol Expectancy Questionnaire: An instrument for the assessment of adolescent and adult alcohol expectancies. *Journal of Studies on Alcohol*, 48(5), 483-491.

- Brown, S. A., Goldman, M. S., Inn, A., & Anderson, L. R. (1980). Expectations of reinforcement from alcohol: Their domain and relation to drinking patterns. *Journal of Consulting and Clinical Psychology, 48*(4), 419-426.
- Brunelle, C., Assaad, J. M., Barrett, S. P., Ávila, C., Conrod, P. J., Tremblay, R. E., & Pihl, R. O. (2004). Heightened heart rate response to alcohol intoxication is associated with a reward-seeking personality profile. *Alcoholism: Clinical and Experimental Research, 28*(3), 394-401.
- Carpenter, K. M., & Hasin, D. S. (1998). Reasons for drinking alcohol: Relationships with DSM-IV alcohol diagnoses and alcohol consumption in a community sample. *Psychology of Addictive Behaviors, 12*(3), 168-184. doi:10.1037/0893-164X.12.3.168
- Cattell, R. B. (1978). *The scientific use of factor analysis*. New York: Plenum Press.
- Chambers, R. A., Taylor, J. R., & Potenza, M. N. (2003). Developmental neurocircuitry of motivation in adolescence: A critical period of addiction vulnerability. *American Journal of Psychiatry, 160*(6), 1041-1052.
- Christiansen, B. A., Smith, G. T., Roehling, P. V., & Goldman, M.S. (1989). Using alcohol expectancies to predict adolescent drinking behavior at one year. *Journal of Consulting and Clinical Psychology, 48*, 419-426.
- Cloninger, C. (1987). Neurogenetic adaptive mechanisms in alcoholism. *Science, 236*(4800), 410-416.
- Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis*. Hillsdale, NJ: Erlbaum.
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*(2), 117-128.

- 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*(5), 990-1005.
- Cooper, M. L., Russell, M., Skinner, J. Frone, M. R., & Mudar, P. (1992). Stress and alcohol use: Moderating effects of gender, coping, and alcohol expectancies. *Journal of Abnormal Psychology, 101*(1), 139-152.
- Crawford, A. M., Pentz, M. A., Chou, C. P., Li, C., & Dwyer, J. H. (2003). Parallel developmental trajectories of sensation seeking and regular substance use in adolescents. *Psychology of Addictive Behaviors, 17*(3), 179-192.
- Cullum, J., Armeli, S., & Tennen, H. (2010). Drinking norm-behavior association over time using retrospective and daily measures. *Journal of Studies on Alcohol and Drugs, 71*(5), 769-777.
- Cumsille, P. E., Sayer, A. G., & Graham, J. W. (2000). Perceived exposure to peer and adult drinking as predictors of growth in positive alcohol expectancies during adolescence. *Journal of Consulting and Clinical Psychology, 68*(3), 531-536.
- Dahl, R. E. (2004). Adolescent brain development: A period of vulnerabilities and opportunities. *Annals of the New York Academy of Sciences, 1021*(1), 1-22.
- Dahl, R. E., & Spear, L. P. (2004). Adolescent brain development: Vulnerabilities and opportunities (Vol. 1021). *New York: New York Academy of Sciences.*
- Darkes, J., & Goldman, M. S. (1993). Expectancy challenge and drinking reduction: experimental evidence for a mediational process. *Journal of Consulting and Clinical Psychology, 61*(2), 344-353.

- Darkes, J., & Goldman, M. S. (1998). Expectancy challenge and drinking reduction: Process and structure in the alcohol expectancy network. *Experimental and Clinical Psychopharmacology*, 6(1), 64-76.
- Darkes, J., Greenbaum, P. E., & Goldman, M. S. (1996). Positive/arousal and social facilitation alcohol expectancies and concurrent alcohol use. *Paper presented at the Annual Scientific Meeting of the Research Society on Alcoholism*, Washington DC, USA, 1996.
- Darkes, J., Greenbaum, P. E., & Goldman, M. S. (2004). Alcohol expectancy mediation of biopsychosocial risk: complex patterns of mediation. *Experimental and Clinical Psychopharmacology*, 12, 27-38.
- Del Boca, F. K., & Darkes, J. (2001). Is the glass half full or half empty? An evaluation of the status of expectancies as causal agents. *Addiction*, 96(11), 1670-1674.
- Depue, R. A., & Collins, P. F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences*, 22(3), 491-517.
- Diego, M. A., Field, T. M., Sanders, C. E. (2003). Academic performance, popularity, and depression predict adolescent substance use. *Adolescence*, 38(149), 35-42.
- Doremus-Fitzwater, T. L., Varlinskaya, E. I., & Spear, L. P. (2010). Motivational systems in adolescence: Possible implications for age differences in substance abuse and other risk-taking behaviors. *Brain and Cognition*, 72(1), 114-123.
- Dunn, M. E., & Goldman, M. S. (1996). Empirical modeling of an alcohol expectancy memory network in elementary school children as a function of grade. *Experimental and Clinical Psychopharmacology*, 4(2), 209-217.

- Dunn, M. E., & Goldman, M. S. (1998). Age and drinking-related differences in the memory organization of alcohol expectancies in 3rd-, 6th-, 9th-, and 12th-grade children. *Journal of Consulting and Clinical Psychology, 66*(3), 579-585.
- Dunn, M. E., & Goldman, M. S. (2000). Validation of multidimensional scaling-based modeling of alcohol expectancies in memory: Age and drinking-related differences in expectancies of children assessed as first associates. *Alcoholism: Clinical and Experimental Research, 24*(11), 1639-1646.
- Earleywine, M., & Finn, P. R. (1991). Sensation seeking explains the relation between behavioral disinhibition and alcohol consumption. *Addictive Behaviors, 16*(3), 123-128.
- Eaton, D. K., Kann, L., Kinchen, S., Shanklin, S., Flint, K. H., Hawkins, J., ... & Wechsler, H. (2012). Youth risk behavior surveillance-United States, 2011. *Morbidity and Mortality Weekly Report: Surveillance Summaries (Washington, DC: 2002), 61*(4), 1-162.
- Epstein, J. A., Griffin, K. W., & Botvin, G. J. (2008). A social influence model of alcohol use for inner-city adolescents: Family drinking, perceived drinking norms and perceived social benefits of drinking. *Journal Of Studies On Alcohol And Drugs, 69*(3), 397-405.
- Fazio, R. H., & Zanna, M. P. (1978). Attitudinal qualities relating to the strength of the attitude-behavior relationship. *Journal of Experimental Social Psychology, 14*(4), 398-408.
- Fernández-Vidal, J. M., & Molina, J. (2004). Socially mediated alcohol preferences in adolescent rats following interactions with an intoxicated peer. *Pharmacology, Biochemistry and Behavior, 79*(2), 229-241. doi:10.1016/j.pbb.2004.07.010
- Flora, D. B., & Curran, P. J. (2004). An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychological Methods, 9*(4), 466-491.

- Franken, I. H. (2002). Behavioral approach system (BAS) sensitivity predicts alcohol craving. *Personality and Individual Differences, 32*(2), 349-355.
- Friemel, C. M., Spanagel, R., & Schneider, M. (2010). Reward sensitivity for a palatable food reward peaks during pubertal developmental in rats. *Frontiers in Behavioral Neuroscience, 4*, 1-10.
- Fromme, K., Stroot, E., & Kaplan. (1993). Comprehensive effects of alcohol: Development and psychometric assessment of a new expectancy questionnaire. *Psychological Assessment, 5*(1), 19-26.
- Galef, B. G., Whiskin, E. E., & Bielavska, E. (1997). Interaction with demonstrator rats changes observer rats' affective responses to flavors. *Journal Of Comparative Psychology, 111*(4), 393-398. doi:10.1037/0735-7036.111.4.393
- Galvan, A. (2010). Adolescent development of the reward system. *Frontiers in Human Neuroscience, 4*, 115-124.
- Gatto, G. J., McBride, W. J., Murphy, J. M., Lumeng, L., Li, T. -K. (1994). Ethanol self-infusion into the ventral tegmental area by alcohol-preferring rats. *Alcohol, 11*(6), 557-564. doi: 10.1016/0741-8329(94)90083-3
- Goldman, M. S. (1999). Expectancy operation: cognitive and neural models and architectures. In I. Kirsch (ed.). *How expectancies shape experience*. Washington, DC: American Psychological Association.
- Goldman, M. S. (2002). Expectancy and risk for alcoholism: the unfortunate exploitation of a fundamental characteristic of neurobehavioral adaptation. *Alcoholism: Clinical and Experimental Research, 26*, 737-746.

- Goldman, M. S., & Darkes, J. (2004). Alcohol expectancy multi-axial assessment (A.E.Max): a memory network-based approach. *Psychological Assessment, 16*, 4–15.
- Goldman, M. S., Darkes, J., & Del Boca, F. K. (1999). Expectancy mediation of biopsychosocial risk for alcohol use and alcoholism. In I. Kirsch (ed.). *How expectancies shape experience*. Washington, DC: American Psychological Association.
- Goldman, M. S., Darkes, J., Reich, R. R., & Brandon, K. O. (2010). Anticipatory processing as a transdisciplinary bridge in addiction. In D. Ross, H. Kincaid, D. Suprrett, & P. Collins (Eds.), *What is addiction?* (pp. 291-334). Boston, MA: MIT Press.
- Goldman, M. S., Darkes, J., Reich, R. R., & Brandon, K. O. (2006). From DNA to conscious thought: The influence of anticipatory processes on human alcohol consumption. In M. Munafò (Ed.), *Cognition and addiction*. New York: Oxford University Press.
- Goldman, M. S., Reich, R. R., & Darkes, J. (2006). Expectancy as a unifying construct in alcohol-related cognition. In R.W. Wiers and A.W. Stacy (ed.), *Handbook of implicit cognition and addiction*, Thousand Oaks, CA: Sage, pp. 105–121.
- Goldstein, H. (2003). *Multilevel Statistical Methods* (3rd ed.) London: Edward Arnold.
- Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Grant, B. F., Dawson, D. A., Stinson, F. S., Chou, S. P., Dufour, M. C., & Pickering, R. P. (2004). The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991-1992 and 2001-2002. *Drug and Alcohol Dependence, 74*(3), 223-234.
- Guilford, J. P. (1954). *Psychometric methods* (2nd ed.). New York: McGraw-Hill.
- Guller, L., Zapolski, T. C., & Smith, G. T. (2015). Personality measured in elementary school predicts middle school addictive behavior involvement. *Journal of Psychopathology and Behavioral Assessment, 37*(3), 523-532.

- Gunn, R. L., & Smith, G. T. (2010). Risk factors for elementary school drinking: Pubertal status, personality, and alcohol expectancies concurrently predict fifth grade alcohol consumption. *Psychology of Addictive Behaviors, 24*(4), 617-627.
- Haber, S. N., & Knutson, B. (2009). The reward circuit: Linking primate anatomy and human imaging. *Neuropsychopharmacology, 35*(1), 4-26.
- Hahn, T., Dresler, T., Ehlis, A. C., Plichta, M. M., Heinz, S., Polak, T., ... & Fallgatter, A. J. (2009). Neural response to reward anticipation is modulated by Gray's impulsivity. *Neuroimage, 46*(4), 1148-1153.
- Hawkins, J., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin, 112*(1), 64-105. doi:10.1037/0033-2909.112.1.64
- Hingson, R., & Zha, W. (2009). Age of drinking onset, alcohol use disorders, frequent heavy drinking, and unintentionally injuring oneself and others after drinking. *Pediatrics, 123*(6), 1477-1484.
- Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Lorch, E. P., & Donohew, R. L. (2002). Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences, 32*(3), 401-414.
- Hutcheson, G., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Thousand Oaks, CA: Sage Publications.
- Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York, NY: Academic Press.

- Johnson, H. L., & Johnson, P. B. (1995). Children's alcohol-related cognitions: Positive versus negative alcohol effects. *Journal of Alcohol and Drug Education, 40*(2), 1-12.
- Johnston, L. D., O'Malley, P. M., & Bachman, J. G., & Schulenberg, J. E. (2012). *Monitoring the Future national results on adolescent drug use: Overview of key findings, 2011*. Ann Arbor: Institute for Social Research. The University of Michigan.
- Jones, B. T., Corbin, W., & Fromme, K. (2001). A review of expectancy theory and alcohol consumption. *Addiction, 96*(1), 57-72.
- Knight, J. R., Wechsler, H., Kuo, M., Seibring, M., Weitzman, E. R., & Schuckit, M. A. (2002). Alcohol abuse and dependence among US college students. *Journal of Studies on Alcohol and Drugs, 63*(3), 263-270.
- Koob, G. F., & Volkow, N. D. (2009). Neurocircuitry of addiction. *Neuropsychopharmacology, 35*(1), 217-238.
- Kramer, D. A., & Goldman, M. S. (2003). Using a modified Stroop task to implicitly discern the cognitive organization of alcohol expectancies. *Journal of Abnormal Psychology, 112*, 171-175.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2005). Why do young people drink? A review of drinking motives. *Clinical Psychology Review, 25*(7), 841-861.
- Leigh, B. C. (1989). In search of the seven dwarves: Issues of measurement and meaning in alcohol expectancy research. *Psychological Bulletin, 105*(3), 361-373.
- Leigh, B. C., & Stacy, A. W. (1993). Alcohol outcome expectancies: scale construction and predictive utility in higher order confirmatory models. *Psychological Assessment, 5*, 216-229.

- Maddox, G. L., & McCall, B. C. (1964). *Drinking among teenagers: A sociological interpretation of alcohol use by high-school students*. New Brunswick, NJ: Rutgers Center of Alcohol Studies.
- Maldonado, A. M., Finkbeiner, L. M., & Kirstein, C. L. (2008). Social interaction and partner familiarity differentially alter voluntary ethanol intake in adolescent male and female rats. *Alcohol*, 42(8), 641-648. doi:10.1016/j.alcohol.2008.08.003
- Martin, C. A., Kelly, T. H., Rayens, M. K., Brogli, B. R., Brenzel, A., Smith, W. J., & Omar, H. A. (2002). Sensation seeking, puberty, and nicotine, alcohol, and marijuana use in adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41(12), 1495-1502.
- Martino, S. C., Collins, R. L., Ellickson, P. L., Schell, T. L., & McCaffrey, D. (2006). Socio-environmental influences on adolescents' alcohol outcome expectancies: A prospective analysis. *Addiction*, 101(7), 971-983.
- Masten, A. S., Faden, V. B., Zucker, R. A., & Spear, L. P. (2008). Underage drinking: A developmental framework. *Pediatrics*, 121(S4), S235-S251. doi: 10.1542/peds.2007-2243A
- McCarthy, D. M., Kroll, L. S., & Smith, G. T. (2001). Integrating disinhibition and learning risk for alcohol use. *Experimental and Clinical Psychopharmacology*, 9(4), 389-398.
- McCutcheon, J. E., Conrad, K. L., Carr, S. B., Ford, K. A., McGehee, D. S., & Marinelli, M. (2012). Dopamine neurons in the ventral tegmental area fire faster in adolescent rats than in adults. *Journal of Neurophysiology*, 108(6), 1620-1630.

- McMurray, M. V. (2013). *Pharmacological versus social alcohol expectancies: Making an important distinction between the anticipated rewarding effects of alcohol* (Master's thesis). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 1535886).
- Miller, P. M., Smith, G. T., & Goldman, M. S. (1990). Emergence of alcohol expectancies in childhood: A possible critical period. *Journal of Studies on Alcohol and Drugs*, 51(4), 343-349.
- Muthén, L.K. and Muthén, B.O. (2012). *Mplus User's Guide* (Seventh Edition). Los Angeles, CA: Muthén & Muthén.
- Naneix, F., Marchand, A. R., Di Scala, G., Pape, J. R., & Coutureau, E. (2012). Parallel maturation of goal-directed behavior and dopaminergic systems during adolescence. *The Journal of Neuroscience*, 32(46), 16223-16232.
- Nixon, K., & McClain, J. A. (2010). Adolescence as a critical window for developing an alcohol use disorder: Current findings in neuroscience. *Current Opinion in Psychiatry*, 23(3), 227-232.
- Noll, R. B., Zucker, R. A., & Greenberg, G. S. (1990). Identification of alcohol by smell among preschoolers: Evidence for early socialization about drugs occurring in the home. *Child Development*, 61(5), 1520-1527.
- Oei, T. P., & Morawska, A. (2004). A cognitive model of binge drinking: The influence of alcohol expectancies and drinking refusal self-efficacy. *Addictive behaviors*, 29(1), 159-179.
- Park, C. L., & Levenson, M. R. (2002). Drinking to cope among college students: Prevalence, problems and coping processes. *Journal of Studies on Alcohol*, 63(4), 486-497.

- Patrick, M. E., Wray-Lake, L., Finlay, A. K., & Maggs, J. L. (2010). The long arm of expectancies: Adolescent alcohol expectancies predict adult alcohol use. *Alcohol and Alcoholism, 45*(1), 17-24.
- Redish, A. D., Jensen, S., & Johnson, A. (2008). A unified framework for addiction: Vulnerabilities in the decision process. *Behavioral and Brain Sciences, 31*(4), 415-437. doi: 10.1017/S0140525X0800472X
- Reich, R. R., Below, M. C., & Goldman, M. S. (2010). Explicit and implicit measures of expectancy and related alcohol cognitions: a meta-analytic comparison. *Psychology of Addictive Behaviors, 24*(1), 13-25.
- Reich, R. R., Goldman, M. S., & Noll, J. A. (2004). Using the false memory paradigm to test two key elements of alcohol expectancy theory. *Experimental and Clinical Psychopharmacology, 12*, 102–110.
- Rodd-Henricks, Z. A., McKinzie, D. L., Crile, R. S., Murphy, J. M., McBride, W. J. (2000). Regional heterogeneity for the intracranial self-administration of ethanol within the ventral tegmental area of female Wistar rats. *Psychopharmacology, 149*(3), 217-224. doi: 10.1007/s002139900347
- Romer, D., & Hennessy, M. (2007). A biosocial-affect model of adolescent sensation seeking: The role of affect evaluation and peer-group influence in adolescent drug use. *Prevention Science, 8*(2), 89-101.
- Scott-Sheldon, L. A., Terry, D. L., Carey, K. B., Garey, L., & Carey, M. P. (2012). Efficacy of expectancy challenge interventions to reduce college student drinking: A meta-analytic review. *Psychology of Addictive Behaviors, 26*(3), 393-405.

- Sher, K. J., Grekin, E. R., & Williams, N. A. (2005). The development of alcohol use disorders. *Annual Review of Clinical Psychology, 1*, 493–523.
- Smith, G. T., Goldman, M. S., Greenbaum, P. E., & Christiansen, B. A. (1995). Expectancy for social facilitation from drinking: the divergent paths of high-expectancy and low-expectancy adolescents. *Journal of Abnormal Psychology, 104*(1), 32–40.
- Somerville, L. H., Jones, R. M., & Casey, B. J. (2010). A time of change: Behavioral and neural correlates of adolescent sensitivity to appetitive and aversive environmental cues. *Brain and Cognition, 72*(1), 124-133.
- Spear, L. P. (2000). The adolescent brain and age-related behavioral manifestations. *Neuroscience & Biobehavioral Reviews, 24*(4), 417-463.
- Spear, L. P. (2011). Rewards, aversions and affect in adolescence: Emerging convergences across laboratory animal and human data. *Developmental Cognitive Neuroscience, 1*(4), 390-403.
- Spear, L. P. (2015). Adolescent alcohol exposure: Are there separable vulnerable periods within adolescence? *Physiology & Behavior, 148*, 122-130.
- Stacy, A. W. (1997). Memory activation and expectancy as prospective predictors of alcohol and marijuana use. *Journal of Abnormal Psychology, 106*, 61–73.
- Stacy, A. W., Newcomb, M. D., & Bentler, P. M. (1991). Cognitive motivation and drug use: A 9-year longitudinal study. *Journal of Abnormal Psychology, 100*(4), 502-515.
- Steinberg, L. (2004). Risk taking in adolescence: What changes, and why? *Annals of the New York Academy of Sciences, 1021*(1), 51-58.
- Steinberg, L. (2007). Risk taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science, 16*(2), 55-59.

- Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review, 28*(1), 78-106.
- Steinberg, L. (2010). Commentary: A behavioral scientist looks at the science of adolescent brain development. *Brain and Cognition, 72*(1), 160-164.
- Stewart, C., & Power, T. G. (2002). Identifying patterns of adolescent drinking: A tri-ethnic study. *Journal of Studies on Alcohol, 63*(2), 156-168.
- Tabakoff, B., & Hoffman, P. L. (2000). Animal models in alcohol research. *Alcohol Research & Health, 24*(2), 77-84.
- Tarter, R. E., Kirisci, L., & Mezzich, A. (1997). Multivariate typology of adolescents with alcohol use disorder. *American Journal on Addictions, 6*(2), 150-158.
- Tolman, E. C. (1932). *Purposive behavior in animals and man*. New York, NY: Appleton-Century-Crofts.
- Wiers, R. W., Gunning, W. B., & Sergeant, J. A. (1998). Do young children of alcoholics hold more positive or negative alcohol-related expectancies than controls? *Alcoholism: Clinical and Experimental Research, 22*(8), 1855-1863.
- Willis, G. B. (1994). *Cognitive interviewing and questionnaire design: A training manual*. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.
- 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 expectancies. *Journal of Studies on Alcohol, 62*(1), 32-43.

- Yetnikoff, L., Reichard, R. A., Schwartz, Z. M., Parsely, K. P., & Zahm, D. S. (2014). Protracted maturation of forebrain afferent connections of the ventral tegmental area in the rat. *Journal of Comparative Neurology*, 522(5), 1031-1047.
- Zucker, R. A. (2006). Alcohol use and the alcohol use disorders: A developmental-biopsychosocial systems formulation covering the life course. In D. Cicchetti, D. J. Cohen, D. Cicchetti, D. J. Cohen (Eds.), *Developmental psychopathology, Vol 3: Risk, disorder, and adaptation (2nd ed.)* (pp. 620-656).
- Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. Hillsdale, NJ: L. Erlbaum Associates.
- Zuckerman, M., Kuhlman, D., Joireman, J., Teta, P., & Kraft, M. (1993). A comparison of three structural models for personality: The Big Three, the Big Five, and the Alternative Five. *Journal of Personality and Social Psychology*, 65(4), 757-768. doi:10.1037/0022-3514.65.4.757

Appendices

Appendix A: USF IRB Exempt Certification Approval Letter



RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

12/10/2014

Megan McMurray,
Psychology
4207 S. Dale Mabry Highway
#4101
Tampa, FL 33611

RE: Exempt Certification

IRB#: Pro00020286

Title: The Psychometric Evaluation and Validation of a Measure Assessing Pharmacological and Social Alcohol Expectancies in Adolescents

Approved items:

[IRB Protocol Megan McMurray Dissertation](#)

Dear Dr. McMurray:

On 12/9/2014, the Institutional Review Board (IRB) determined that your research meets USF requirements and Federal Exemption criteria as outlined in the federal regulations at 45CFR46.101(b):

(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Your study qualifies for a waiver of the requirements for the informed consent process as outlined in the federal regulations at 45CFR46.116 (d) which states that an IRB may approve a consent procedure which does not include, or which alters, some or all of the elements of informed consent, or waive the requirements to obtain informed consent provided the IRB finds and documents that (1) the research involves no more than minimal risk to the subjects; (2) the waiver or alteration will not adversely affect the rights and welfare of the subjects; (3) the research could not practicably be carried out without the waiver or alteration; and (4) whenever appropriate, the subjects will be provided with additional pertinent information after participation.

Appendix A Continued

Per CFR 45 Part 46, Subpart D, this research involving children was approved under the minimal risk category 45 CFR 46.404: Research not involving greater than minimal risk.

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF IRB policies and procedures. Please note that changes to this protocol may disqualify it from exempt status. Please note that you are responsible for notifying the IRB prior to implementing any changes to the currently approved protocol.

Per our recent change in policy, #303: "Once the determination of exemption is made, the application is closed in eIRB. Any proposed or anticipated changes to the study design that was previously declared exempt from IRB review must be submitted to the IRB as a new study prior to initiation of the change." (Please call if you have questions).

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,



John Schinka, Ph.D., Chairperson
USF Institutional Review Board

Appendix B: Sample Original PSAES-A

Instructions: The following items contain statements describing possible effects of alcohol. Read each statement and decide whether it is an accurate statement about what happens to most people when they drink alcohol. You will have five choices for each item: (1) Strongly Disagree, (2) Disagree, (3) Neither Disagree nor Agree, (4) Agree, (5) or Strongly Agree. When the statements refer to “drinking alcohol,” you may think in terms of any alcoholic beverage such as beer, wine, whiskey, liquor, vodka, rum, gin, shots, or various alcoholic mixed drinks. **Even if you have never actually tried alcohol, please answer based on how you think alcohol affects the typical or average drinker.** Be sure to try and answer every statement. Even if you are unsure of your answer, try to choose the *best* answer. There are no right or wrong answers.

Pharmacological Expectancy Items

1. When a person drinks alcohol, he/she feels more energized.
2. When a person drinks alcohol, he/she feels giddy.
3. When a person drinks alcohol, he/she feels drunk.
4. When a person drinks alcohol, he/she feels more relaxed.
5. When a person drinks alcohol, he/she gets a wonderful feeling.
6. When a person drinks alcohol, he/she is in a better mood.
7. When a person drinks alcohol, he/she feels warm and cozy.
8. When a person drinks alcohol, he/she feels more aroused/physiologically excited.
9. When a person drinks alcohol, he/she gets a more pleasurable experience.
10. When a person drinks alcohol, he/she feels blissful

Social Expectancy Items

1. When a person drinks alcohol, he/she looks cooler to others.
2. When a person drinks alcohol, he/she fits in better with a group he/she likes.
3. When a person drinks alcohol, others think he/she is more fun.
4. When a person drinks alcohol, others find him/her more attractive.
5. When a person drinks alcohol, others see him/her as more confident.
6. When a person drinks alcohol, others find him/her more interesting.
7. When a person drinks alcohol, others find him/her funnier.

Appendix C: Tables and Figures

Table C1

Self-Reported Sample Demographics

Variable	<i>n</i>	%
Gender		
Female	288	45.3
Male	346	54.6
Ethnicity/Race		
American Indian or Alaskan Native	14	2.3
Asian or Pacific Islander	12	2.0
Black, not of Hispanic Origin	130	21.3
Hispanic/Latino	201	32.9
White, not of Hispanic Origin	165	27.0
Other	49	8.0
Prefer not to answer	40	6.5
Drinker Status		
Initiated	292	49.2
Not Initiated	301	50.8

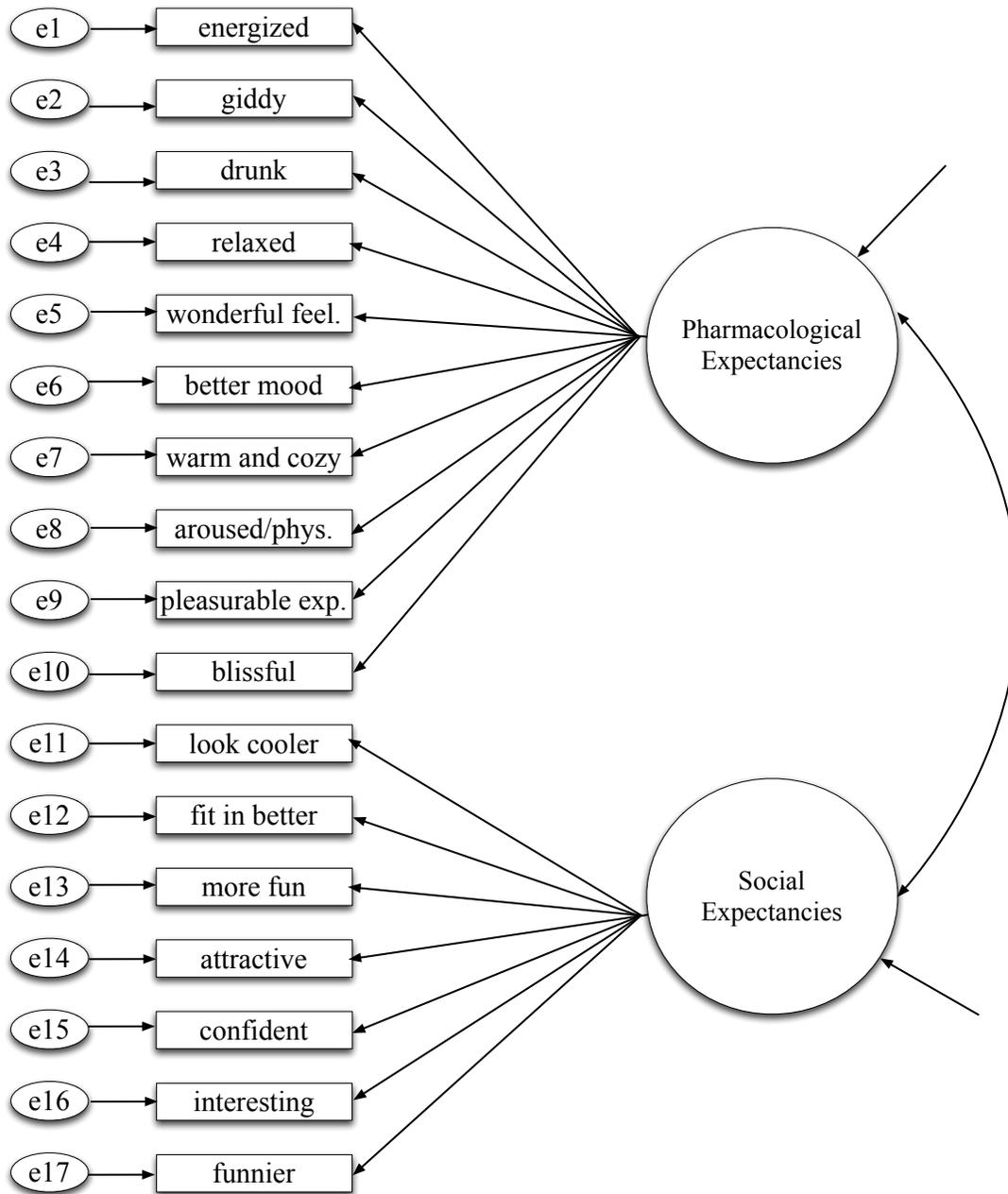


Figure C1. First-order measurement model of the original PSAES-A consisting of 17 items loading onto two correlated factors.

Table C2

Standardized Estimates and Their Standard Errors for the Item Factor Loadings from First-Order Confirmatory Factor Analysis of PSAES-A Items

Item	PE	SE
he/she feels more energized	.48(.03)	
he/she looks cooler to others		.63(.03)
he/she feels giddy	.39(.04)	
he/she fits in better with a group he/she likes		.59(.03)
he/she feels drunk	.09(.05)	
he/she feels more relaxed	.53(.03)	
he/she is more fun		.68(.02)
he/she gets a wonderful feeling	.68(.03)	
he/she is in a better mood	.66(.03)	
others find him/her more attractive		.62(.03)
he/she feels warm and cozy	.58(.02)	
others see him/her as more confident		.64(.02)
he/she feels more aroused/physiologically excited	.54(.03)	
others find him/her more interesting		.74(.02)
he/she gets a more pleasureable experience	.67(.03)	
he/she feels blissful		.62(.03)
others find him/her funnier	.68(.02)	

Note. PE = pharmacological expectancies; SE = social expectancies.

Table C3

List of Remaining 16 PSAES-A Items Following Model Respecification

Subscales	Items
Pharmacological Expectancies	he/she feels more energized
	he/she feels giddy
	he/she feels more relaxed
	he/she feels gets a wonderful feeling
	he/she is in a better mood
	he/she feels warm and cozy
	he/she feels more aroused/physiologically excited
	he/she gets a more pleasurable experience
	he/she feels blissful
Social Expectancies	he/she looks cooler to others
	he/she fits in better with a group he/she likes
	Others think he/she is more fun
	Others him/her more attractive
	Others see him/her more confident
	Others find him/her more interesting
	Others find him/her funnier

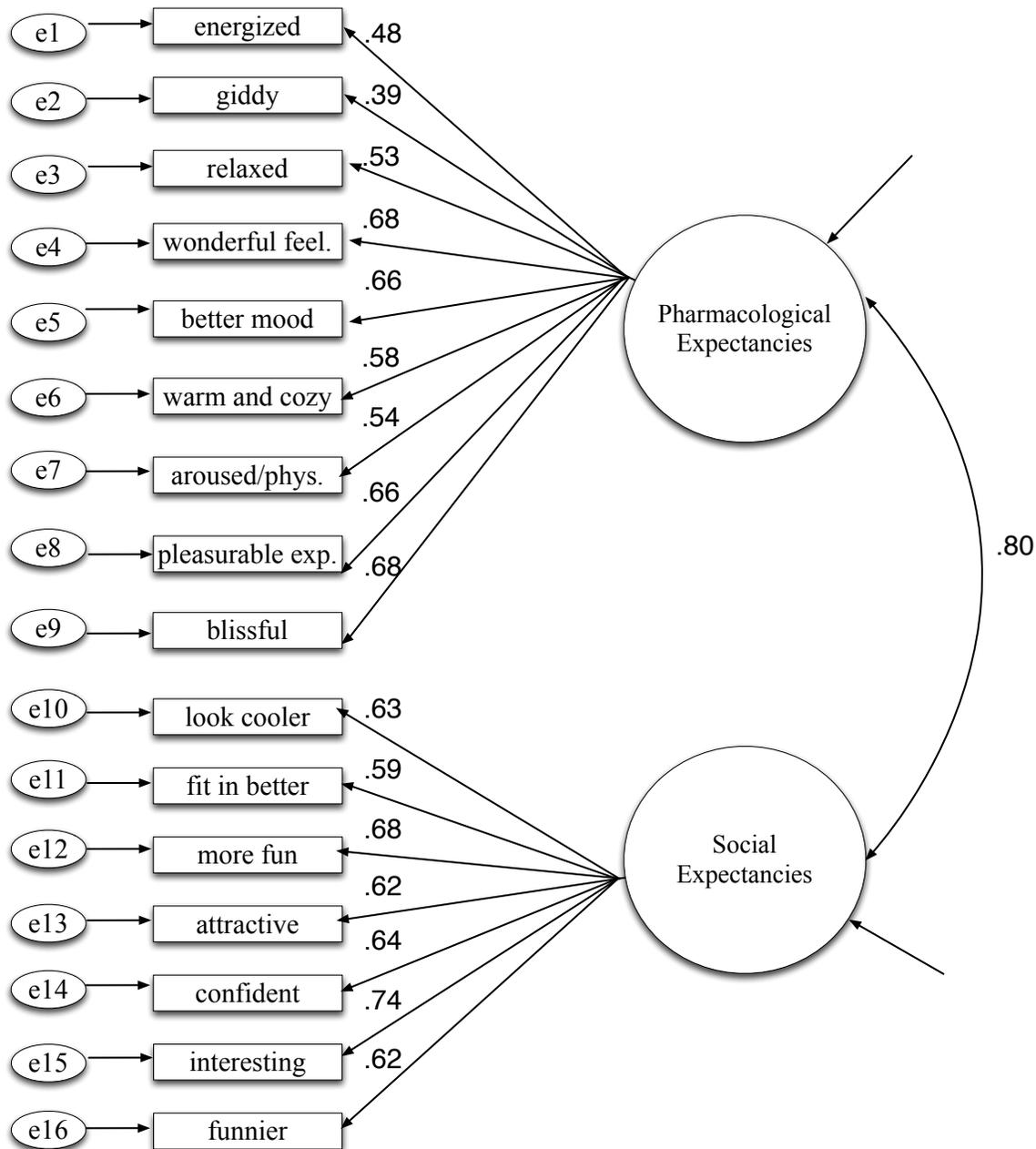


Figure C2. Respecified measurement model of the PSAES-A consisting of 16 items loading onto two correlated factors. Factor loadings and the factor correlation are provided.

Table C4

Standardized Estimates and Their Standard Errors for the Item Factor Loadings from Respecified Confirmatory Factor Analysis of PSAES-A Items

Item	PE	SE
he/she feels more energized	.48(.03)	
he/she looks cooler to others		.63(.03)
he/she feels giddy	.39(.04)	
he/she fits in better with a group he/she likes		.59(.03)
he/she feels more relaxed	.53(.03)	
he/she is more fun		.68(.02)
he/she gets a wonderful feeling	.68(.03)	
he/she is in a better mood	.66(.03)	
others find him/her more attractive		.62(.03)
he/she feels warm and cozy	.58(.02)	
others see him/her as more confident		.64(.02)
he/she feels more aroused/physiologically excited	.54(.03)	
others find him/her more interesting		.74(.02)
he/she gets a more pleasureable experience	.67(.03)	
he/she feels blissful		.62(.03)
others find him/her funnier	.68(.02)	

Note. PE = pharmacological expectancies; SE = social expectancies.

Table C5

Linear Regression Analysis of Social Expectancies and Drinker Level

Model	Unstandardized Coefficients		Standardized Coefficients	
	<i>B</i>	<i>SE (B)</i>	β	<i>t</i>
Constant regression	.61	.27		2.24*
Social Expectancies	.08**	.01	.22	5.37**
<i>F</i>	28.87**			
<i>R</i> ²	.05			
Adj. <i>R</i> ²	.05			

Note. ** $p < .01$. * $p < .05$.

Table C6

Linear Regression Analysis of Pharmacological Expectancies and Drinker Level

Model	Unstandardized Coefficients		Standardized Coefficients	
	<i>B</i>	<i>SE (B)</i>	β	<i>t</i>
Constant regression	.05	.35		.13
Pharmacological Expectancies	.08**	.01	.23	5.79**
<i>F</i>	33.50**			
<i>R</i> ²	.05			
Adj. <i>R</i> ²	.05			

Note. ** $p < .01$.

Table C7

Hierarchical linear regressions predicting number of drinks per typical occasion

<i>Step</i>	<i>Model 1</i>	<i>B</i>	<i>SE</i>	β	<i>R</i>	R^2	ΔR^2
1	Enter: PSAES-A SE factor				.22	.05	.05**
2	Enter: PSAES-A PE factor				.24	.06	.01*
	PSAES-A SE factor	.05**	.02	.14			
	PSAES-A PE factor	.04*	.02	.13			

Note. Beta weights are shown for all variables only at the final step of the hierarchical model. SE = Social Expectancies; PE = Pharmacological Expectancies
* $p < .05$. ** $p < .01$.

Table C8

Multiple Regression Analysis Predicting Frequency of Alcohol Consumption

Variable	<i>M</i>	<i>SD</i>	Correlation with Freq	Multiple Regression Weights	
				<i>b</i>	β
Freq	2.02	1.72			
SE	18.28	5.16	.18**	.04*	.13
PE	26.51	5.81	.16**	.02	.08
<i>R</i> ²					.04**
<i>F</i>					10.55**

Note. *N* = 580. PE = pharmacological expectancies. SE = social expectancies.
Freq = frequency of alcohol consumption.

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

Table C9

Multiple Regression Analysis Predicting Frequency of Getting Drunk

Variable	<i>M</i>	<i>SD</i>	Correlation with FreqD	Multiple Regression Weights	
				<i>b</i>	β
FreqD	1.77	1.72			
SE	18.28	5.16	.23**	.06**	.17
PE	26.52	5.80	.21**	.03	.10
<i>R</i> ²					.06**
<i>F</i>					18.29**

Note. *N* = 583. PE = pharmacological expectancies. SE = social expectancies.
FreqD = frequency of getting drunk.

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

Table C10

Multiple Regression Analysis Predicting Frequency of Going Out with the Intention to Get Drunk

Variable	<i>M</i>	<i>SD</i>	Correlation with FreqI	Multiple Regression Weights	
				<i>b</i>	β
FreqI	1.57	1.54			
SE	18.27	5.15	.25**	.06**	.19
PE	26.50	5.80	.22**	.03	.10
<i>R</i> ²					.07**
<i>F</i>					21.42**

Note. *N* = 583. PE = pharmacological expectancies. SE = social expectancies.

FreqI = frequency of going out with the intention to get drunk.

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

Table C11

Multiple Regression Analysis Predicting Frequency of Drinking More than Intended

Variable	<i>M</i>	<i>SD</i>	Correlation with FreqM	Multiple Regression Weights	
				<i>b</i>	β
FreqM	1.58	1.47			
SE	18.26	5.15	.22**	.05**	.18
PE	26.52	5.82	.19**	.02	.08
<i>R</i> ²					.05**
<i>F</i>					16.39**

Note. *N* = 582. PE = pharmacological expectancies. SE = social expectancies.

FreqM = frequency of drinking more than intended.

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

Table C12

Multiple Regression Analysis Predicting Most Recent Alcohol Use

Variable	<i>M</i>	<i>SD</i>	Correlation with RecAU	Multiple Regression Weights	
				<i>b</i>	β
RecAU	3.7	3.12			
SE	18.38	5.16	.16**	.04	.07
PE	26.61	5.82	.18**	.07*	.13
R^2					.03**
<i>F</i>					9.52**

Note. $N = 544$. PE = pharmacological expectancies. SE = social expectancies.
RecAU = most recent alcohol use.

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

Table C13

Multiple Regression Analysis Predicting Rate or Speed of Alcohol Consumption

Variable	<i>M</i>	<i>SD</i>	Correlation with RateAC	Multiple Regression	
				Weights	
				<i>b</i>	β
RateAC	1.59	0.89			
SE	18.25	5.15	.27**	.03**	.15
PE	26.47	5.80	.28**	.03**	.19
R^2					.09**
F					29.31**

Note. $N = 544$. PE = pharmacological expectancies. SE = social expectancies.
RateAC = rate or speed of alcohol consumption.

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

Table C14

Linear Regression Analysis of Sensation Seeking and Social Expectancies

Model	Unstandardized Coefficients		Standardized Coefficients	
	<i>B</i>	<i>SE (B)</i>	β	<i>t</i>
Constant regression	10.69	.88		12.14**
Social Expectancies	.29**	.03	.34	8.81**
<i>F</i>	77.61**			
<i>R</i> ²	.12			
Adj. <i>R</i> ²	.11			

Note. ***p* < .001.

Table C15

Linear Regression Analysis of Sensation Seeking and Pharmacological Expectancies

Model	Unstandardized Coefficients		Standardized Coefficients	
	<i>B</i>	<i>SE (B)</i>	β	<i>t</i>
Constant regression	18.49	1.00		18.44**
Pharmacological Expectancies	.31**	.04	.32	8.19**
<i>F</i>	66.99**			
<i>R</i> ²	.10			
Adj. <i>R</i> ²	.10			

Note. ** $p < .001$.