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Validity of the Addiction Prone Personality Scale

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VALIDITY OF THE ADDICTION PRONE PERSONALITY SCALE

By

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ABSTRACT
Young adults, age 18-30 years are in the highest risk group for developing substance use disorders (SUDs) and these disorders are associated with a myriad of negative consequences. Researchers in the field of psychology studying SUDs and personality variables have determined that specific personality traits tend to be associated with and affect the type and severity of SUD’s. There appear to be 2 clusters of substance abusers: those high in Psychoticism or “P” traits such as impulsivity, sensation-seeking, disinhibition, anti-social behaviors and those high in Neuroticism or “N” traits such as internalizing, depressive tendencies, negative views and anxiety.

The Addiction Prone Personality scale (APP) (Barnes et al., 2000) was developed as a measure of personality vulnerability to SUD’s. Given that the APP is a relatively new scale and that the research is limited, further research investigating the scale’s psychometric properties seems justified. The present study examined the construct validity of the APP with 5 sub-validity studies to examine internal consistency/reliability, factor validity, convergent validity, incremental validity, and criterion validity. This study employed a young adult population, ages 18-30, drawn from two samples: a college student sample and a clinical sample of DUI offenders referred for assessment and psycho-educational treatment.

Results were mixed in that the APP demonstrated strong internal consistency with the clinical group, but weak internal consistency for the student and combined groups. The factor analysis of the APP revealed three underlying subscales which measure constructs consistent with previous research. However, there was no underlying unidimensional scale. Therefore the total score is impossible to interpret. Further, while the APP had moderate convergent validity with the SASSI-3, there was no significant incremental or discriminant validity with these samples using the SASSI-3. Given the limited psychometric properties, the results suggest that the APP in its present form would not be appropriate for use with individuals in predicting addiction proneness. The results are discussed in terms of previous research and recommendations for future research into the construct of addiction proneness are offered.
CHAPTER 1
INTRODUCTION

Statement of the Problem

Substance use disorders (SUDs) are one of the most important contributors to preventable morbidity and mortality in America and among the most difficult public health challenges (Johnston, O’Malley & Bachman, 1994; McGinnis & Foege, 1993; Peele, 1993). Substance abuse and dependence have widespread effects on society including victims of homicide and violence, abuse, motor vehicle accidents and disruption of family life and careers (Zuckerman, 1999). The government spends billions of dollars annually attempting to contain the drug trade with limited success. A thorough understanding of the problem of substance abuse and dependence in terms of biological, social and psychological factors is needed in order to address the problem.

Of all age groups, underage drinkers (18-20 year olds) and young adults (21-30 year olds) consume the largest amount of alcohol and have the highest rates of heavy drinking (Foster et al., 2003; Naimi et al., 2003). College students are in an age group that has the highest rate of binge drinking and are at a higher risk for heavy episodic drinking than their peers who do not attend college (Johnston, O’Malley & Bachman, 1994). Binge drinking is associated with substantially higher risks of acute health problems such as serious injury, especially resulting from auto crashes; unplanned and unsafe sex, assault, aggressive behavior, and a spectrum of drinking related social and psychological problems (Wechsler & Isaac, 1992; Wechsler et al, 1994). Thus, binge drinking is arguably the number one public health hazard and the primary source of preventable morbidity and mortality for college students in the U.S. (Wechsler et al., 1995).

Risk factors associated with SUD’s include genetic, environmental/psychosocial and biochemical variables. The literature indicates that the relationship between such factors as demographic variables, familial characteristics, types of substance abuse and related personality factors are complex and intertwined. Typically, individuals with substance abuse/dependence disorders have secondary diagnoses or comorbid disorders, especially anxiety, depression and personality disorders.
Personality research has been helpful in identifying individual vulnerability to SUD’s (Sher, Bartholow & Wood, 2000). Sensation seeking, impulsivity and risk taking propensity are specific personality constructs found to be particularly relevant to substance abuse (Lejuez et al., 2002; Wagner, 2001; Waldeck & Miller, 1997; Barnes, et al., 2000). Alcoholism is the most prevalent of all the substance use disorders likely due to a combination of its legality, availability, and social acceptance (Zuckerman, 1999). There is a high co-morbidity of alcohol disorder and anti-social personality disorder or ASPD and almost half of alcoholics have a second diagnosis (Helzer et al., 1991). Twenty-five percent of male alcoholics and 10% of female alcoholics have an ASPD diagnosis (Kessler et al., 1997). ASPD almost always precedes alcoholism even though the type of alcoholic with ASPD has an earlier age of onset. Alcoholism is prevalent in a majority of hard drug users and reaches 84% in cocaine users (Helzer et al., 1991).

Research focused on the measurement of personality traits associated with an underlying vulnerability to abuse/addiction has met with mixed success. The research in this area has culminated in the development of a measure of vulnerability to addiction or addiction proneness, the Addiction Prone Personality Scale (Barnes et al., 2000; Anderson, 2003) as a means of identifying those at risk for developing addiction. The development of such a measure is based on research about typologies, risk factors and personality models identified by researchers in the fields of substance abuse and personality. Anderson (2003) has explored the relationship between items of the APP Scale in several samples using statistical procedures designed to evaluate the dimensionality, differential item functioning and taxometric status. The goal of this research was to assess the dimensionality of APP (whether it is unidimensional or multi-dimensional) and determine the extent to which multiple underlying factors are present, and what these sub-dimensions might be. This research identified 3 sub-dimensions of Sensation Seeking (SS), Negative views (NV) and Impulsivity/Recklessness (I/R).

Findings to date suggest that research involving underlying vulnerability and its measurement could prove to be a significant contribution to clinical applications in terms of prevention and early intervention. This is particularly relevant for young adults who appear to be at highest risk for developing substance abuse disorders.
Barnes et al., (2000); Anderson, (2003); Anderson et al., (2004) research and the APP measure will be discussed in detail in terms of the relevance and contribution to the field of substance use disorders and personality traits and questions for future research.

**Significance of the Study**

Given the magnitude of the problem of SUDs both to individuals and society in terms of loss of life, functioning, health, productivity and huge economic burdens, it is incumbent upon social scientists to continue to explore methods of identifying and providing better prevention and intervention efforts. There is converging evidence in the literature supporting the notion that vulnerabilities to SUD’s exist and certain personality constructs, specifically impulsivity, sensation seeking, disinhibition and negative views, are associated with and precede the development of these disorders. The problem has been in measuring vulnerability rather than relying on measures that identify existing SUDs. There is a need for instruments with the ability to predict SUDs since there are established scales that measure SUDs but none that focus on earlier detection through establishing vulnerability. Barnes et al., (2000) developed the APP scale, purported to predict addiction-proneness, through identifying personality factors related to addiction derived from established personality and substance use measures. This is a significant contribution to the knowledge base in the area of addiction and personality in that a measure predicting vulnerability prior to development of SUDs has potential in helping to curtail the enormous costs of addiction to individuals and society. The APP scale is relatively new and therefore, the research regarding its psychometric properties is limited. The present study sought to examine the construct validity of the APP scale using clinical and student populations with the hypothesis that there would be significance differences in the groups; specifically with the clinical group scoring higher than the college students given that the former had developed SUDs. The study was an attempt to bolster the evidence of previous research results indicating that the APP scale showed promise in predicting vulnerability to SUDs. This research is based on the growing consensus in the literature that a biopsychosocial model appears to best fit the etiology and treatment of addictions. The refinement of measures such as the APP scale aimed at identifying individuals at risk would be most beneficial in clinical settings in terms of prevention and intervention efforts.
Assumptions

Assumptions refer to measures taken to minimize threats to internal and external validity of the results. Basic assumptions of the study were as follows: the participants in both groups would be honest and forthright in responding to the questions (no demand characteristics) and would answer most/all of the questions such that there would be limited missing data. The two samples would be representative of the two populations from which they were drawn and thus, exhibit normal versus skewed statistical distributions that would compromise the meaningfulness of the results. The SASSI-3 and the APP Scale would demonstrate strong psychometric properties i.e. reliability and construct validity with these two groups. The constructs measured of substance use disorders and addiction proneness would be well defined and represented in the instruments. There would be no carryover effect or order effect in the presentation of the two instruments that might result in fatigue, boredom, lack of motivation or expectancy on the part of the participants. There would be no experimenter bias or expectancy or unconscious cues from the experimenter in presenting the research, administering the tests and/or scoring the data.

Delimitations

Practical limitations of the study included a relatively small sample size of 200 subjects due to the inclusionary criterion and time required to collect the data, especially with the clinical population. There was some missing data, particularly with regard to socioeconomic status since the participants could choose not to disclose their family income. There may have been unconscious or subtle experimenter bias since there was no other administrator or researcher available due to practical limitations. The samples may not have been representative of the two populations due to geographical location (southern United States) and other variables such as predominantly English speaking, white, unmarried, middle class participants. The Student participants were chosen from college of education higher level undergraduate classes due to availability and convenience. The clinical subjects are less likely to be cooperative and forthcoming and even hostile in some instances given that they were mandated to treatment and many in denial of any substance use disorders versus the students who would be less likely to have any concerns about how the results might impact them. There may also have been an order effect since it was decided that the SASSI-3 would be administered first followed by the APP Scale to both groups and there was no counter-balancing. Lastly, the limited research using the APP Scale meant limited information about the psychometric properties of the test populations.
Significance of the problem

According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2000), 14 million Americans meet clinical criteria for alcohol abuse or alcoholism. Alcohol plays a role in one in four cases of violent crime. More than 16,000 people die each year in automobile accidents in which alcohol was involved. Alcohol abuse accounts for 75,000 deaths and costs more than $184 billion annually (Nelson et al., 2005). This makes alcohol abuse the third leading preventable cause of death for the nation (Mokdad et al., 2004; Rice, 1999).

Heavy drinking is defined as more than two drinks per day for men and more than one drink per day for women (USDA, 2003). In terms of medical consequences, heavy drinking can cause inflammation of the liver (hepatitis) and lead to scarring of the liver (cirrhosis), a potentially fatal disease. It has also been linked to high blood pressure and heart muscle damage (cardiomyopathy), as well as mouth, throat, esophagus, colon and breast cancers (NIAAA, 2000). Immediate health risks include unintentional injuries (traffic injuries, falls, drownings, burns) (Smith, Branas & Miller, 1999), violence (Greenfield, 1998; NCASA, 2006), risky sexual behaviors (Naimi, et al., 2003; Wechsler et al, 1994), miscarriage, stillbirth and birth defects (Kesmodel et al., 2002; American Academy of Pediatrics, 2000), and alcohol poisoning (Sabap & Chapman, 2003). Long term health risks can lead to the development of chronic diseases including cardiovascular problems (Rehm et al., 2003; Leonard & Rothbard, 1999), liver diseases (Kochanek et al 2002; Schiff, 1997); gastrointestinal problems (Lesher & Lee 1989; Kelly et al., 1995), neurological impairments (Corrao et al., 2002; 2004), social problems (Booth & Feng, 2002), and psychiatric disorders (Castaneda et al., 1996). More than one third of Americans report that alcohol has caused problems in their immediate family (Newport, 1999).

The ECA study (Helzer et al., 1991) classified 11% of the population as lifelong abstainers, 61% as social drinkers, 14% as heavy drinkers, and 14% as abusers or alcohol dependent. The rates for male alcohol abuse or dependence were twice those for women (33% vs. 15%). One-year prevalence rates for alcoholism are highest in the 18-30 year range for both genders and decline thereafter. One-year prevalence rate of alcoholism is much higher in unskilled and skilled labor groups than in professionals and managers, with service and sales workers in the median range. The highest rates of alcoholism are in high school dropouts and the lowest rates are found in those who graduate from college or high school. Individuals who have never been married or
had more than one divorce have higher rates than those who have maintained a stable marriage (Helzer et al., 1991).

Shults, et al., (2002) found that men are nearly three times as likely as women to report alcohol impaired driving. As well, single individuals were about 50% more likely to report alcohol-impaired driving than married individuals or those living with a partner.

Widely held perceptions that most Americans drink moderate amounts on a regular basis without negative consequences is a myth that impacts public policy and has implications for the development of SUDs. According to data obtained by the National Household Survey (1999), a large majority of adults age 21+ report they did not consume any alcohol in the past month and an additional 25% report drinking once a week or less (SAMHSA, 1998). Therefore, the vast majority abstains or drinks responsibly (once per week or less). However, 20 % of adults report binge use (5 or more drinks at one time) in the past month. Bingers are 20 % of the population of adult drinkers but consume 83% of alcohol. Frequent bingers (those who binge more than once per week) represent 6 % of the population but drink 50% of the alcohol.

In terms of under age drinkers, the proportion of binge drinkers is even higher than adults, at 23%, especially in the 18-20 year old group. In addition, 71% of the 18-20 year-olds report binge drinking in the past month versus 41% of adults. The significance of these data is that it reveals how myths about alcohol use patterns translate into public policies that make alcohol readily available, at low prices and with widespread marketing targeted at young adults. This creates an environment that encourages alcohol use and downplays the potential for harm. The policies are actually accommodating heavy and hazardous use by a small minority of consumers, many of whom are underage. Controls on alcohol have little impact on the majority of Americans but can reduce heavy and hazardous use, especially in young adults and underage drinkers (U.S. Department of Justice, 1999).

Foster et al., 2003 in a study on alcohol consumption and expenditures for underage drinking and adult excessive drinking report that the proportion of 12-20 year-olds who drink was estimated to be 50%, while the proportion of adults aged 21 or older who drink was estimated to be 52.8%. Underage drinkers consumed 19.7% of the total number of drinks consumed per month. The amount of adult drinking that was excessive (2+ drinks per day) was 30.4%. Expenditure on alcohol in the U.S. in 1999 was $116.2 billion with $22.5 billion attributed to underage drinking and $34.4 billion attributed adult excessive drinking. The data suggest that
underage drinkers and adult excessive drinkers are responsible for 50.1% of alcohol consumption and 48.9% of consumer expenditure.

Data on drug abuse related hospital emergency department (ED) visits estimate that 627,000 such visits were made nationwide during the last six months of 2003 (Drug Abuse Warning Network (DAWN), U.S. Department of HHS, SAMHSA, 2004 list one specific citation for this prior statement (627,000 ED visits)). More than half, 54%, of these visits involved multiple drugs, and alcohol or an illicit drug was involved in nearly two-thirds. The specific drugs most commonly associated with drug misuse or abuse related ED visits included cocaine, 28%, alcohol, 26%, marijuana, 20%, heroin, 10%, major stimulants (amphetamines and methamphetamine), 10%, Benzodiazepines (tranquilizers), 17%, and opiates/opioid (pain relievers), 17% (USDH, 2004).

**Young Adults and Substance Use Disorders**

Young adults (18-30 year-olds) are a high-risk population for substance abuse and dependence. Nelson et al., (2005) reported that alcohol is a factor in the deaths of 1,400 college students each year. In addition, they cite that college students currently spend $5.5 billion a year on alcohol, more than they spend on textbooks, and all other beverages combined. In a recent national survey, 66% of college students reported consuming alcohol in the past 30 days (Johnston, O’Malley & Bachman, 1998). Young adults are at greatest risk for alcohol-related problems during their early 20s (Grant et al., 1994). However, the risk appears to decrease appreciably over time in approximately two thirds of untreated young adult “problem drinkers” as they transition into adult family and occupational roles (Fillmore, 1988). Sher and Gotham (1999) argue that, in many cases, pathological alcohol involvement may be characterized as a developmental disorder of young adulthood. Schulenberg (2000) suggested that such time-limited deviation (i.e. heavy drinking during the college years) might be typified as a “developmental disturbance” rather than an indicator of a more persistent problem.

The most thoroughly studied predictors of college students drinking behavior are demographic variables. Clusters of these variables identify subgroups of students at risk for excessive consumption of alcohol. Researchers in the Harvard School of Public Health College Alcohol Study have found that young people who drank in high school consumed more alcohol than young people who began drinking alcohol in college (Wechsler et al., 1995; Wechsler et al., 1994; Reis & Riley, 2000). In addition, they found that male gender, and college students
involved in athletic programs and/or fraternities/sororities appear to be at highest risk for developing substance use disorders (SUD).

Researchers have examined the course of alcoholism in different populations and found significant differences. Vaillant (1996) studied the outcomes of alcoholism in two samples of males ranging from ages 40-70. The two groups included Harvard undergraduates and an inner-city non-delinquent group. The study found that 19% of the college group and 37% of the inner-city group had achieved abstinence. Twenty-three percent of the college group and 20% of the inner-city group were classified as social drinkers and 59% of the college group and 43% of the inner-city group were chronic alcohol abusers. Prognosis was worse for the college group despite their educational advantages and socioeconomic status. These findings provide additional evidence that the college population is at particular risk for substance abuse and dependence. Therefore, future research with this population is warranted.

The heavy drinking that is prevalent on college campuses is associated with a myriad of negative consequences (O’Malley & Johnston, 2002; Wechsler et al., 2000). These consequences vary in frequency and severity (Perkins, 2002), ranging from mild negative outcomes, such as being late for class, to more severe consequences, such as interpersonal aggression and sexual victimization (Abbey, 2002; Donovan & McEwan, 1995). Heavy drinking and its consequences among college students have been the focus of much research attention (Boyd & Faden, 2002; Goldman, 2002).

Motor vehicle accidents are the leading cause of death among youth ages 15-20. In addition, drivers under 21 are more susceptible than older drivers to the alcohol-induced impairment of driving skills. The rate of fatal crashes among alcohol-involved drivers between 16 and 20 years old is more than twice the rate for alcohol-involved drivers 21 and older. Suicide rates, sexual assaults and high-risk sex, all associated with substance abuse, are also higher amongst underage substance abusers ages 14-20 years old (NIAAA, 2006).

The National Survey on Drug Use and Health (NSDUH) surveyed persons aged 12 or older about drinking and driving and whether or not they had been arrested for driving under the influence (DUI) (NSDUH, 2004). The survey also asked about the use of alcohol and any illicit drug use in the past year and past month. This study found that in 2002 and 2003, 4.2 million (21%) of persons aged 16 to 20 reported that they had driven in the past year while under the influence of alcohol or illicit drugs. Among this age group, whites and American Indians/Alaska
Natives were more likely to report DUI than other racial/ethnic groups. Among all persons aged 16-20, males (24%) were more likely to report DUI involving alcohol or illicit drugs than females (18%). According to the Center for Disease Control (USDH, 2004), in 2002 and 2003, approximately 169,000 (4%) of persons who reported DUI in the past year had been arrested and booked for DUI in that year. The percentage of this group who reported being arrested for DUI was higher among males (6%) than females (2%). In this age group, 17% reported past year DUI involving alcohol, 14% reported DUI involving illicit drugs and 8% reported DUI involving a combination of both. Motor vehicle crashes were the leading cause of death among this age group in 2002. Among persons aged 16-20, older persons had a higher reported prevalence of DUI involving alcohol or illicit drugs than those who were younger. For example, persons aged 20 were nearly 3 times more likely to have driven under the influence than persons age 16 (28 vs. 10%).

According to the same study (CDC, 2004) one in three adult drivers age 21-25 had driven under the influence of alcohol or drugs during the past year. The data show that 16.6% of adult drivers age 21 or older (30.7 million persons) reported driving while under the influence of alcohol or illicit drugs during the past year. The report found that older drivers in this age group are less likely than younger drivers to drive under the influence of alcohol or illicit drugs. The data show that 33.8% of drivers age 21-25 had been convicted of DUI while 24.3% of those ages 26-34 and 18.5% of those ages 34-49 had DUI convictions.

O’Neill, Parra & Sher (2001) investigated the clinical relevance of heavy drinking during the college years and beyond on concurrent and prospective alcohol-related problems in a high-risk sample. The researchers observed a trend toward relative stability in mean-level heavy drinking during the college years, followed by a substantial decrease in heavy drinking in the post college years. This decrease in heavy drinking and alcohol-related problems observed over time is consistent with the “maturing out” effect described by Fillmore (1988) and Sher & Gotham (1999). However, the amount of reported heavy use and alcohol-related problems was consistently greater in individuals with alcoholic fathers over the course of the study.

In summary, the epidemiological data cited in the preceding section highlights the gravity of the problem of SUDs in the U.S., particularly with regard to those who are most vulnerable to the development of serious problems, such as young adults and the college student population thus highlighting the need for earlier intervention through more effective assessment.
Measurement of Vulnerability to SUD’s

The Addiction Prone Personality and the Development of the APP Scale

Research in the area of assessment of personality and SUDs has been marred by the following limitations: small number of longitudinal studies and a reliance on cross-sectional studies, design flaws such as limited item pools (i.e. MMPI-2 items only), and use of instruments not designed to assess vulnerability (MMPI-2 MAC scale; EPQ), small sample sizes, and reliance on samples of convenience (college student). These limitations have contributed to the lack of predictive validity of these instruments to assess vulnerability (Barnes et al., 2000).

Barnes et al., (2000) developed the Addiction Prone Personality scale (APP) to be used as a measure of personality vulnerability to SUDs. The APP was developed by using multiple measures of SUDs and personality tracking over 1,200 individuals in Winnipeg, Canada over two years, as well as 600 families in Vancouver, Canada and conducting clinical studies of more than 400 individuals in alcohol treatment programs.

Findings corroborate that certain personality factors precede the development of SUD’s, specifically sensation seeking and disinhibition. Research by Anderson (2003) has identified three auxiliary APP dimensions: sensation seeking (SS); impulsivity/recklessness (I/R) and negative view of self (NV). Sensation Seeking may be differentially related to substance abuse patterns among substance users who are high versus low in IR and NV. Therefore, there appears to be two personality pathways to SUD’s. The first is sensation seeking, in which individuals high on this trait use substances as novel experiences to keep their reward centers stimulated in a satisfactory manner. This eventually leads to problems as the addictive properties of the substance take hold. The other personality pathway works differently. Individuals who are higher on masculine traits like tough-mindedness, lower social conformity and impulsivity or “psychoticism” seem more prone to consume high levels of substances from the start of use and develop problems associated with SUDs more quickly. These individuals get a far greater reward from substance use than individuals low on these traits, and they have difficulty finding an alternative activity that provides the same satisfaction with very little effort. The rewards for substance use seem to outweigh the fear of consequences due to low levels of harm avoidance (Barnes et al., 2000).

The potential value of the APP as a screening instrument in the early detection of those who
are vulnerable to addiction is readily apparent. Early recognition, prior to substance use altering brain chemistry would presumably lessen the chances of developing SUDs. The APP has been shown to have reasonably strong reliability with clinical populations and has proven to be predictive of the development of SUD symptoms (Anderson, et al., 2004). It also has been demonstrated to have value as an instrument predictive of treatment outcome in the clinical population. High scorers on the APP are characterized by having higher levels of sensation seeking and lower social conformity. Research with the APP (Barnes et al., 2000) has also shown that this test is effective for discriminating drug addicts from non-addicts, predicting the severity of addiction, and likelihood of remission during recovery. The APP has proven to be more effective than MAC scale of the MMPI-2 and the EPQ-A scale were not specifically developed to assess premorbid personality traits related to the development of SUDs. The APP measure has potential in facilitating early intervention and prevention efforts in treating SUDs as well as treatment planning in clinical settings.

Definitions of Terms

Definitions of Substance Use Disorders

In order to discuss the problem of substance use disorders in depth, there needs to be a clear understanding of how the problem is defined and described. The Diagnostic and Statistical Manual of the American Psychiatric Association, the DSM-IV-TR (APA, 2000) provides the most current and definitive description of this clinical problem.

Criteria for substance abuse are met if one or more of the following symptoms are experienced within a one-year period:

- Repeated use of a substance that causes a person to fail at meeting obligations in major life areas such as work, school, home, etc.
- Repeated substance use in situations that could be potentially dangerous or lethal such as driving, operating power tools, machinery etc.
- Recurrent substance-related legal problems such as arrests for DUI, disorderly conduct, etc.
- Continued use despite ongoing relationship difficulties such as fights or arguments with spouse or friends, loss of friends, or isolation.

Criteria for Substance Dependence are met if there is a pattern of substance use leading to significant impairment within a one-year period and evidence of three or more of the following
symptoms:

- The increased need of a substance to attain the same desired effect
- A markedly diminished effect over time with the same amount of the substance
- Withdrawal symptoms
- The substance is taken in larger amounts over time than was intended.
- Inability to cut down or stop completely despite an effort or desire to do so.
- A great deal of time spent thinking about and getting the substance.
- Important activities related to socialization, recreation, work, school, family, etc. are given up in favor of using the substance
- Substance use is continued despite repeated or worsening effects in important areas such as health, family, work/school, financial, social, and legal (APA, 2000).
CHAPTER 2

SUBSTANCE USE DISORDERS AND PERSONALITY RESEARCH:
A REVIEW OF THE LITERATURE

Risk Factors and Substance Use Disorders

Genetic and Environmental/Psychosocial Factors

This section will cover the complex nature and relative contributions of genetic predisposition to substance abuse and associated personality factors as well as environmental/psychosocial factors. The literature suggests that genetics and environmental/psychosocial factors implicated in substance abuse and personality interact and overlap. Specific factors of importance to be discussed include demographic factors such as gender, age and socioeconomic status (SES); familial characteristics such as history of substance abuse by parents and siblings; environmental factors such as peer associations and influence; types of substance abuse and personality traits and disorders associated with substance abuse.

Much of the research attempting to identify the relative contribution of genetic and environmental factors to substance abuse is focused on data obtained from twin and adoption studies. Adoption studies have shown increased rates of alcoholism in adopted men and women whose biological parents were diagnosed as alcohol abusers (Sigvardsson, Bohman & Cloninger, 1996; Cadoret et al, 1985). Findings from a number of twin studies suggest that male drug abuse has some genetic sources plus an equal or greater influence of shared environment (Pickens, et al., 1991; Gynther et al., 1994; Tsuang et al., 1996). Women show much less genetic influence on their drug abuse. The discrepant findings between men and women might be explained by the fact that drug abuse is mediated by the antisocial and sensation seeking personality traits which are stronger in men (Pickens et al., 1991; Gynther et al, 1994; Tsuang et al., 1996). Research findings also suggest that alcoholism, drug abuse, anti-social personality and major depression all occur with greater frequency in the first degree relatives of persons with drug abuse disorders (Handelsman et al., 1993; Luthar et al, 1992; Rounsaville et al., 1991).

Twin, family and adoption studies have firmly established that genetics plays an important role in determining an individual’s preferences for alcohol and the likelihood for developing alcoholism. Alcoholism is influenced by several genes that interact with each other and with
environmental factors (NIAAA, 2000). Genetic factors are related to alcoholism with about one-half of alcoholic men and women seeking treatment having at least one close alcoholic relative (Schukitt, 1994). As stated earlier, the genetic risk seems to be higher for men than women, according to data obtained from twin studies (Pickens et al, 1991; McGue et al., 1992; Kendler et al., 1992). Studies of alcoholism amongst male and female identical twins have found that concordance rates among male identical twins range from 68% to 76% whereas the rates for female identical twins are significantly lower at 32% to 47%.

In an attempt to identify the relative contribution of environmental factors on substance abuse, researchers have focused on data obtained from adoption studies. A study of adoptees in the U.S. found that if a biological first-degree relative was an alcoholic, 62% of their male and 33% of their female adopted-away children became alcoholics compared to 24% of the men and 5% of the women without biological alcoholic relatives (Cadoret et al., 1985). Even when the genetic influence from the biological relatives was controlled, there was a significant influence of alcoholism in adoptive relatives. The genetic factor was significant in women and men but the risk was lower for women.

Kahler et al., (2003) studied social environmental selection as a mediator of gender, ethnic and personality factors on college student drinking. Results showed that male gender, white ethnicity and sensation seeking were uniquely associated with alcohol use. Mediational analyses indicated that socio-environmental factors such as friends’ approval of drinking/getting drunk were positively associated with alcohol use and significantly accounted for part of the effects of ethnicity and sensation seeking, gender and alcohol use. Results suggest that white students and those high on sensation seeking may drink more heavily in college in part because they select social environments in which alcohol use is encouraged i.e. fraternities.

Wechsler et al., (1995) conducted a study using a representative sample of college students to examine the nature and extent of the binge drinking on college campuses. Binge drinking or heavy, episodic drinking is defined as consuming five or more drinks for men or four or more drinks for women in about 2 hours (Wechsler et al., 1995). Findings indicate that 44% of students were classified as binge drinkers. The following variables- being male, white, single, having parents who were college educated, majoring in business, being a resident of a fraternity, engaging in risky behaviors such as unsafe sex, smoking marijuana and cigarettes, being involved in athletics, indulging in binge drinking as high school senior, and viewing parties as
very important were all associated with binge drinking. These findings illustrate that binge drinking is widespread among American college students.

Knight et al., (2002) examined the prevalence of alcohol abuse and dependence among U.S. college students in order to identify characteristics associated with these diagnoses. More than two of every five students reported at least one symptom of abuse or dependence. Students who were heavy episodic drinkers were more likely than those who were not to have an alcohol disorder. Students who were frequent heavy episodic drinkers have 13 times greater odds for abuse and 19 times greater odds for dependence. One in every five frequent heavy episodic drinkers was classified with alcohol dependence (alcoholism) compared to one of every 20 students in the overall student population.

King et al., (2005) examined genetic and environmental contributions to stability and change in heavy drinking from late adolescence to young adulthood in a longitudinal sample of twin pairs. Longitudinal analysis of the data supports the following conclusions: 1) biological factors appear to be more influential to heavy drinking in men vs. women; 2) the magnitude of heritable influences on heavy drinking is not significantly greater at age 17 than at age 20 and 3) change in heavy drinking is predominantly due to non-shared environmental factors. P3 amplitude, an event-related brain potential marker of alcoholism risk, was less predictive of heavy drinking in women than in men, providing further support for the proposition that biological factors have less impact on heavy drinking in young adult women than in young adult men.

Research supports the contention that children of alcoholics (COAs) are at an increased risk for developing alcoholism (Sher et al., 1991). The relationship between alcoholism and other psychiatric disorders (in particular, sociopathy, depression and anxiety disorders) in COAs and non-COAs continues to be a contested issue (Kushner, Sher & Beitman, 1990; Sher et al., 1991). Jacob et al., (1999) conducted a study comparing the drinking, psychiatric and psychosocial status of 84 adult COAs with those of 111 offspring of normal controls and 102 offspring of psychiatric controls. The findings indicated that COAs exhibited disturbance in the realms of drinking, drug use, behavioral control, and educational achievement. Female versus male COAs were most clearly differentiated from normal and psychiatric controls. The assessment of moderator effects provides some evidence for the contention that the risk associated with a family history of alcoholism is qualified by variations in family-of-origin characteristics; in particular, that lower SES significantly increases risk for adverse offspring outcomes.
Chassin et al., (2004) studied the effects of familial alcoholism and personality in young adults. The authors found that heavy drinking/heavy drug use group was at risk for alcohol and drug dependence and persistent dependence was associated with more familial alcoholism, negative emotionality and low constraint. The moderate drinking/experimental drug use group was at risk for alcohol dependence but not drug dependence or persistent dependence and showed less negative emotionality and higher constraint. This research suggests that familial alcoholism raised risk for alcohol and drug use and dependence and children from alcoholic families were more impulsive and lower in agreeableness.

Research on twins reared apart has confirmed that the genetic influence on personality is just over 40% (Hur, McGue & Iacono, 1998). If major personality dimensions are stable and biologically based, then the chance that these factors may be causally related to alcoholism is also enhanced. Recent research from twin studies (Jang, Livesley & Vernon 1995; Kendler et al., 1992; Prescott et al., 1994) and adoption studies (Cloninger, Bohman & Sigvardsson, 1981) has established an association between genetic factors and alcoholism and has found that the genetic aspect is particularly relevant to the type of alcoholism associated with physical dependence (Goodwin, 1983). Genetic data suggest a moderate heritability for alcoholism similar to that of some personality traits (50%). It may be that there are no specific genes for alcoholism but genes that predispose personality traits such as impulsivity, sensation seeking and neuroticism (Noble, 1996; Zuckerman, 1986; Ebstein et al., 1996; Smith et al., 1992).

Sigvardsson et al. (1996) examined the effects of the socioeconomic levels of the adoptive parents on Type 1 or relief users and Type 2 or impulsive/sensation-seeking alcoholics and found that impoverished environments were a risk only for Type 1 alcoholics. The combination of genetic Type 1 and lower class environment increased the risk of Type 1 alcoholism while Type 2 alcoholism was increased if the biological fathers had Type 2 alcoholism, regardless of the social background. These findings suggest that genetics are a stronger influence on Type 2 alcoholism while both environment and genetics influence Type 1 alcoholics.

El-Sheikh & Buckhalt (2003) examined parental problem drinking and children’s adjustment with regard to attachment and family cohesion as moderators and mediators of risk. The researchers found that a higher level of cohesion and adaptability functioned as a protective factor against behavioral and cognitive difficulties otherwise associated with problem drinking and social adjustment problems. Children’s perceptions of attachments to parents were consistent
predictors of behavioral, social and cognitive problems and further evidence of relations between problem drinking and child functioning. The results support the notion that parent and family functioning variables act as either pathways and/or protective factors for children exposed to a high-risk environment.

Studies concerning family and social risk factors indicate a social role of alcoholism as well as a genetic influence. McCord (1990) conducted a longitudinal outcome study on sons of alcoholic fathers and compared these to controls. Findings suggest that three parental variables: low maternal competence, bad father interaction and weak family control predicted juvenile delinquency, juvenile deviancy and adult criminality but none of them significantly predicted an outcome of alcoholism in the boys. While the father’s status as an alcoholic predicted the son’s alcoholism, the father’s criminality did not. An alcoholic father increased the son’s chances of becoming alcoholic only if the father was part of an intact family. This suggests a social role of the father’s alcoholism as well as a genetic influence in producing alcoholism in a son since his presence in the family seems to increase the risk for the son.

The family study component of the research the Vancouver Family Study (FVA) Anderson, (1999), suggests that the home environment plays an important role in the development of addiction-prone personality types. Individuals from harsh family environments where parental care is not as nurturing are at high risk to develop addiction-prone personalities. Indicators of a harsh family environment include: an abusive family environment; lack of parental involvement with children; hyperactive and/or impulsive children and a family history of addiction. In contrast, the interactive role of the variables of “caring” and “family cohesiveness” tested in both biological and adoptive families is shown to be significant in terms of insulating individuals from the development of SUDs. The researchers conclude that the environment has a very important role to play in determining how this personality trait gets expressed.

A number of studies have shown that use by older siblings is associated with adolescent substance use (Gfroerer, 1987; Griffin et al., 2002; Rajan et al., 2003). For substance use and deviant behavior in general, sibling influence has been shown to be stronger than parental influence (Brook, Brook & Whitman, 1999; Windle, 2000) and is equal to or greater than peer influence (Brook et al., 1990; Vink et al, 2003). Pomeroy et al., (2005) investigated parental, peer and older siblings’ contributions to adolescents’ substance use with a sample of 225 African American families. The findings demonstrate that older siblings’ behavioral willingness as well
as cognitions influences younger siblings and their use of substances. Older siblings’ behavioral willingness and cognitions predicted change in younger siblings use, controlling for other relevant variables (parent, peer and sibling use). These results are consistent with other studies demonstrating the influence that older siblings have on their younger siblings (Griffin et al., 2002; Slomkowski et al, 2001). The researchers conclude that preventive intervention programs may need to be designed with the entire family in mind since both parents and siblings influence adolescents’ substance use.

Rende et al., (2005) examined sibling effects on substance use in adolescence in terms of social contagion and genetic factors and found that sibling contact and mutual friendships represent a source of social contagion for adolescent smoking and drinking independent of genetic relatedness. Researchers used data from a sample of twin and non-twin siblings and found that while monozygotic twins had the highest levels of sibling contact and mutual friendships, the pattern of results among sibling types were not consistent with genetic models but shared environmental factors influenced these sibling relationship features.

In a study examining influences of peers and parents on alcohol use and problems in late adolescence Wood et al., (2004) found a significant association between both peer and parental influences. Peer influences included social modeling and perceived norms while parental influences involved nurturance, attitudes and values related to substance use. Findings suggest that parental influences moderated peer influences with regard to drinking behavior with higher levels of perceived parental involvement associated with a weaker association between peer influence and alcohol use. The authors conclude that parents continue to exert an influential role in late adolescence regarding drinking behavior.

Research in the area of molecular genetics has shown an association between molecular genetic structure and personality with regard to SUDs. Ebstein & Belmaker, (1997) found an association between the D4 (dopamine) receptor and novelty seeking as measured by the Tridimensional Personality Questionnaire (TPQ) (Cloninger, 1987a). These results were replicated by Benjamin et al., (1996) in research using the NEO Five Factor Inventory. Blum et al., (1990) reported that the A1 allele of the dopamine receptor gene occurred with a much higher frequency in the DNA of samples taken from alcoholics following autopsy vs. comparison samples. Lawford et al., (1997) in a review of literature, supported the association between the A1 allele and alcoholism. Blum & Payne (1991) purport that individuals who are vulnerable to
alcohol suffer from abnormally low levels of dopamine and a lower ability to bind dopamine receptors in the reward center of the brain producing a hypersensitivity in the reward center so that anything that increases the amount of dopamine including alcohol, can produce strong feelings of well-being or euphoria. Their results are consistent with research involving the psychology of addictive behaviors and sensation seeking behavior in general. The results show that the A1 allele is associated with cocaine dependence (Noble et al 1993); cigarette smoking (Comings et al., 1996; Noble et al., 1994) and polysubstance abuse (Smith et al 1992).

Based on other research linking A1 allele and hyperactivity (Miller & Blum, 1996) Barnes et al., (2000) suggest that Blum & Payne (1991) may have discovered the gene for reward seeking or sensation seeking versus alcohol abuse. Miller and Blum (1996) use the term “reward deficiency syndrome” to describe this condition. In earlier research, Zuckerman (1987) postulates that sensation seeking is associated with a desire for stimulation in the reward center of the brain.

Research provides some evidence that there is a biological basis underlying the impulsive personality characteristics of substance abusers (Cloninger, 1987a; Zuckerman, 1989). Twin studies (Eysenck, 1990; Macaskill et al., 1994) have shown a substantial proportion of variance in primary personality characteristics of Extroversion, Neuroticism, and Psychoticism that can be explained by genetic variance. Krueger et al., (1998) suggest that there are certain personality traits (e.g. novelty or sensation seeking, impulsivity, hostility/disagreeableness) and personality disorders (antisocial, borderline) that are commonly associated with, and not simply consequences of, addiction. In other words, these traits and disorders may precede addiction. These traits and disorders appear to influence symptom severity, remain present and interfere with psychosocial functioning once abstinence is achieved, and create significant ongoing risk for relapse. These dimensions can be conceptualized together under a broader construct that has been labeled behavioral disinhibition, disinhibitory psychopathology or externalizing disorder (Kreuger et al, 1998; 2002). Research suggests that these dimensions precede the development of substance disorders and are risk factors for their development.

This constellation of disinhibitory personality traits are related to earlier age of onset, poly-drug use, chronic/heavy use, conduct and antisocial personality disorders, violence, arrests, substance dependence severity, HIV risk behaviors, psychiatric symptoms, mood disorders, suicide attempts, family history and early school dropout (Ball, 2002b). These disinhibitory
personality traits appear to define individuals at higher risk for developing a severe subtype of the substance disorder (Ball, 1995).

Stabenau (1992) found that the diagnosis of antisocial personality disorder was more common in a combination alcohol and drug group than in alcohol-only or drug-only groups. A family history of drug abuse was most common in the drug-only group, and a family history of alcoholism was most common in the alcohol-only group, suggesting specific genetic or shared environmental influences. The antisocial personality predisposes to both kinds of substance abuse.

Adoption studies shed more light on the separation of shared environmental and genetic causes of personality and SUDs. Results of adoption research show that vulnerabilities to substance abuse share a familial cause, possibly mediated by antisocial personality disorder. Two genetic pathways to substance abuse have been identified: one directly from abuse in biological relatives to abuse in the adoptees and the other indirectly from antisocial behavior in the biological relatives to antisocial personality in the adoptee which in turn leads to substance abuse (Cadoret et al., 1986; Cadoret et al., 1995).

Slutske et al. (1998) studied the association between retrospectively reported childhood conduct disorder (CD) and history of alcohol dependence (AD) in an attempt to identify common genetic risk factors using a sample of male and female unlike-sex adult twin pairs. The research suggests that genetic factors accounted for most of the association between CD and AD with the remainder of the association being due to non-shared specific environmental factors. Genetic influences common to CD and AD accounted for 17% and 35% of the genetic variation in AD liability in men and women respectively and accounted for 11% and 23% of the total variation in AD liability. Results suggest that there are common genetic risk factors for AD and that CD itself is an important genetically influenced risk factor for AD.

Slutske et al. (2002) further examined personality and the genetic risk for alcohol dependence in a sample of male and female same-sex and unlike sex twin pairs and found the genetic factors contributing to variation in behavioral under-control accounted for about 40% of the variation in AD and CD risk and about 90% of the common genetic risk for AD. These results suggest that genetic factors contributing to variation in dimensions of personality, particularly behavioral undercontrol account for a substantial proportion of the genetic diathesis for AD and most of the common genetic diatheses for AD in both genders.
Biochemical Factors

It is hypothesized that the biochemical basis for the actions of alcohol in the brain lies in the interaction of alcohol with receptors from other systems including dopamine, serotonin and opiate receptors since there is no distinct alcohol receptor in the central nervous system (Tabakoff & Hoffman, 1987). Biological studies suggest that, upon ingestion, alcohol’s reinforcing properties may be the result of increased dopamine levels in the nucleus accumbens, the reward center of the brain (O’Brien, Eckart & Linnoila, 1995). Studies of rats and humans have linked the endogenous opioid system (endorphins) to the reinforcing effects of alcohol. Specifically, low levels of endorphins may constitute a vulnerability to alcoholism and the release of endorphins through alcohol use may be particularly reinforcing to those with this deficit (Gianoulakis et al, 1996).

Serotonin levels have been found to increase with the ingestion of small amounts of alcohol and a deficit in serotonin could explain the comorbidity of alcoholism with both antisocial personality disorder and depression since both disorders have also been associated with serotonin deficits (Fils-Aime et al., 1996). Zuckerman (1999) notes that many of the biochemical and psycho-physiological markers for alcoholism are the same as those for ASPD and, therefore, concludes that the tendency toward antisocial personality is the factor that is inherited by most male alcoholics.

Monoamine oxidase (MAO) is a neurotransmitter-regulating enzyme that has been found at abnormally low levels in alcoholics (L. von Knorring, Oreland & von Knorring, 1987), in those with a family history of alcoholism and in nonalcoholic sensation seekers (Schukitt, 1988; Sher, 1993). This suggests that low MAO may be a biological marker for alcoholism (Schukitt, 1988; Sher, 1993). Low MAO is characteristic of a wide range of disinhibitory disorders including substance abuse and personality traits such as impulsive sensation seeking in normals. Since this enzyme is a regulator of the dopamine system, the MAO deficit may result in a dysregulation of the dopamine system and thus a vulnerability to the impulsive sensation seeking mediated by that approach system (Zuckerman, 1994b).

Gonadal hormones such as testosterone are also involved in the expression of personality traits like sensation seeking, impulsivity, social dominance and sociability. Both testosterone and dopamine are involved in the type of sensation seeking (disinhibition) that seeks excitement through socialization (Zuckerman, 1990a; 1994). A deficit of dopamine in the reward centers of
the brain (nucleus accumbens) and the medial forebrain bundle limits natural euphoria, and the
tendency to engage in activities that normally produce these. In an individual chronically low in
dopamine, there may be a natural kind of anhedonia (absence of sensation of pleasure) and
asociality but in an individual who has been hedonically driven, a deficit in the neurotransmitter
would lead to compensatory activity in search of stimulation that would activate the
dopaminergic systems. Most drugs of abuse produce euphoria through activation of the
mesolimbic dopamine system (Bozarth, 1987; Zuckerman, 1986b; Zuckerman, 1984a;
Zuckerman, 1994).

Studies of alcohol tolerance in sons of alcoholics provide another possible biological marker
for alcoholism, one based on subjective and behavioral reactions to alcohol. Schukitt, (1988)
found that while blood alcohol levels in sons of alcoholics and sons of non-alcoholics are similar
after drinking, sons of alcoholics rate themselves as less intoxicated and show less impairment
on cognitive and behavioral tasks. An 8-year follow-up study of these subjects revealed that 43%
of those with a family history of alcoholism met criterion for alcohol abuse or dependence while
only 17% of those with no family history of alcoholism met criterion (Schukitt & Smith, 1996).
Further, level of reactivity to alcohol at age 20 was negatively related to the diagnosis of alcohol
abuse or dependence and number of symptoms 8 years later. The capacity for these prealcoholics
to “hold their liquor” better than non-alcoholics may contribute to their drinking larger quantities
and to developing a tolerance for alcohol. Genetic factors contribute to these alcohol reactivity
variables (Heath & Martin, 1992).

McGue, (1993) has conducted studies to identify genes associated with alcoholism and reports
that the disorder may be due to the absence of protective mechanisms as well as the presence of
genetic traits which might make alcohol more attractive to some individuals than others. Those
who get immediately ill after drinking alcohol are less likely to become alcoholics due to
aversive conditioning. A gene that affects the alcohol metabolizing liver enzyme acetaldehyde
dehydrogenase (ALDH) has been used to account for the low rate of alcoholism in people of
Asian descent relative to people of European descent. Another gene, the A1 form of the D2
dopamine receptor gene, has been linked to alcoholism in some studies but not in others (Noble,
1996; Uhl, Perisco & Smith, 1992). Individuals with the A1 allele seem to have fewer D2
dopamine receptors than others. Noble suggests that they attempt to compensate for this
deficiency by stimulating dopamine release in the reward circuits of the brain through use of
alcohol and other substances. This is consistent with the “endogenous deficit” theory of drug abuse (Zuckerman, 1986).

**Substance Use Disorders and Comorbidity**

**Axis I Disorders**

Alcoholism has comorbidity with some anxiety and depressive disorders (Helzer & Pryzbeck, 1988). Almost half of alcoholics have a second diagnosis (Helzer et al, 1991). Major depression is comorbid with many other disorders, but is two to three times more prevalent among alcoholics with a rate of 36%. Panic disorder is more than four times as frequent among alcoholics as among nonalcoholics. Males with posttraumatic stress disorder have a 52% rate of comorbid alcoholism and the rate is also elevated in women (Kessler et al., 1995). However, extreme stress does not necessarily increase rates of alcoholism. Unless there has been a previous history of alcoholism, most who drink excessively during a crisis resume their normal drinking patterns once the crisis is resolved (Kasl et al., 1987). Lisman (1987) reviewed research on the stress reduction theory of alcoholism and concludes that stress reduction by alcohol depends on other factors including attitudes towards alcohol and the personality of the subjects.

Studies of heavy drinking among adolescents and young adults show little concurrent or predictive validity for scales of neuroticism and anxiety or the Type 1 alcoholic classification (Zuckerman, 1987). Zuckerman concludes that longitudinal studies using personality assessments in childhood, prior to the development of alcoholism are needed in order to establish if anxiety and depression precede alcoholism.

In the ECA community study (Robins & Regier, 1991), those diagnosed with drug abuse or dependence were found to be at higher risk for every Axis I disorder except cognitive impairment. Comparisons of age of onset of the disorders with age of onset of substance abuse found that substance abuse more often preceded depression and mania. On the other hand, generalized anxiety disorder was equally divided between preceding and following the onset substance abuse (Rounsaville et al., 1991). Sixty percent of males and 30% of females diagnosed as having drug abuse or dependence also had a lifetime co-morbidity of alcohol abuse or dependence. Other studies have shown similar high rates of comorbidity between various types of drugs and alcohol (Rounsaville et al., 1991; Brooner et al., 1997). The high comorbidity among the different types of substance abuse and dependence suggests the construct of the “addictive personality” (J.C.Anthony, 1992).
**Axis II Disorders: Anti-Social Personality Disorder (ASPD)**

The importance of diagnosing Axis II disorders in substance abusers has often been overlooked and although substance abuse and personality disorder is the most common form of comorbidity, it is often not recognized as a form of dual diagnosis (Zuckerman, 1999). This becomes crucial in terms of intervention since treating an addiction without attending to the personality disorder is ineffective because the personality symptoms persist as major relapse vulnerabilities (Zuckerman, 1999). Likewise, treating the personality disorder without attending to the symptoms of addiction is ineffective because substance abuse reduces the retention, motivation and stability necessary for change (Zuckerman, 1999).

Research on the co-occurrence of substance use and personality disorders has focused on prevalence and prognostic significance (Verheul et al., 1998). The Cluster B personality disorders (Antisocial, Borderline, Narcissistic and Histrionic) are the most prevalent although clusters A (Paranoid, Schizoid and Schizotypal) and C disorders (Avoidant, Dependent and Obsessive-Compulsive) are also common in treated substance abusers. Rounsaville et al. (1998) found that the majority of substance abusers (70%) in a sample of 370 opiate, cocaine and alcohol dependent subjects met criteria for one or more personality disorders.

Various studies have shown a high incidence of anti-social personality disorder (ASPD) amongst substance abusers. About a quarter of male alcoholics and a tenth of female alcoholics have an ASPD diagnosis (Kessler et al, 1997). ASPD diagnoses in substance abusers are associated with an earlier age of onset of abuse, more severe dependence; a greater incidence of polysubstance abuse; and a poorer treatment outcome (Brooner et al., 1997; Cottler et al., 1995; Carroll, Ball & Rounsaville, 1993; Cacciola et al., 1994).

Research studies of substance abusers and the anti-social personality have found that antisocial traits precede and predict drug use (Newcomb & Bentler, 1990; Cloninger et al., 1988; Masse & Tremblay, 1997). By definition ASPD must begin in conduct disorder before the age of 15 and the average age of onset for the first symptoms is between 8 and 9 years of age for both genders (Robins & Regier, 1991). The median ages of onset for substance abuse in the ECA data are 18 and 21 years for males and females, respectively and the median ages of onset for bipolar disorder and depression are 19 and 25 years for males and females, respectively. The onset of ASPD far precedes these other disorders and is more prevalent in male substance abusers, whereas depression is more prevalent in female substance abusers (Hesselbrock, 1991).
The high comorbidity between ASPD and substance abuse suggests that they may share common genetic diatheses. However, research does not support this contention. Children of alcoholics who do not have ASPD are at risk for alcoholism but not for ASPD and children of the ASPDs who are not alcoholics are at risk for ASPD but not for alcoholism (Cadoret et al, 1985; Cloninger & Gottesman, 1987). The high rate of ASPDs who develop substance abuse is likely due to the fact that the ASPD personality is impulsive, sensation seeking, disinhibited and therefore likely to experience the desirable effects of substances early in life.

Trull & Sher (1994) studied psychopathology and personality using the Five Factor Model (Costa & McCrae, 1992). They found that high scores on “openness to experience” and low scores on “conscientiousness” characterizes substance abuse. Openness to experience is related to at least one type of sensation seeking (experience seeking) and conscientiousness is negatively correlated with impulsive sensation seeking in the alternative five-factor system (Zuckerman et al., 1993).

The co-occurrence of substance abuse and personality disorders is associated with greater substance abuse and psychiatric symptom severity (Brooner et al., 1997; Rounsaville et al., 1998) and increased risk for suicide, hospitalization, repeated treatment admissions, over-utilization of medical care, employment and legal problems, victimization or perpetration of abuse and HIV infection (Target, 1998). The presence of a personality disorder appears to make substance abusers more susceptible to relapse and interpersonal conflict (Kruedelbach et al, 1993; Smyth & Washousky, 1995).

**Typologies of Substance Use Disorders**

Research examining substance abuse typologies and related personality traits intersect and are driven by comprehensive models of personality. The relationship between common personality variables and substance abuse/addiction has been extensively investigated in the professional literature (Cloninger, 1987a; Babor et al., 1992; Zucker et al., 1995). Various theoretical models have been proposed including those that posit types of substance abusers (Cloninger, 1987a; Babor et al., 1992; MacAndrew, 1979; 1981). Others focus on common personality traits or dimensions associated with the onset and maintenance of addictive disorders (Zucker et al., 1995; Blackson, 1994; Cloninger, 1987; Casillas & Clark, 2002). A third model attempts to find a common underlying dimension of addiction proneness comprised of a single personality factor that correlates with several of the common personality dimensions that have been found to relate
to substance abuse (Barnes et al., 2000).

Identification of types of substance abusers began with research using a psychoanalytic approach (Knight, 1937). The etiology of alcoholism was viewed from the psychodynamic view as patients being fixated at an extremely immature level of personality development that is the passive, oral stage of psychosexual development. Knight labeled this as “essential” alcoholic types. In contrast, “reactive” type alcoholics were more likely to be compulsive and more reliable and fixated at an anal stage of development. The reactive type is more likely to have initiated alcohol use later in their lives and more likely to have an identifiable event that precipitated their excessive drinking. Drinking represents a regression back to a passive state of existence.

Jellinek (1960) created a different typological model of alcoholism in which he envisioned a variety of structural forms of the disorder. This taxonomy distinguishes between “disease” and “non-disease” types of alcoholism. Gamma and delta types were viewed as “disease –like” in that there existed a physical dependence on alcohol. Gamma alcoholism was seen as a progressive disorder in which cellular adaptation to alcohol and development of loss of control followed a predictable pattern. Gamma types are characterized by loss of control of drinking but they are able to retain the ability to abstain from alcohol between drinking episodes (binges). Delta types may be able to remain in control of drinking during the episode but are unable to abstain from drinking. Other forms such as alpha and beta types did not involve disease-like processes.

Jellinek’s conception of alcoholism does not represent a personality theory of alcoholism, per se, although the distinction between disease and non-disease types parallels that of Knight and did lay a foundation for future research to focus on identifying more severe forms of alcoholism as well as addiction to other substances. Research examining the disorder in terms of severity has involved a search for personality types that are associated with the more severe forms of alcoholism and other addictions. Personality types and models that have emerged in relation to substance abuse will be examined in more depth in the next section.

Cloninger (1987b) described two types of alcoholics, noting that the groups were originally differentiated in adoptees on the basis of symptoms expressed in relation to alcohol and by mode of inheritance (Cloninger et. al., 1981) and were later identified with unique temperamental profiles. Cloninger argued that these subtypes were syndromes associated with diametrically
opposed temperaments. Type 1 alcoholics, also referred to as milieu type or secondary type, Cloninger (1987b) asserted, had relatively late onset of alcohol problems, experienced guilt and fear in association with drinking, tended to lose control once drinking was initiated, infrequently engaged in alcohol-related anti-social conduct and rarely exhibited spontaneous alcohol-seeking behavior. Type 1 alcoholics were described as “emotionally dependent, rigid, perfectionistic, anxious, inactive, quiet, patient and introverted (Cloninger, et al., 1988, p.495). Type 2 alcoholics, also referred to as male type or primary type, had an earlier onset of alcohol-related problems, less ability to abstain from alcohol, more frequent alcohol-related anti-social behavior, less loss of control once drinking commenced and less guilt or fear associated with drinking than Type 1 alcoholics. Cloninger contended that Type 1 alcoholism predominated among women, while both types were prevalent among men, although most men hospitalized for alcoholism were Type 2 alcoholics.

Cloninger, Bohman & Sigvardsson (1981; 1988) provide support for the validity of two classifications of alcoholics that differ according to personality. Primary type includes individuals who are high on extroversion and secondary type, are individuals high on neuroticism. The former tend to have lower levels of neurotransmitters such as serotonin and dopamine and occur more commonly in males (Von Knorring, et al., 1985; MacAndrew, 1979, 1980, 1983). Further support for the concept of two main personality types comes from the research by MacAndrew (1979, 1980; 1983). MacAndrew indicates that 85% of the alcoholics identified by the MacAndrew Alcoholism Scale (MAC) are primary vs. secondary substance abusers.

Scheidt & Windle, (1997) hypothesized that the subtypes that have been associated with more severe alcoholic symptoms (e.g. ASPD, gamma or loss of control and binging/delta or continuous use with no loss of control; positive family history and other drug abuse) would also involve greater HIV risk behavior. This study evaluated the associations for HIV risk behavior and 5 typologies of alcoholism (gender, co-morbid psychopathology, gamma-delta, family history, and drug abuse). They found that gender, depression and anxiety were not consistently associated with HIV risk behavior; while ASPD, drug abuse, gamma-delta, and positive family history subtypes were significantly associated. The authors conclude that there may be an underlying or super-ordinate construct shared by ASPD, drug abuse, gamma-delta alcoholism and family history of alcoholism. These may include heritable personality traits such as high
novelty seeking (Cloninger, 1987) that have been associated with criminal behavior as well as early onset alcoholism.

The super-ordinate constructs that these authors propose were identified by Babor et al., (1992). This typology defined two subtypes of alcoholism. Type A or late onset alcoholism was defined by later onset, less severe dependence, fewer alcohol-related problems, and fewer childhood risk factors and less psychopathology. Type B or early onset was defined by early onset, more severe dependence, more chronic treatment history, childhood risk factors, familial alcoholism, poly-drug use, greater psychopathological dysfunction, and more life stress. The criteria for type B share a number of similarities with the subtypes associated with HIV risk in the Sheidt & Windle, (1997) study. In addition, the findings suggest the relevance of the ASPD comorbidity and drug abuse typologies.

Feingold et al., (1996) extended Cloninger’s (1987b) typology for alcoholism to other substances and found that 60% of subjects drawn from treatment clinics could be classified as Type A’s, equivalent to Type 1 alcoholics and 40% as Type B’s, equivalent to Type 2 alcoholics. Feingold’s Type A and Type B classifications of substance abusers suggest that one subtype (B) should have a background of antisocial personality with traits including poor socialization, sensation seeking, impulsivity and aggression and history of delinquency and criminality. Type A’s may have a more neurotic personality and substance abuse may be related to trauma or chronic stress.

Several theorists (Babor et al., 1992; Cloninger, 1987a; 1987b; Morey & Skinner, 1986) have related personality traits to alcoholism in the context of a multidimensional typological framework and Ball (1996) has extended this to drug abusers. The Type A/B model (Feingold, et al., 1996) is derived by cluster analysis of multiple indicators related to etiology, symptom expression, psychosocial factors and psychopathology. In contrast to the less severe Type A, Type B substance dependence is characterized by an earlier onset and more severe course of symptoms, impulsivity, sensation seeking, psychiatric symptoms, conduct disorder, positive family history and antisocial personality disorder (Babor et al., 1992; Ball et al., 1995). Type B’s also exhibit greater histories of aggression, criminality, violence, depression, suicide attempts, substance abuse and psychiatric treatment episodes.

Dush & Keen, (1995) concluded that the number of subtypes of alcoholics identified in studies using the MMPI with clinical samples is not stable over time and probably reflects transient
withdrawal symptoms. Results from adoption studies (Cloninger, Bohman & Sigvardsson, 1981) and longitudinal research conducted by Cloninger, Sigvardsson & Bohman, (1988) provide strong support for the validity of the two major classifications of alcoholics that differ according to personality characteristics. The Type 1 or neurotic alcoholic, low on novelty seeking (NS), high on harm avoidance (HA) and high on reward dependence (RD) is associated with later onset, more guilt and less frequent history of fighting and arrests. This type of alcoholic (milieu) is motivated to drink for tension relief and occurs in environments that are conducive to heavy drinking. Type 2 alcoholics are high on novelty seeking, low on harm avoidance and reward dependence and are characterized by an earlier onset and frequent fighting and arrests. This type is associated with lower levels of serotonin, dopamine and metabolites. This type of alcoholic is expected to be at greater risk regardless of the environment and is largely limited to males.

Studies of clinical samples of those in alcohol treatment have typically identified more than two clusters of alcoholics. Two studies using the MMPI (Sheppard, Smith & Rosenbaum, 1988; Dush & Keen, 1995), however, found that clusters that were identified during treatment were not enduring. After treatment a high psychopathic deviate score was the only enduring feature of the initial clusters.

### Personality and Substance Use Disorders

#### Comprehensive Personality Models

A number of influential approaches have been developed for specifying the number and nature of domains of personality. From these, three dominant models have emerged: 1) the Big Five Factor Model (Costa & McCrae, 1992; 1995); 2) the Alternative Five Factor Model (Zuckerman et al., 1997) and 3) The Big Three factor models (Cloninger, 1987a, 1987b; Eysenck & Eysenck, 1975; 1985; Eysenck, 1990). All of these models have received empirical support and are considered to have strong potential for systematically organizing the findings on personality and substance abuse (Martin & Sher, 1994; Sher & Trull, 1994). The personality systems of Cloninger (1987a; 1987b) and Eysenck & Eysenck (1975; 1985) both focus on the underlying neurobiological bases of personality that have implications for learning and psychopathology (Sher, Bartholow & Wood, 2000).

Cloninger’s “unified biosocial” model of personality (1986) has been one of the most influential theories proposed in the past 24 years. Cloninger developed the theory to account for the differences in the susceptibility of individuals with particular temperamental profiles to the
syndromes of chronic cognitive and somatic anxiety. Numerous accounts of the theory have been published (Cloninger, 1987a; 1994; Cloninger & Gilligan, 1987). One of the most important developments is the extension of the theory to the problem of alcoholism (Cloninger, 1987b).

The original model postulated three genetically independent but functionally interactive personality dimensions: Novelty Seeking (NS), Harm Avoidance (HA) and Reward dependence (RD) (Cloninger, 1986). Each trait was considered moderately heritable, developmentally and situationally stable and associated with specific neural systems mediating stimulus-response relationships of different types. Cloninger (1987b) related NS, HA and RD to brain systems regulated primarily by the monoamine neurotransmitters/neuromodulators dopamine, serotonin and norepinephrine. Subsequent discussions have examined brain systems underlying NS, HA and RD in greater detail (Cloninger, 1991).

Cloninger extended his original model to personality disorders (1987a) and alcohol use disorders (1987b), with the contention that normal and disordered personalities share a tridimensional structure but that individuals with personality or alcohol use disorders have extreme temperaments. For example, antisocial personality disorder (ASPD) is associated with a high NS, low HA and low RD profile. Cloninger (1987b) described two types of alcoholics (Type 1 & 2), noting that the groups were originally differentiated in adoptees on the basis of symptoms expressed in relation to alcohol and by mode of inheritance (Cloninger et al., 1981) and were later identified with unique temperamental profiles. Cloninger argued that these subtypes were syndromes associated with diametrically opposed temperaments.

Type 1 alcoholics, as previously discussed, had relatively late onset of alcohol problems, experienced guilt and fear in association with drinking, tended to lose control once drinking was initiated, infrequently engaged in alcohol-related antisocial conduct and rarely exhibited spontaneous alcohol-seeking behavior. Type 1 alcoholics had low NS, high HA, high RD profiles and were emotionally dependent, rigid, perfectionistic, anxious, inactive, quiet, patient and introverted (Cloninger, et al., 1988). Type 2 alcoholics had an earlier onset of alcohol related problems, less ability to abstain from alcohol, more frequent alcohol related antisocial behavior, less loss of control once drinking commenced and less guilt or fear associated with drinking than Type 1 alcoholics. Like individuals with ASPD, Type 2 alcoholics were believed to exhibit high NS, low HA and low RD traits and to be aggressive, impulsive, active, talkative and impatient.

As it relates to substance abuse, Cloninger’s model hypothesizes that brain systems of
behavioral activation, behavioral inhibition and behavioral maintenance will relate to heritable (genetic) dimensions of personality, labeled novelty seeking (NS), harm avoidance (HA) and reward dependence (RD). Novelty seeking is described as impulsive, excitable, exploratory, fickle, disinhibited tendencies. Harm avoidance refers to cautious, apprehensive, inhibited, and sensitive to punishment tendencies while Reward Dependence refers to ambitious, sympathetic, warm, industrious, persistent, moody and sentimental tendencies. These tendencies are assessed by the TPQ (Cloninger, 1987c). A number of studies have concluded that high NS consistently predicts alcohol and other substance abuse (Battaglia et al, 1996; Heath et al., 1997; Howard et al, 1997). NS is also highly correlated with impulsivity and sensation seeking (Zuckerman & Cloninger, 1996), a measure that shows strong relationships with substance abuse (Zuckerman, 1994).

Comprehensive models of personality such as the Big Three (Eysenck, 1991) or the Five Factor Model of personality (McCrae & Costa, 1987) have been utilized to succinctly characterize the personality profiles of substance abusers. In terms of the Big Three model, abusers appear to score high on measures of psychoticism and neuroticism (Rankin, Stockwell & Hodgson, 1982; Sher, Bartholow & Wood, 2000). The findings concerning the third dimension, Extroversion, have been somewhat discrepant as Rankin et al. (1982) observed low Extroversion in abusers while Jackson & Matthews (1988) observed high scores for abusers on Extroversion, sociability and impulsivity. Similarly in terms of the Five Factor Model of personality, individuals prone to abuse substances have been characterized by low Extroversion (Trull & Sher, 1994), low agreeableness (Flory et al., 2002; Martin & Sher, 1994; Trull & Sher, 1994), and low conscientiousness (Flory et al., 2003; Martin & Sher, 1994; Trull & Sher, 1994; Tucker et al., 1995) as well as high neuroticism (Martin & Sher, 1994; Sher et al., 2000; Trull & Sher, 1994) and openness to experience (Flory et al, 2002; Sher et al., 2000; Trull & Sher, 1994).

Eysenck & Eysenck’s (1975; 1985) model is composed of three broad dimensions including introversion-Extroversion (E), neuroticism (N), and psychoticism (P), assessed using the Eysenck Personality Questionnaire (EPQ, 1975) or the revised version (EPQ-R, 1988). Extroversion describes sociable, lively, active, assertive, sensation-seeking, dominant, tendencies. Neuroticism describes anxious, depressed, guilt feelings, tense, irrational, shy, moody, emotional tendencies and Psychoticism describes aggressive, cold, egocentric, impersonal, impulsive, antisocial, creative, tough minded tendencies. Like Cloninger’s model,
components of Eysenck’s model also have been linked with substance abuse. Specifically high scores on P and N have been associated with alcohol abuse (Heath et al., 1997; Kilbey, Downey & Breslau, 1998) and other substance abuse (O’Boyle & Barratt, 1993; Rosenthal et al., 1990; Zuckerman, 1993).

A review of the literature indicates that traits related to impulsivity-behavioral disinhibition are most strongly and consistently associated with substance use and abuse problems (Battaglia et al., 1996; Cloninger et al., 1995; Zuckerman, 1993; Health et al., 1997). The literature linking neuroticism-negative emotionality and substance abuse is somewhat less compelling (Sher & Trull, 1994; Sher et al., 1999) but still suggests a positive relationship. Extroversion-sociability has been less consistently related to substance use and abuse (Sher et al., 1999).

The personality systems of Cloninger (as measured by the Tridimensional Personality Questionnaire or TPQ) and Eysenck (as measured by the Eysenck Personality Questionnaire or EPQ) both have been linked to substance abuse (Sher, Bartholow & Wood, 2000). Sher, Bartholow & Wood (2000) examined the role of personality in predicting substance use disorders (SUD’s) using multidimensional personality systems both cross-sectionally and prospectively (over 7 years) to test the long-term predictive utility of personality constructs with SUDs. This approach is useful in that variables that predict both current (cross-sectional) and subsequent (prospective) substance use disorders can be considered that most important or diagnostic personality predictors. Findings revealed that traits related most clearly to disinhibition or behavioral undercontrol (i.e. TPQ-NS and EPQ-P) were most consistent predictors of SUDs both cross-sectionally and prospectively. This finding is consistent with previous work linking antisociality-disinhibition with alcohol involvement (Bates & Labouvie, 1995; Caspi et al, 1997, McGue et al., 1999). In addition, traits related to negative emotionality were reliable correlates of SUD diagnoses cross-sectionally while the link for Extroversion-SUD was weak and most implicated with respect to alcohol use disorders. The personality system assessed by the EPQ, especially the dimension of personality measured by the P scale added significantly to the prediction of a diagnosis of alcohol dependence. Further, the dimension of personality tapped by the NS on the TPQ was a predictor of other types of substance abuse prospectively, which is consistent with prior behavioral genetic research (Heath et al. 1995). The authors conclude that traits related to behavioral undercontrol are most relevant for predicting addictive phenomena in that the data linked NS and P to later SUDs. The systems of Cloninger and Eysenck provide
unique predictions of problems with alcohol and other drugs. These results provide further
evidence of the etiologic relevance of traits related to behavioral undercontrol for SUDs.

A growing consensus seems to validate what is referred to as the Big Five model of
personality (McCrae & Costa, 1987), typically characterized by dimensions of Neuroticism
(tendency to experience negative affect); Extroversion (gregariousness, excitement-seeking);
Openness-to experience (adventurousness, broad-mindedness); Agreeableness (helpfulness,
compassion); and Conscientiousness (dependability, responsibility) (Holden et al., 2006; Rolland
et al., 1998). Theakston et al., (2004) examined relations between the Big Five personality
domains and motivations for drinking alcohol with young adult drinkers. Findings suggest that
there are certain personality factors that are associated with vulnerability to SUDs and risky
internal reasons for drinking. Specifically, coping motives were predicted by low emotional
stability and enhancement motives were predicted by high Extroversion and low
conscientiousness.

Converging data in the literature suggests that most personality models identify at least four
common factors using different labels: 1) disinhibition (or impulsivity, novelty/sensation
seeking, low conscientiousness/constraint); 2) neuroticism (or negative affect, negative
emotionality, harm avoidance; 3) agreeableness (or cooperativeness, low hostility/antagonism)
and 4) Extroversion (or sociability, positive emotionality, reward dependence). The relationship
between personality traits, disorders and substance abuse is very complex (Ball, 2005). Research
provides sufficient data to suggest that addictive personality traits do exist and are strongly
related to the concept of externalizing disorders (Krueger et al., 1998 & 2002) that encompasses
disinhibitory personality traits (impulsivity, novelty/sensation seeking and low
conscientiousness/constraint) and antisocial personality and internalizing disorders.

Internalizing disorders encompass negative emotionality or affective traits (neuroticism),
mood and anxiety disorders (Krueger et al., 1998; Widiger & Clark, 2000). Traits associated with
both externalizing and internalizing disorders act as risk factors, mediators, moderators and
consequences of the development, progression and outcome of both substance abuse and
personality disorders. There have been mixed findings in the literature concerning whether
internalizing traits such as anxiety or depression are premorbid to or are consequences of
substance abuse (Barnes, et al., 2000). There is evidence to suggest that some of the traits that
were used to identify these symptom clusters, particularly those related to internalizing disorders.
such a depression and anxiety, tend to decrease following treatment (Barnes, 1983). For some substance abusers, anxiety and depression are secondary to their substance abuse while for others, these disorders are primary. This is consistent with MacAndrew’s (1981) view that secondary alcoholics, those who are low on the MacAndrew Alcoholism Scale, are likely “neurotics who just happen to drink too much.” MacAndrew (1979) hypothesized that primary substance abusers make up the bulk of treatment populations and the anxiety and depression exhibited by these abusers tend to reflect the consequences of their addictive histories.

**Personality Traits and Substance Use Disorders**

Research on personality traits has made significant contributions to understanding clinical syndromes such as substance abuse. Mounting evidence supports the role of constellations of personality traits and disorders that are commonly observed in substance abusers. There is converging evidence to suggest certain personality traits, especially psychoticism or P factor (including sensation seeking/novelty seeking/stimulus-reducing and impulsivity) are correlated with substance abuse, especially Type 2 or “male” typology. However, there is a need for more longitudinal data to corroborate findings that certain personality variables represent a vulnerability to developing substance disorders. Also, more research is needed to identify and validate measures that can predict vulnerability to abuse and addiction in order to enhance prevention and intervention efforts. Also, research using different populations is needed, focusing on populations at highest risk i.e. college students, young adults, and those with family positive histories, genetic predispositions and childhood behavioral problems. Research suggests that there may be underlying dimensions that can be identified which predict addiction proneness and this knowledge could potentially curtail the development of substance disorders, reducing the enormous costs to individuals and society of these problems.

**Psychoticism**

Early conceptualizations of alcoholism and drug addiction posited the existence of an addictive personality or character rooted in psychodynamic concepts of pathological dependency (Ball, 2005). The first two editions of the DSM (American Psychiatric Association, 1952; 1967) classified alcoholism and drug addiction as types of sociopathic personality disturbances and later under a broader category of personality disorders. This conceptualization changed with the DSM III (APA, 1980) and the differentiation of substance use from personality disorders through their re-location on separate axes. The separation of personality disorders from addiction was
consistent with the failure during the preceding two decades to identify a single addictive personality type (Sutker & Allain, 1988).

The biosocial theories of Cloninger, (1987a and 1987b) on the genetics of alcoholism also contribute to re-positioning personality traits in a central role in the area of SUDs. In his original model, deviations in Novelty Seeking, Harm Avoidance and Reward Dependence were related to specific neurotransmitter and behavioral systems underlying susceptibility for certain types of substance abuse as well as personality disorders. Cloninger’s Type 1 alcoholism, (a later onset, environmentally influenced, less severe and characterized by higher Harm Avoidance) versus Type 2 (earlier onset, greater genetic influence, higher chronicity and was associated with higher Novelty Seeking). With regard to personality disorders, high Novelty Seeking and low Harm Avoidance appeared to define a broader Impulsive trait often found in Antisocial Personality Disorder (Cloninger et al., 1995; Sher et al., 1995).

Research on the role of biologically influenced temperament and personality traits (impulsivity, aggression, sensation seeking) and addictive behavior provide evidence for the role of personality in substance abuse (Nathan, 1988). Theories of developmental psychopathology have described how heritable variations in behavioral disinhibition increases risk for problematic socialization and identification with a deviant peer group. Both of these factors are related to substance abuse and antisocial behaviors (Sher & Trull, 1994; Sutker & Allain, 1988; Tarter, 1988). Although a case for a single, unitary addictive personality concept cannot be made, there is strong support for the importance of traits related to behavioral disinhibition or impulsivity and interpersonal hostility. Cross sectional and longitudinal research conducted now implicate these personality tendencies in the initiation of substance use, the development of substance abuse and the maintenance of substance dependence (Barnes et al., 2000).

As evidence accumulates for the strong association among substance abuse, disinhibitory personality traits and antisocial personality disorder, it could appear that the field has come full circle in its view of an addictive personality. However, earlier notions of substance abuse as a sociopathic personality disturbance have been tested and replaced by more complex models (supported by family/genetic studies and longitudinal data) of the multiple interacting influences between personality traits, psychiatric symptoms and disorders (Ball, 1995).

Longitudinal studies (Cloninger, Sigvardsson & Bohman, 1988) have found a twenty-fold difference in the risk of alcohol abuse in adulthood predicted by childhood personality
characteristics. Labouvie & McGee (1986). The researchers found that adolescents who progressed to heavier levels of use tended to score lower on achievement and harm avoidance and higher on exhibition, impulsivity and autonomy. Bates & Labouvie (1995) reported that high impulsivity and disinhibition were associated with high risk for development of substance abuse problems. Other longitudinal studies have found associations between personality traits in childhood such as aggression, anxiety (Pulkkinen & Pitkanen, 1994) and novelty seeking and low harm avoidance (Masse & Tremblay, 1997) and development of substance abuse in adulthood. Vaillant & Milofsky (1982) found antisocial behavior in adolescence played an important role in predicting adult alcoholism.

Research in the drug abuse field is also consistent with an association between personality factors and drug abuse. Glantz & Pickens (1992), in a book describing longitudinal studies predicting the transition from drug use to abuse, concluded that drug use appears to be more a function of social and peer factors whereas abuse appears to be more a function of biological and psychological processes. Jessor et al., (1991) found that personality characteristics were the major factors associated with predicting the risk of problem behaviors including alcohol abuse. Research on high risk individuals or those with a family history of alcohol abuse has focused on such characteristics as stimulus augmenting/reducing, field dependence (Hennecke, 1984), anxiety and tension reduction (Finn, Zeitouni & Pihl, 1990).

A variety of factor analytic studies on personality structure (McCrae & Costa, 1985a, 1985b, 1987, 1989; Zuckerman et al., 1988) suggest that there are between three and seven major personality dimensions in general. Three main personality dimensions are described by the Eysencks (Eysenck, Eysenck & Barrett, 1985) including Introversion-Extroversion, Neuroticism and Psychoticism and have been repeatedly found in factor analytic studies, observed in different cultures (Barrett & Eysenck, 1984) and linked with biological vulnerabilities (Zuckerman, 1989).

Matano, Lock & Schwartz (1994) have summarized six studies using the MCMI. In these studies, a negativistic-passive-aggressive cluster occurred most frequently, followed by low psychopathology compulsive/conforming and narcissistic-anti-social-histrionic clusters. In a study using the Personality Assessment Inventory, Schinka (1995) found seven clusters that were labeled as depressed, dysphoric, antisocial, personality disorder, normal, somatic concerns and distressed.
**Impulsivity**

Within the drug and alcohol abuse literature, there has been increased interest in the construct of impulsivity (Bickel & Marsch, 2001; Kollins, 2003; Madden, Bickel & Jacobs, 1999; Moeller et al., 2001). Impulsivity is conceptualized as “behaving without thinking and without considering the risk involved in the behavior” (Parker, Bagby & Webster, 1993). Along with other traits, impulsivity is thought to contribute to a wide range of pathological behaviors including personality disorders, substance use, pathological eating and gambling (Barratt & Stanford 1995). Impulsivity has repeatedly been associated with substance abuse (Sher & Trull, 1994; Watson & Clark, 1993) including both alcohol (Sher et al., 1999) and polysubstance use (O’Boyle & Barratt, 1993).

Implicit in the concept of an impulse disorder is the presence of a repeated tendency to exhibit behaviors that are characteristically sudden, unpredictable and/or spontaneous, that occur without due deliberation or regard for their consequences and that occur under the influence of a compelling pressure that restricts the subject’s freedom of will (Sims, 1988). Impulsive behaviors do not occur only in the context of the specified Impulse Control Disorders (pathological gambling, intermittent explosive disorder, kleptomania; pyromania and trichotillomania) but are found across a broad spectrum of psychiatric disorders such as bulimia nervosa, sexual paraphilias, substance abuse disorders, borderline personality disorders and violent suicidal acts (Lacey & Evans, 1986). McCown (1988) found elevated Eysenck’s Impulsivity Questionnaire scores in multiple compared to single substance abusers. O’Boyle & Barratt (1993) found that multiple substance dependence was associated with higher Barratt Impulsivity Scale and Eysenck Personality Questionnaire Psychoticism scale scores as well as being associated with all three Clusters of personality disorders.

Blaszczynski, Steel & McConaghy, (1997) examined the role of impulsivity in pathological gamblers using the Eysenck Impulsivity scale. The research supports a model of pathological gambling in which the severity of associated behavioral and psychological disturbance is mediated by an impulsivity/psychopathy construct. This suggests that the trait of impulsivity in association with psychopathy is of clinical relevance to the understanding of pathological gambling and possibly other forms of addiction.

Casillas & Clark, (2002) studied the three personality traits of dependency, impulsivity and self-harm that fall within the disinhibition and Neuroticism domains to examine the relationship
between cluster B Personality Disorders (PDs) (i.e. antisocial, borderline, histrionic and narcissistic) and substance use disorders (SUDs) within a college student population. Results indicate that impulsivity and self-harm play a significant role in both cluster BPDs and SUDs, while the trait of dependency was not associated with either type of disorder. Findings suggest that cluster B PDs and SUDs are related and this relationship is due in part to the common factors of the broad based personality domains of Disinhibition and Neuroticism. Impulsivity was correlated with substance use, as measured by the Substance Abuse Screening Scale (SASSI-3; Miller et al., 1997) and found to be consistently associated with both Cluster B PDs and substance use, suggesting that this trait is central to the behavioral presentation of these disorders.

Flory et al., (2003) sought to test a theory that individuals with ADHD and Conduct Disorder (CD) are at special risk for substance abuse. Relations between childhood symptoms of ADHD and CD and young adult tobacco, alcohol, marijuana and hard drug use were examined. ADHD and CD symptoms were found to predict marijuana dependence and hard drug use and dependence during young adulthood, thus indicating a relationship between impulsivity and substance abuse.

**Sensation Seeking**

The theory of a sensation-seeking trait began with the hypothesis of individual differences in optimal levels of stimulation and arousal, expressed in certain types of activities and measurable in a self-report questionnaire (Zuckerman et. al., 1964; Zuckerman, 1969). It was first proposed that differences in the balance of excitatory and inhibitory processes in the central nervous system influenced the optimal levels of arousal sought in sensation-seeking activities. In the 1970s the model evolved to include genetic variations influencing the biochemistry of the central nervous system (Zuckerman, Murtaugh & Siegel, 1974; Zuckerman, & Neeb, 1979). Differences in activity of brain catecholamine systems influenced arousability of the higher cortical centers. Environment may determine the particular forms of expression of the trait, but the amount of variation in stimulation received during infancy could also influence the developing trait (Zuckerman, 1983b; Zuckerman, 1983f; Zuckerman 1990a).

Sensation seeking is a trait defined by the seeking of varied, novel, complex and intense sensations and experiences and the willingness to take physical, social, legal and financial risk for the sake of such experience (Horvath & Zuckerman, 1993). Sensation seeking has been
related to heavy drinking and early onset of drinking in preadolescents, adolescents, young adults and adult alcoholics (Zuckerman, 1987; 1994b). Type 2 alcoholics score higher on the Sensation Seeking Scale (SSS) than Type 1 alcoholics as predicted by Cloninger’s model (Oreland et al., 1988). Alcoholics who are high sensation seekers show tendency towards sociability, self-confidence, risk taking and uninhibited behavior (O’Neil et al., 1983).

Sensation seeking is part of a broader trait constellation called impulsive-sensation seeking (Zuckerman, et al., 1988; Zuckerman et al., 1991). Underlying IMPSS as well as Extroversion, is a mechanism that might be called “approach”. Sensation seeking represents the optimistic tendency to approach novel stimuli and actively explore the environment. Impulsivity is a style of rapid decision making in deciding to approach. Sociability is the tendency to approach social objects. All three of these traits are involved in the general approach disposition (Zuckerman, 1991).

All three components of approach have a genetic basis accounting for 40-60% of the variance (Zuckerman, 1994). Research suggests that underlying the approach trait at the biological level are the monoamine neurotransmitters and the gonadal hormones. Neurotransmitters such as dopamine, serotonin and norepinephrine and enzymes such as monoamineoxydaze (MAO) have been implicated in determining individual approach tendencies (Zuckerman, 1994).

Age and gender are the most powerful demographic influences on sensation seeking. Sensation seeking is higher in men than in women, rises between ages 9 and 14, peaks in late adolescence or early 20s and declines steadily with age thereafter (Russo et al., 1991; Carton et al., 1992). Demographic differences suggest alternative hypotheses of explanation including social learning and biological-developmental tendencies. Demographic data on sensation seeking are consistent with known gender and age risk factors pertaining to driving accidents, criminal violations and other phenomena on which young males are the group at highest risk (Eysenck et al., 1985; Zuckerman, 1994).

Sensation seeking is related to alcohol and drug use in preadolescence and adolescence. As well, the early adolescent sensation-seeking trait predicts later substance use (Zuckerman, 1999). Young alcohol abusers score higher than nonusers of alcohol or drugs but not as high as drug users, particularly those who use drugs beyond marijuana. Marijuana tends to be the first illegal drug used and is favored by the younger, higher sensation seekers (Zuckerman et al., 1988; 1991).
In a Swedish longitudinal study of boys, severe aggressiveness and hyperactivity at age 13 predicted both criminality and alcohol abuse in adults (Magnusson & Bergman, 1990). Caspi et al., (1997) conducted a short term prediction study from personality traits assessed at age 18 to alcohol dependency at age 21 and found that those who were alcohol dependent at 21 had low scores on scales of Traditionalism, Harm Avoidance, Control and Social Closeness and high scores on Aggression, Alienation and Stress Reaction.

Similar to Cloninger’s novelty seeking dimension, Zuckerman’s sensation seeking has been consistently related to substance abuse in adolescents and adults (Zuckerman, 1994). Higher sensation seeking has been associated with vulnerability to use, chronicity of dependence and co-occurring psychiatric disorders (Ball, 2002b). Longitudinal research links sensation seeking and behavioral disinhibition with adolescent deviance and substance abuse in young adulthood (Caspi, et al., 1996; Iacono et al., 1999; Labouvie & McGee, 1986; Newcomb & McGee, 1991). From a five-factor model perspective, substance abuse as well as personality disordered patients evidence high Neuroticism and low Agreeableness and Conscientiousness and these trait elevations correlate with clinically significant problems in other areas (Ball, 2002b).

Sensation seeking has been found to be associated with exclusive alcohol dependence and impulsivity with higher rates of antisocial personality disorder and cocaine and alcohol dependence in substance abusing women (Conrad et al., 2000). In youth, elevated levels of sensation seeking have been linked to drug use (Hansen & Breivik, 2001; Piko, 2001).

Parent & Newman, (1999) studied the relationship of sensation seeking to alcohol use and risk taking behaviors in female college students. They found that sensation seeking appears to play a mediating role in alcohol use and risk taking behavior within this population.

Disinhibition (DIS) a subscale measure of sensation seeking has been theorized to increase risk for alcohol use, abuse and dependence (Cloninger, 1987; Finn, Kessler, & Husson, 1994; Sher & Trull, 1994). The DIS subscale of the Sensation Seeking Scales (SSS, Forms IV and V; Zuckerman, 1979) has been associated with alcohol use and the development of alcoholism (Zuckerman, 1994). Darkes, Greenbaum & Goldman (1998) studied the predictive validity of the DIS with drinking in college students and concluded that disinhibition, as measured by the DIS, maintains a reliable association with alcohol use.

The fact that anxious and neurotic patterns diminish rapidly in those drug abusers who are abstinent or in a treatment program for several months suggests that anxiety is reactive to the
physiological, social or legal stresses associated with chronic drug abuse rather than a part of the substance abuser’s personality. Sensation seeking and impulsivity, however, seem to be a central part of the substance abuser’s personality and do not abate after the abuser discontinues drinking or drug use (Zuckerman et al., 1998; Zuckerman, 1991).

The earlier theory of optimal arousal related to sensation seeking predicted that this trait would be positively related to use of stimulant drugs and negatively related to use of depressant drugs (Zuckerman et al., 1988). The cumulative evidence, however, suggests that sensation seeking is related to the extent of illegal drug use and the variety of drugs used (poly-drug use) rather than to the use of specific classes of drugs (Zuckerman et al., 1988; Zuckerman, 1991). Sensation seekers seem to be motivated to use all types of drugs by their need for novel experiences and curiosity. Initially, they tend to use the drugs to get the “high” or euphoria/pleasure produced by the drug. After tolerance for the drug and dependence develops, however, sensation seeking is probably irrelevant to continued use of the drug. Sensation-seeking drug users start by seeking positive arousal (reinforcement) but end by using the drug to reduce negative arousal (withdrawal effects/negative reinforcement) and maintain an optimal level of arousal that may be considerably lower than where they started (Zuckerman et al, 1988; 1991; Zuckerman, 1994).

In summary, there are certain personality traits (novelty seeking or sensation seeking, impulsivity and hostility/disagreeableness and disorders (antisocial) that are very common and seem to precede and not simply to be consequences of addiction. These traits and disorders appear to influence symptom severity, continue to be present and interfere with psychosocial functioning once abstinence is achieved and create significant ongoing risk for relapse. These dimensions can be conceptualized together under a broader construct that has been variously labeled behavioral disinhibition, disinhibitory psychopathology or externalizing disorders (Krueger et al., 1998; 2002). Substance abuse and this constellation of disinhibitory personality traits are related to earlier age of onset, poly-drug use, chronic/heavy use, conduct and antisocial personality disorders, substance dependence severity, HIV risk behaviors, psychiatric symptoms, mood disorders, family history and early dropout (Ball, 2002b). These traits appear to define individuals at higher risk for developing a severe subtype of the disorder (Ball, 1995). Although research now supports an important role for personality, the differentiation of substance abuse behaviors from specific personality traits (disinhibitory) and disorders (antisocial) remains at the core of assessment and diagnosis (Krueger et al., 1998).
Measurement of Substance Use Disorders/Addiction Proneness

Increased research efforts to refine the measurement of personality traits may facilitate the identification of types of individuals at increased risk for substance use disorders (SUDS) toward whom prevention efforts can be targeted and to understanding the relapse vulnerabilities of addicted individuals (Ball, 2002b). Active substance abuse results in significant changes in cognitive, emotional and social functioning and these problems mimic many of the symptoms of personality disorders but may not accurately reflect baseline personality functioning. Ball (2005) recommends the use of multidimensional personality inventories in assessing personality traits, problems and disorders in substance abusers.

Several instruments have been developed as measures of the addictive personality. The most prominent include the MAC (MacAndrew, 1965); Eysenck Addiction Scale EPQ-A (Gossop & Eysenck,1980). The MAC was designed to discriminate adult male alcoholics and psychiatric outpatients while the EPQ-A discriminated a clinical sample of substance abusers and normals. Neither instrument was developed to assess premorbid personality traits related to SUDs. A variety of other SUD scales have also been derived using various forms of the MMPI. In general, the scales that were developed used predominantly male clinical samples, assessed older individuals, made comparisons with other psychiatric samples and focused primarily on alcohol. These scales have not been used to prospectively predict new cases of addictive behavior.

The MMPI’s clinical, supplemental and special scales have been used to provide measures of personality traits and substance abuse (i.e. MAC-R, APS; AAS; PAI). The MacAndrew Alcoholism Scale (MAC; MacAndrew 1965) was developed to differentiate alcoholic from nonalcoholic psychiatric patients. The MAC-R scale has been described as assessing an addiction-prone personality. It is suggested that higher MAC-R scorers are at greater risk for developing substance abuse problems even if they are not currently abusing substances. The existing literature does not support such interpretations. The relationships between MAC scale scores and current substance abuse do not address the issue of predicting such abuse amongst persons who currently are not abusers (Graham, 2000). The MAC-R was not developed to assess premorbid personality traits related to SUD’s. Other substance abuse scales derived using
various forms of the MMPI (McAndrews, 1986; Weed et al., 1992 and 1994) use older alcohol using male samples and were not used to predict new cases of SUD’s.

In addition, research by Butcher et al., (1989) suggests that the MAC-R does not seem to have sufficiently strong internal consistency. Moreland (1985b) reported modest test-retest reliability (1 week interval .62 and .78 respectively). After reviewing 74 empirical studies, Gottesman & Prescott (1989) questioned the routine use of the MAC-R scale in clinical and employment settings. They indicated that the evidence for the use of the MAC-R scale to identify substance abusers is not as compelling as many users assume (Graham, 2000).

It has also been suggested that the MAC-R scale measures general antisocial tendencies and not specifically substance abuse. Research indicates that MAC-R scores may be a function of both psychiatric diagnosis and substance abuse. Subjects with diagnoses of antisocial personality disorder often obtain relatively higher scores on the MAC-R scale whether or not they abuse substances (Wolf et al., 1990). Thus, non-abusing patients with diagnoses of antisocial personality disorder are often misidentified as having substance abuse problems. Also, persons who previously abused substances but no longer do so may still obtain high scores on the MAC-R scale.

Weed et al., (1992) developed the Addiction Acknowledgement Scale (AAS) using items in the MMPI-2 that have obvious content related to substance abuse. Persons who score high on the AAS are openly acknowledging substance abuse problems and additional assessment in this case is indicated. The meaning of low scores is less clear but persons not wanting to reveal substance abuse problems can easily obtain lower scores since the content of the items is obvious.

Weed et al. (1992) using the MMPI-2 item pool also developed the Addiction Potential Scale (APS). Sawrie et al. (1996) factor analyzed the items in the APS scale and identified five major clusters of items: satisfaction/dissatisfaction with self; powerlessness/lack of self-efficacy; antisocial acting out and risk taking/recklessness. The limited data available concerning the APS suggest that it has some promise for discriminating between persons who abuse substances and those who do not (Greene et al., 1992; Rouse et al., 1999). Examination of the content of the APS items suggests that scale may reveal aspects of antisocial personality. Therefore, like the MAC-R, the scale may have difficulty in discriminating between persons who abuse substances and those who have other features of anti-social personality disorder but who do not abuse substances. The label of Addiction Potential suggests that the scale assesses a potential for or
vulnerability to substance abuse whether or not that abuse is currently taking place. Available data address the ability of the scale to identify persons who currently are abusing substances or have done so in the past. The extent to which the scale can predict future abuse and identify current abuse by persons who are denying abuse remains to be investigated. Therefore, Graham (2000) concludes that it is not appropriate to reach conclusions about substance abuse on the basis of the MMPI-2 subscale scores alone. High scores on the MAC-R and APS should be taken to mean that additional information concerning possible substance abuse should be obtained.

Schuckit et al., (1994) report that a number of longitudinal studies find limited evidence that existing scales are useful in predicting future cases of SUD’s. Studies have been hindered by small sample sizes and the exclusion of measures of ASPD; restricted item pools (MMPI items only); and use of clinical or convenience (college student populations). The authors conclude that in order to identify personality traits premorbid to diagnosable clinical SUD’s, data from general population samples is preferable. Once traits related to SUD’s are identified in general populations, clinical and convenience samples could then be used for further validation. This would likely increase the chances of identifying personality traits premorbid to SUD’s. The use of a wider sample of personality items using a diverse set of personality batteries would increase reliability and validity of measures. The development of the APP Scale represents the first such attempt at refining measurement of premorbid personality factors predictive of SUDs.

**Development of the Addiction Prone Personality (APP) Scale**

There has been considerable debate in the substance abuse and personality literature regarding the role of personality characteristics in predicting substance abuse (Barnes et al, 2000). The problem has been that historically, the majority of studies have been cross sectional in nature comparing clinical samples with poorly matched controls. Also, few studies have used comprehensive measures of constructs to discriminate alcoholics in clinical samples from non-alcoholics in general population samples. Past efforts to develop a measure of an addictive personality have resulted in limited success and have largely been based on a limited item pool from the MMPI and MMPI-2.

Barnes et al., (2000) set out to investigate the relationships between personality characteristics and alcohol abuse using 4 strategies or stages. They used a two year slice in the life span study designed to predict the risk of alcoholism, and used comprehensive measures of the personality constructs that have been found to discriminate alcoholics in clinical samples from non-
alcoholics in a general population sample. The test battery included personality items from the Revised Eysenck Personality Questionnaire (EPQ-R, Eysenck, Eysenck & Barrett, 1985); two research scales from the MMPI, Ego Strength (ES; Barron, 1953) and the MacAndrew Alcoholism Scale (MAC; MacAndrew, 1965); the Vando Reducer-Augmenter Scale (VANDO; Barnes, 1985; Vando, 1969); the trait subscale of the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970) and the Rosenberg (1965) Self-Esteem Inventory (SEI). The investigation resulted in the development of a measure of the prealcoholic personality which was achieved by selecting items from a broader item pool than the MMPI-2. The criterion chosen for item selection was significant association with a family history of alcohol abuse (FH+); either mother or father scoring above a value of 5 on the Short Michigan Alcohol Screening Test (SMASH; Pokorny, Miller & Kaplan, 1972) and significant association with the person’s own current abuse. Alcohol abuse was determined by the DIS criteria (Diagnostic Interview Schedule; Robin et al., 1989). Correlations between personality items and FH status were calculated to determine which personality items best discriminated between FH+ and FH-status. These 63 items (p<.001) were then correlated with alcohol status to determine which of these best further discriminated between ALC+ and ALC-. The resulting Prealcoholic Personality (PAP) Scale consisted of 23 items.

Four main research strategies were employed in their investigation. The first strategy employed was to conduct a general population longitudinal study called the Winnipeg Health and Drinking Survey (WHDS) of the relationship between personality and alcohol abuse. The aim was to examine patterns of association between latent personality factors and alcohol use and abuse patterns. The unique contributions of this study included gathering data on a large representative sample of adults residing in Winnipeg, Canada, aged 18-65, and following them over a two-year period. This represents an epidemiological approach to obtain general population estimates on patterns of alcohol consumption and prevalence of alcohol abuse measured by a variety of indicators. The use of multiple measures of personality constructs as predictor variables and alcohol use and abuse dependent variables was analyzed by structural equation modeling (Bentler, 1995) to test the patterns of associations between personality and alcohol use and abuse.

The second research strategy employed in this investigation was to supplement the data gathered in the WHDS with a clinical sample of alcoholics and drug addicts. The rationale was
that clinical samples represent extreme cases of the disorder being investigated that may not be accessible in the general population. This strategy would help to determine which personality factors were effective in predicting alcohol use and abuse in the general population and in discriminating clinical alcoholics from non-alcoholics. The addition of a 6-month follow-up in the clinical sample provided an association between personality and treatment outcome.

The third research strategy was to conduct a general population family survey (Vancouver Family Survey (VFS) to examine the association between aspects of the family environment and the development of the prealcoholic or addiction-prone personality. The design included biological and adoptive families and examined family socializing patterns and influences of both parents and one offspring (eldest child, living at home between ages of 15-24).

In the fourth stage of the investigation, the researchers attempted to develop a measure of the prealcoholic personality. MacAndrew (1979) suggested that a test designed with this specific purpose in mind might be effective in predicting the risk of the development of alcoholism. The availability of a general population longitudinal sample allowed the development of a subset of personality items that were designed specifically to predict the development of alcoholism. The availability of a clinical sample and a second general population sample from the VFS provided an opportunity to conduct further reliability and validity analyses on this measure.

Using the data from the combined sample of general and clinical populations, it was determined that the majority of the 23 items of the PAP correlated positively with each other, suggesting a large general factor. Factor analysis and further validation of the PAP found correlations with demographics in a manner similar to the prevalence of alcohol abuse in other studies (higher number of males and younger individuals) and trait measures of personality constructs were consistent with overall pattern of personality and alcohol abuse in the literature (higher P, SR, N, anxiety, lower Ego Strength (ES) and lower self-esteem. The PAP identified high levels of alcohol abusers in the clinical sample and even higher for polysubstance users and cigarette smokers. These results led to the reconceptualization of the PAP to proneness for addiction in general. Two face valid items with direct content to substance abuse were eliminated, resulting in the 21-item Addiction Prone Personality measure (APP). The APP was further validated using the VFS supporting the external validity of the APP.

In the WHDS general population, the APP was found to be a consistent predictor of new incidences of alcohol problems over a 7-year follow-up (Anderson, Barnes & Murray 1999). The
APP was a significant predictor above other inventories based on dimensional models such as the EPQ-R (Eysenck, Eysenck & Barrett, 1985); the short Five Factor Inventory (FFI; McCrae & Costa, 1991) the short Temperament and Character Inventory (TCI; Cloninger et al., 1994) and the impulsivity (IMP) and sensation seeking (SS) subscales of the Sensation Seeking Scale (SSS; Zuckerman & Kuhlman, 2000). The APP correlated with personality scales in a manner consistent with what would be expected if measuring an underlying vulnerability to addiction as reflected in the literature. Therefore, the researchers concluded that the APP Scale may access an emergent dimension of addiction proneness and appears to be a reliable and valid measure of personality characteristics related to addiction proneness and may contain a large, underlying general factor (Barnes et al., 2000).

In terms of prevalence of alcohol abuse, Barnes et al., (2000) results suggest that the highest abuse rates in the general population occurred among the young, male, English speaking and unmarried respondents. These results are consistent with findings reported in previous surveys on the epidemiology of alcohol abuse (Bland et al., 1988).

In terms of the correlational analyses of personality constructs and substance abuse, results were consistent with expectations that alcohol use and abuse would be higher for respondents who scored higher on psychoticism, stimulus reducing (sensation seeking), and neuroticism.

In the structural equation modeling analyses, the neuroticism and psychoticism dimensions emerged as anticipated while ego strength did not emerge as its own factor but loaded on neuroticism. On the Extroversion factor, it was decided to allow a separate factor to emerge for stimulus reducing-augmenting rather than allowing this dimension to load on the Extroversion factor since this fit the data best and separated out the component of Extroversion that was most directly linked with alcohol abuse. The sociability facet of Extroversion was not linked with alcohol abuse whereas the impulsivity/sensation-seeking component was. The personality structure is complex due to the multifactoral nature of some of the measures used such as the MacAndrew Alcoholism Scale (MAC) and Ego Strength (ES) Scale and the Vando Augmentor/Reducer Scale. However, this structure proved to be stable across time and age and gender groups (Barnes et al., 2000). A similar personality structure emerged in the clinical sample and provided further evidence for the generalizability of this structure. The data supported a dual pathway model of alcohol addiction (use/abuse). In the first wave of data, alcohol use was predicted by a stimulus-reducing factor, and the psychoticism dimension
predicted substance abuse. The stimulus-reducing factor is comprised of high scores on the Vando Reducer scale and high scores on Ego strength. Stimulus reducers on the Vando Scale are also higher on sensation seeking (Barnes, 1985b; Dragutinovich, 1986). Zuckerman (1994) has acknowledged that the content of the Sensation-Seeking Scale and the Vando R-A Scales is similar and equivalent in what they measure.

The first pathway to abuse starts with stimulus reducing, or sensation seeking. This trait appears to lead to alcohol/drug consumption and over time, heavier consumption that contributes to behavioral and emotional problems. Longitudinal studies (Cloninger et al., 1988; Bates & Labouvie, 1995) have supported the relationship between novelty seeking or sensation seeking and the development of substance use. Zuckerman (1994) suggests that sensation seeking is very important in the initiation of substance use but less important in the maintaining of use after tolerance and dependence have developed.

The second pathway to abuse is a more direct pathway that leads from the Psychoticism dimension to abuse. The Psychoticism variable is comprised of higher Eysenck Psychoticism scores, lower social conformity (Lie scale scores) and higher MacAndrew scale scores. This dimension is linked with higher impulsivity and lower self-regulation. Individuals that are high on the psychoticism factor are more prone to develop alcohol problems. Numerous longitudinal studies have shown a link between P (psychoticism) related characteristics such as impulsivity (Hagnell et al, 1986), undercontrolled temperament (Caspi et al., 1997), antisocial characteristics (Rydelius, 1981), low agreeableness (Gotham et al., 1997), psychosis proneness (Kwapil, 1996), hyperactivity (af Klintenberg et al., 1993), and alcohol abuse. The longitudinal analyses using the personality measures showed that the personality traits assessed were extremely stable across time. These results are consistent with previous studies showing high correlations for personality traits assessed across time (McCrae & Costa, 1984).

In the longitudinal analyses predicting alcohol use and abuse, a family history of alcohol abuse was related to subsequent alcohol abuse both directly and indirectly. One pathway from family history to abuse went through the psychoticism (P) dimension. In families where alcohol abuse is common, high P characteristics may be prevalent, and these traits may be passed on directly to offspring via genetic transmission (Eysenck, 1978). High Psychoticism characteristics and alcohol abuse may also disrupt the family environment and produce less effective parenting. This can indirectly lead to the development of addiction-prone personality characteristics.
Personality traits were also used to predict the level of alcohol use and abuse at admission to treatment, and treatment outcome with the clinical sample. The treatment sample scored much higher on neuroticism and related characteristics than the non-treatment sample of alcoholics. It seems likely that at least some of the distress or high N (neuroticism) is due to the distress arising from their addiction. The clinical study did not assess personality following treatment to determine whether or not symptoms of neuroticism would decline following treatment. Other studies have shown declines in neuroticism and related characteristics following treatment (Schuckit, Irwin & Brown, 1990).

The personality factor of Psychoticism emerged in both the clinical population and the general populations, while the stimulus-reducing/sensation-seeking factor did not prove significant. This adds credence to Zuckerman’s contention that sensation seeking and related traits are more important in the earlier stages of the development of substance abuse. Higher N in the clinical sample is consistent with tension-reducing explanations for alcohol abuse and may be more evident as abusers progress in their disorder.

In terms of alcoholic subtypes, the results of the cluster analyses suggest that two major clusters of alcoholics occurred in both the general population and clinical samples. More extreme scores on scales indicative of high P characterize one of these clusters and the other by more extreme scores on scales indicative of high N. This first cluster displayed characteristics of a difficult temperament and had more severe dependence on substances and a stronger family loading for alcohol abuse. These results are consistent with those of Babor et al., (1992), Blackson (1994), and Zucker et al., (1996) regarding the two major types of alcoholism. The family socialization study examined linkages between aspects of the family environment and the occurrence of addiction prone personality traits in biological and adoptive families. Higher scorers on the Addiction Prone Personality Measure (APP) of the children were found in families characterized by lower levels of parental care and higher score on parental APP characteristics. This suggests that the APP does not measure a temperament that is largely determined by genetics but measures personality or character traits that are partly under environmental control.

In summary, one of the main objectives in this research was to develop a measure of the prealcoholic as opposed to the clinical alcoholic personality. The research was designed to develop a test that would be useful as a predictor of an individual’s vulnerability to developing alcoholism by selecting a set of personality items associated with both a family history of alcohol
abuse and current alcohol abuse. Results suggest that the scale has satisfactory reliability and validity and was useful in predicting the development of alcohol abuse problems in the longitudinal analyses. The Prealcoholic Personality Test combines elements of the two latent personality factors, stimulus reducing (sensation seeking) and psychoticism that were important in predicting alcohol abuse in the general population sample. Cross validation of the test in the clinical sample demonstrated that the test was reliable and valid in the clinical sample and able to discriminate alcoholics from non-alcoholics. The Prealcoholic Personality Test was found to be as strongly linked with the risk of other drug abuse problems as with the risk of alcohol abuse. This discovery culminated in the authors (Barnes et al., 2000) renaming the test the Addiction Prone Personality or APP Measure, a 21-item, forced choice scale. Finally, scores on the APP Measure were successfully used to predict treatment outcome for both alcohol and drug addicts. The APP may be useful as an overall screening tool to determine the likelihood of lifetime prevalence of substance use disorders and to determine whether additional assessment is necessary and where/how to focus intervention efforts.

**Dimensions of the APP**

Anderson (2003) examined the APP using 4 samples from the Barnes et al., (2000) data (WHDS general and clinical samples, VFS adult and youth samples) to determine whether the instrument measures a single underlying dimension/trait or several dimensions and whether different groups of individuals with similar overall APP scores respond similarly to individual items on the APP. In addition, Anderson investigated whether the APP could best be conceptualized as representing a continuum of risk for addiction or as a measure that distinguishes between different naturally occurring groups of individuals. Anderson (2003) explored the relationship between items of the APP in several samples using procedures designed to evaluate dimensionality, differential item functioning and taxometric status.

Findings suggest that while there appears to be a large general factor underlying the APP, it is a multidimensional measure with auxiliary or sub-dimensions named sensation seeking (SS), negative views towards one’s life (NV) and impulsivity/recklessness (I/R). Statistical analyses reveal that there are bundles of items related to these auxiliary dimensions that function differentially by gender and age cohorts. Specifically, given the same level on other APP items, males and younger individuals tended to exhibit higher levels of sensation seeking. Older individuals tended to endorse more items related to impulsivity/recklessness. Females, regardless
of age group, tended to show more negative views given the same level on other APP trait items. Older males tended to show more negative views than younger males.

The author concludes that a simple taxonomic model does not appear to fit the data but that there is evidence that a more complicated configural or “latent class model” containing three distinct classes provides a good fit in three of the samples studied (WHDS general and clinical samples and the VFS adult sample). The three classes across the three samples included one that appeared to represent individuals who tended to score relatively low on the APP overall, having item thresholds that tended to be relatively high. Another class tended to have relatively high item thresholds for most items but had thresholds that were considerably lower for sensation-seeking items. Individuals in this class tended to score somewhat higher on the APP. The third class tended to have lower thresholds overall and tended to score the highest on the APP. In the VFS youth sample, two of the three classes i.e. the low and the high APP scorers were also identifiable but only when the data were forced into a three class model. Tests of external validity revealed that the overall APP score served as the best predictor in regression equations for all the samples. The overall APP score was able to explain from 12% to 27% of the variance in the general population sample and from 7% to 8% of the variance in the clinical sample.

Anderson concludes from the results that the APP dimensional and taxonomic structure is complex. The APP is comprised of several correlated sub-dimensions. These dimensions correspond with personality dimensions that were found to be associated with higher levels of alcohol and other substance abuse in the previous research using structural equation modeling (Barnes, et al., 2000). The SS sub-dimension corresponds with S-R factor and IMP/R sub-dimension is related to IMP and DIS, both part of the P factor. NV sub-dimension is related to some of the cognitive/affective components of the N factor. The N factor was not directly related to alcohol consumption or problems in the general population sample; however, N was correlated with P and was also correlated with P in the clinical sample.

There appear to be two personality pathways directly related to alcohol consumption and problems. This finding is consistent with other research using structural equation modeling (Finn et al., 2000). The two personality factors were named excitement/pleasure seeking (EPS) and social deviance proneness (SDP). SDP was directly related to an alcohol problems factor in their model and is related to P in the Barnes et al., (2000) and Anderson (2003) models. EPS is conceptually related to SR in the latter models and was directly related to an alcohol
consumption factor. Finn et al. (2000) did not include measures of neuroticism related traits so the relationship between N and alcohol abuse/dependence was not studied in their model.

The existence of multidimensionality in the APP measure does not preclude the importance of an underlying single dimensional construct as well. The sub-dimensions could be viewed as auxiliary dimensions of the APP and as such, could contribute to an underlying construct as well as measuring a separate dimension. Therefore, there could be an underlying single dimensional construct. The auxiliary dimensions all serve to contribute to the risk of developing an addiction. They may also identify different sub-dimensions in which individuals may differ without having significantly different levels of the underlying APP construct. Gender and age differences accounted for some of the variability in these sub-dimensions in these samples. The sub-dimensions could be considered specific constituents of a more general addiction-proneness personality construct. Sher et al., (1991) posit a broad construct named “behavioral undercontrol” as a personality risk factor related to the development of substance abuse. This construct has also been labeled “behavioral disinhibition” (Young et al., 2000). Anderson (2003) proposes a reconciled model in which the related constructs of EPS and SDP and a construct related to negative affect could be subsumed under the larger more general construct. Overall scores on the APP may be viewed as self-report measure that is positively related to that larger, more general construct. It may prove valuable as a screening tool for research purposes or as a general measure of risk due to behavioral undercontrol/disinhibition.

Although there was some evidence that an underlying taxonomic structure may be present, strongly consistent patterns across all variable and techniques were not observed. A simple taxonic structure could not be ruled in or out using this methodology. Anderson concludes that alternative statistical methods may help to identify inter-relationships between variables. There were strong similarities between the three latent classes that were detected in this study and the results of other recent research.

In the area of neuropsychological research, there have been recent studies exploring how cognitive-affective functioning influences decision-making using both cognitive and physiological measures to identify decision-making biases and deficits that separated substance dependence individuals into three distinct groups (Bechara & Damasio, 2002; Bechara, Dolan & Hindes, 2002). This line of inquiry may be theoretically relevant in terms of better understanding how underlying neurological processes may be linked to observable personality traits. Based on
the results of this research, there appear to be two processes that affect decision-making biases in substance dependent individuals. One is characterized by insensitivity to future consequences (both positive and negative) due to impairments in processing somatic states. Another process involves impairments in decision-making that are primarily driven by hypersensitivity to reward. This hypersensitivity to reward is compounded by a hyposensitivity to punishment. These findings provide a parallel to the findings of prior studies that have identified two pathways to addiction involving personality factor (Barnes et al., 2000; Finn et al., 2000) but also the findings of possible configural taxonicity in addiction-proneness in Anderson (2003) study. Anderson concludes that the latent classes identified in his study arose in part due to the influence of biological underpinnings.

In terms of the clinical significance of these findings, Anderson (2003) suggests that if further validation supports the notion that the different configurations reflect different physiological processes, then latent class membership may be useful in clinical assessment and treatment planning. For example, members of the low APP class may exhibit problems with substances that could be conceptualized as being “reactive” or situational vs. “essential” or personality variables. Members of the other two groups of abusers may be more “essential” in nature. Those in the High SS group may be using substances for their reinforcing properties due to a heightened sensitivity to reward. They may also have more positive expectancies for alcohol or other drugs than are present in members of the low APP class. Those in the High APP group may have increased levels of behavioral under-control/disinhibition as well as a heightened sensitivity to reward. Interventions for the low APP group that target situational factors may be sufficient while those in the High SS group may require interventions that target their sensitivity to reward and identifying more prosocial sources of reinforcement. Individuals in the High APP group may have more substantial treatment needs due to their higher levels of impulsivity.

Anderson, Clark & Barnes (2006) examined the validity of a two-path model of personality risk in a clinical sample of stimulant dependent (cocaine/methamphetamine) adults who participated in a neuroimaging study. Personality measures included the three auxiliary dimensions of the APP (SS, IR, and NV), Arnett Inventory of Sensation Seeking (AISS) and the Levenson Self Report Psychopathy Scale (LSRP) examining sensation seeking, addiction prone personality and psychopathic traits. Substance use was measured by self-report measure of number, amount and type of drugs used in the past 6 months and consequences of use by the
Inventory of Drug Use Consequences (InDUC). General pathology was measured by self-report of number of medications used, number of lifetime DSM IV diagnoses met (CDIS interview) and the total number of lifetime medical hospitalizations, psychiatric treatments, alcohol treatments other substance abuse treatments and/or incarcerations (interview). Measures of sensation-seeking, addiction-prone personality and psychopathic traits loaded on two orthogonal factors: Intensity Seeking (IS) and disinhibition (DIS) supporting a two-path model of personality risk. IS was significantly associated with the number of drugs used in the prior 6 months while DIS was associated with both lifetime general pathology and self-reported drug use consequences. Younger age and male gender were associated with higher levels of IS but there was no association between age and DIS. Female gender was associated with higher levels of DIS. The authors hypothesized that a self-report measure of sensation seeking would be associated with the APP SS auxiliary dimension in a latent factor structural model and that a subscale measuring the need for intensity of experience would be more closely associated with APP SS than a subscale measuring novelty of experience. In addition, the authors hypothesized that a self-report measure of secondary psychopathic traits would be associated with APP IR and NV traits and that there would be differences in structural paths predicting substance use patterns from a latent trait factor underlying APP SS when compared to the paths from a latent factor underlying other APP traits (IR and NV). The authors conclude that a combination of IS and DIS traits represents the highest personality risk for the development of SUD’s. The results build on previous research by indicating that two personality pathways are relevant within a clinical sample of stimulant dependent individuals. Since IS and DIS have differential relationships with factors that are related to drug use, consequences and general pathology, assessment of these different domains appears to be important. The authors are currently working on further exploration of these domains using fMRI which they expect will lead to the development of IS and DIS assessment instruments based on functional neurological correlates. In the future, refined measures that tap into IS and DIS traits could be useful in treatment planning and interventions in tailoring treatment to fit individuals needs based on the prevailing pathway.
The Concept of Validity

In quantitative research, validity is concerned with evidence regarding the extent to which an instrument actually measures what it is purported to measure. Evidence of validity of an instrument establishes the likelihood that relationships among variables or scales actually exist versus being an error in the measure itself. Evidence needs to be established for face, content and construct validity. Face validity documents individuals’ perception that the instrument appears to measure what they are told it is intended to measure. Content validity provides evidence that the content of the instrument is consistent with the theoretical basis of the instrument. Construct validity is congruence between what the instrument actually measures and what it is intended or designed to measure and is the sum total of evidence derived from studies examining factorial, convergent, divergent and criterion validity. Factorial validity is evidence that clusters of associated items can be identified and reproduced across groups in a consistent manner with the theoretical basis of the measure. Convergent validity provides evidence that the total scores of the instrument are associated with other measures of similar constructs in a consistent direction. Discriminant or divergent validity provides evidence that the total scale scores of the instrument are not associated with measures of dissimilar constructs in a theoretically consistent direction. Criterion validity provides evidence that the total score of the instrument accurately discriminates between groups of individuals.

Construct validity includes evidence from factorial, convergent, discriminant and criterion validity analyses. Validity is not an absolute but the higher the validity of a measure, the more likely the instrument is measuring the constructs it purports to measure. Measures can only be established to be valid for specific uses with specific groups of users and not in a general sense.

Validation of an instrument encompasses 5 components including standardization of sample, bias (race/gender), reliability, validity and utility of use. Traditionally, the concept of validity has been divided into three types: content, criterion and construct validities. Messick (1995) purports that this view is fragmented and incomplete and does not take into account value implications of score meaning impacting social consequences of score use. The current and more comprehensive conception of construct validity views it as a unified concept that takes into account score meaning and social values in test interpretation and use. Unified validity integrates content, criteria and consequences into a construct framework allowing for testing hypotheses regarding score meaning and relationships for both applied and scientific settings.
Validity is an evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of test interpretations based on test scores (Messick, 1989b). Validity is the extent to which the test measures the constructs it purports to measure and is a property of the meaning of the test scores not of the test. The meaning and interpretation of the score and the implications of how it will be utilized is what needs to be valid (Cronbach, 1971). Validation is considered a continuing process since it must remain consistent across persons or populations and settings or contexts.

Historically, emphasis in construct validation has been placed on internal and external test structures or the appraisal of expected patterns of relationships among item scores or between test scores and other measure. In the unified concept of validation, score meaning takes into account performance differences over times, across groups and settings and in response to experimental treatments. Construct validity subsumes content relevance and representativeness and criterion-relatedness. Thus, empirical relationships between predictor scores and criterion measures should make theoretical sense in terms of what the predictor test is interpreted to measure and what the criterion is presumed to embody (Gulliksen, 1950). In order to appraise how well a test performs the job for which it is used, the potential social consequences of test interpretation and use are important considerations. The values served in the intended and unintended outcomes of test interpretation and use are integral to the meaning of the test scores and the appraisal of the social consequences of the testing is also subsumed as an aspect of construct validity (Messick, 1964, 1975, 1980). Therefore, validity is a unified concept and the unifying force is the meaningfulness or trustworthy interpretation of the test scores and their action implications, namely, construct validity.

Messick (1995) identifies six aspects of construct validity in the notion of validity as a unified concept. These include content, substantive, structural, generalizability, external and consequential aspects of construct validity. These six aspects represent validity criteria and the prevailing scientific standard for all educational and psychological measurement. The intent of the distinctions is to provide a means of addressing the complexities in appraising the appropriateness, meaningfulness and usefulness of score inferences. The six aspects function as a general validity criteria or standards for all educational and psychological measurement (Messick, 1989b).

The content aspect of construct validity includes evidence of content relevance,
representativeness and technical quality (Lennon, 1956; Messick, 1989b). A central issue is the specification of the boundaries of the construct domain to be assessed or the knowledge, skills, attitudes and other attributes to be examined by the task. It is crucial that all relevant parts of the construct domain are considered in selecting tasks/items that sample domain processes in terms of their functional importance.

The substantive aspect of construct validity emphasizes the role of substantive theories and process modeling in identifying the domain processes to be revealed in assessment tasks (Embretson, 1983; Messick, 1989b). There is a need for tasks to provide appropriate sampling of domain processes in addition to traditional coverage of domain content and there must be empirical evidence that the sampled processes are actually engaged by respondents in task performance. The issue of domain coverage refers to both the content representativeness of the construct measure and to the process representation of the construct and the degree to which these processes are reflected in construct measurement. Thus, representativeness is a core concept in both content and substantive construct validity and includes both the issue of sampling of tasks/contexts and the ability to simulate the constructs realistic engagement in performance.

The structural aspect appraises the trustworthiness of the scoring structure to the structure of the construct domain at issue (Loevinger, 1957; Messick, 1989b). Scoring models should be consistent with knowledge of the structural relations inherent in behavioral manifestations of the construct in question. This is called structural fidelity (Loevinger, 1957). The theory of the construct domain should underlie the selection of relevant assessment tasks and also the development of construct based scoring criteria.

The generalizability aspect examines the extent to which scores and interpretations generalize to and across population groups, settings and tasks (Cook & Campbell, 1979; Shulman, 1970). The issue is that the assessment should provide representative coverage of the content and processes of the construct domain such that the score interpretation is not limited to the sample of assessed tasks as but be broadly generalizable to the construct domain. Evidence of generalizability depends on the degree of correlation of the assessed tasks/items with other task/items representing the construct. In addition to assessed tasks/items, the limits of score meaning are also affected by the degree of generalizability across time, incidences, or observers/raters of the tasks. Measurement error associated with the sampling of tasks,
incidences and scorer/raters underlie reliability concerns (Feldt & Brennan, 1989).

The external aspect includes convergent and discriminant evidence from multitrait-multimethod comparisons (Campbell & Fiske, 1959) as well as evidence of criterion relevance and applied utility (Cronbach & Gleser, 1965). This is the extent to which the assessment scores’ relationships with other measures and behaviors reflect the relations in the construct being assessed. Thus, the meaning of the scores is substantiated externally by appraising the degree to which empirical relationship- or lack thereof- are consistent with that meaning. Both convergent and discriminant correlation patterns are important in that convergent patterns represent correspondence with other measures of the construct while discriminant patterns indicate difference from other measures of the construct. Thus, the construct theory once again highlights the relevance of relationships between the assessment scores and criterion measures and empirical evidence of such links adds to the utility of the scores for the applied purpose.

The consequential aspect appraises the value implication of score interpretation as a basis for action and the potential consequences of test use, especially with regard to issues of bias, fairness and distributive justice (Messick, 1980, 1989b). Social consequences of testing may be either positive or negative and the primary measurement concern with respect to consequences is that any negative impact on individuals or groups should not be the result of any source of test invalidity. Construct underrepresentation or construct-irrelevant variances are examples of sources of test invalidity (Messick, 1989b).

Validity as an integrative summary is empirical evaluation of the meaning and consequences of measurement. The six aspects of construct validity supply a means of insuring that the theoretical rationale and the evidence are linked to the inferences drawn from the assessment. Messick (1995) notes that score-based interpretations and actions are typically extrapolated beyond the test context on the basis of presumed relationships with non-test behaviors and expected outcomes. The challenge in test validation is to link inferences to convergent evidence supporting them and to discriminant evidence discounting rival inferences. Evidence pertinent to all of these aspects needs to be integrated into an overall validity judgment to maintain score inferences and their implications or provide rationale why there is not a link, which is the meaning of validity as a unified concept. Both meaning and values are integral to the concept of validity. A unified validity framework distinguishes two intertwined facets of validity as a unitary concept (Messick, 1989a; 1989b). One facet is the source of justification of the testing
based on appraisal of evidence supportive of score meaning or consequences contributing to score valuation. The other is the function or outcome of the testing, either in interpretation or applied use. Thus, meaning and values, test interpretation and use are intertwined in the validation process. Test validation includes both science and ethics of assessment.

The current study will focus on examining the validity of the APP measure with two populations. Conclusions can then be drawn from the empirical evidence and interpreted as either increased or decreased evidence of validity of the instrument in terms of assessing vulnerability to addiction with these particular populations.

**Summary and Conclusions**

In summary, a review of the literature suggests that substance use disorders (SUDs) and associated personality traits fit a biopsychosocial model. Risk factors for vulnerability to SUDs include demographic, genetic, biological, social/environmental, and psychological/personality variables. In terms of demographic variables, young (18-30 year old), unmarried, white males with lower SES appear to be at highest risk for vulnerability to SUDs. Genetic risk factors include positive family history for SUDs and personality disorders, especially ASPD for the more severe Type 2 abuser. Biological markers such as low MAO, dopamine, serotonin and endorphin levels have been identified as important underlying risk factors resulting in the reward deficiency hypothesis which purports that any behavior that results in increasing levels of these chemicals in the brain is reinforcing. Environmental and social factors include parental, peer and sibling influences (attitudes, parenting, attachment, social modeling), positive family history of SUDs, academic environments with accessibility and prevalence of use, and social affiliations, such as athletics and fraternities/sororities.

Research indicates that biologically based individual differences or temperaments remain relatively stable from childhood (Caspi & Silva, 1995) and that personality characteristics are stable in adulthood (McCrae & Costa, 1984) and there appears to be biological bases underlying primary personality characteristics (Cloninger, 1987a; Zuckerman, 1989). Therefore, if major personality dimensions are stable and biologically based, then the chances that these factors may be causally linked to alcohol/substance dependence is also enhanced. Blum & Payne, (1991) theorized that individuals who are vulnerable to alcohol abuse/dependence suffer from abnormally low levels of dopamine resulting in super sensitivity in the reward center of the brain to anything that increases dopamine levels. This hypothesis is consistent with the literature.
regarding the psychology of addictive behaviors and sensation seeking.

There is a convergence in the field in terms of the notion that a biopsychosocial vulnerability to SUDs exist and that personality constructs, especially those associated with psychoticism (P) or externalizing behaviors and neuroticism (N) or internalizing behaviors are commonly associated with these disorders. Measurement tools such as the APP (Barnes et al., 2000) have potential utility in research and clinical settings in providing objective data for use in prevention and intervention. Longitudinal studies and studies of high risk populations, such as those with a positive family history for SUDs (FH+) have found that the association between P and SUDs is more often substantiated than other personality dimensions and indicates P as a premorbid personality characteristic (Barnes, 1983; Barnes et al., 2000; Graham & Strenger, 1988; Martin & Sher, 1994; Musgrave et al, 1997; Nestadt et al., 1992; Rankin et al., 1982; Rosenthal et al., 1990).

The APP Scale (Barnes et al., 2000) purportedly assesses vulnerability to addiction based on personality dimensions. The APP has been investigated using clinical and general population samples and in terms of criterion validity, was found to be useful in discriminating substance abusers from non-abusers. This comprehensive research utilizing past efforts at measuring personality constructs related to substance use disorders is based on empirically established models of personality, specifically the Big Three (Eysenck & Eysenck, 1975; 1985; Cloninger, 1987a; 1987b), the Big Five (Costa & McCrae, 1992; 1995) and the Alternative Five Factor Model (Zuckerman, 1997). The development of this measure is the result of past efforts to identify personality dimensions or traits associated with substance abuse that may precede and sustain the disorders. Research has identified four superfactors that converge with different labels:

1) P or disinhibition/impulsivity/NS/SS; low conscientiousness, externalizing disorders; 2) N or negative affect, harm avoidance, negative emotionality, depressive, anxious, or internalizing disorders 3) agreeableness; cooperativeness, low hostility and 4) E or sociability, reward dependence.

Research supports a dual pathway model of SUDs of high psychoticism and high neuroticism (Anderson, 2003). Alcohol abuse was predicted by stimulus reducing or sensation seeking/novelty seeking while substance abuse was predicted by psychoticism. Further, it appears that stimulus reducing is an important factor in the initiation of abuse while psychoticism
(low social conformity, higher impulsivity, lower self-regulation) is an important factor in the development of SUD’s and severity of abuse. Research (Anderson et al, 2006) further corroborates the dual pathway of vulnerability and suggests the need to further refine measures that tap into traits of impulsivity/sensation-seeking (IS) and disinhibition (DIS).

Results of the Vancouver Family Study (VFS) Anderson, (1999), suggest that a positive family history (FH+) for SUDs relates to substance abuse both directly and indirectly. High psychoticism in the parents results in higher rates of substance abuse, thus representing a direct, genetic relationship. High psychoticism parent behaviors result in less effective parenting and the development of substance abuse in offspring. Further, children with high psychoticism traits typically have experienced more disruptive and troubling relationships with parents. This places them at higher risk of alcohol abuse. The clinical sample was found to exhibit higher levels of neuroticism (anxiety, depression) than the general sample. The authors speculate that this may be a consequence of substance abuse. However, a definitive assertion could not be made since they did not assess post treatment neuroticism levels. While psychoticism was found in both samples, sensation seeking was not significant in the clinical treatment sample. This finding is consistent with Zuckerman’s (1994) hypothesis that sensation seeking is a more important variable in the early stages of abuse while higher neuroticism is consistent with the tension-reducing function with the progression of abuse. Cluster analysis revealed two subtypes of alcoholics in both the general and clinical populations: 1) high N, and 2) high P, characterized by difficult temperament, more severity of substance abuse and stronger family history (consistent with Babor et al., 1992; Blackson et al., 1994; and Zucker et al., 1996). In the VFS, higher APP scorers had lower levels of parental care and higher parent APP scores, suggesting that the APP measures personality traits that are partially under environmental control.

Anderson (2003) concludes from evaluating the APP that it appears to be a multi-dimensional measure of vulnerability to substance abuse but has sub-dimensions of SS, NV and I/R. Three latent classes emerged from the data including (1) those scoring low on the APP overall but with higher item thresholds (2) those scoring low on the SS items but higher on remaining threshold items and 3) those with high overall APP scores but with lower other threshold items. The overall APP score appears to be the best predictor of vulnerability.

There are substantial gaps in the literature that need to be addressed in future research in order to minimize threats to reliability and validity. There is a need for more longitudinal data.
corroborating the correlation of personality variables representing vulnerability to SUD’s. Much of the existing research is based on cross-sectional studies with poorly matched or no controls. This results in the ability to describe but not to predict vulnerability. In addition, there is a need for more research on measures such as the APP in terms of corroborating reliability and validity of the measure with different populations. Limitations of the MAC-R, APS and AAS in predicting SUDs highlight the need for measures such as the APP. Further research using the APP should focus on establishing whether or not there is a general underlying factor and sub-dimensions (taxonomy) as Anderson (2003) suggests. The author notes that there is a need for different statistical methods to explore this issue further. The use of different populations, especially those at highest risk such as adolescent and young adults, such as children of alcoholics, (COAs) and individuals with positive family histories of SUDs, samples from forensic and institutional populations would be helpful in establishing the usefulness of the APP in predicting vulnerability and would increase the generalizability of the measure. The collection of collateral data instead of sole reliance on self-report measures would increase the validity of the information. Also, use of measures with validity scales able to identify attempts at deception in measuring SUDs such as the Substance Abuse Subtle Screening Scale (SASSI-3) (Miller, 1997) would protect the validity of results. Also, Barnes et al., (2000) research does not clarify whether N is an enduring trait since there was no follow-up on the treatment population in terms of personality assessment.

It appears that empirical evidence strongly supports the contention that there is a correlation between certain personality dimensions/traits and SUDs and that the biopsychosocial model best represents the accumulating research. Therefore, objective measures with predictive ability are needed to enhance prevention and intervention efforts. The APP appears to have utility in measuring vulnerability to SUDs with general and clinical populations and further research using this measure is warranted in order to further substantiate the validity and reliability of this instrument.
Research Questions

Given the preceding review of the literature in this area, the following research questions arise:

1. What is the internal consistency of the APP scale?
2. What is the factor validity of the APP scale?
3. What is the convergent validity of the APP scale using the SASSI-3?
4. What is the incremental validity of the APP Scale?
5. Part A: What is the criterion related validity of the APP scale using two groups from a young adult population: clinical subjects, adjudicated to treatment due to legal consequences (DUI/reckless driving), and college students?
   
   Part B: What is the criterion related validity of the SASSI-3 scale using two groups: clinical subjects and college students?
CHAPTER 3
METHODOLOGY

Participants

Participants were recruited and managed according to the ethical guidelines set forth by the Florida State University’s Internal Review Board (See Appendix VI). Participants included young adults, age 18-30, males and females, selected from two source samples including the following:

1) Junior and Senior level undergraduate college students enrolled in either the communications course in the Department of Educational Psychology and Learning Systems entitled “Human Relations and Communication (SDS 4481) or in the course entitled “Classroom Applications of Educational Psychology” (EDF 4214) at the Florida State University in Tallahassee, Florida and

2) A clinical population of individuals referred for substance abuse assessment and psycho-educational treatment by the Northeast Florida Safety Council as a result of arrests and suspended driving privileges for driving under the influence (DUI) or reckless driving in Jacksonville, Florida.

Student participants were recruited by contacting instructors of the two classes and asking for access to the students during class time to participate in the study. Students who were within the ages of 18-30 and had not had a DUI were eligible to participate. The student data were collected from students in five classes; three sections of the communications class and two sections of the educational psychology class. The students were introduced to the present investigator and the study by the instructor of each class and the data were collected in a group format during the last 30 minutes of the class time. This occurred in the fall semester of 2008 and all student data were collected in one day.

Clinical participants were recruited during the initial intake appointment of the psychosocial treatment after having been referred through Northeast Florida Safety Council for evaluation and treatment. Clinical participants who were within the ages of 18-30 and those who agreed to allow their data to be used in the study were given a discounted intake fee ($65.00 versus $75.00) as an incentive. The clinical data were collected on an individual basis over a period of two years between Fall 2008 and Fall 2010.
Demographic data for the two groups and combined group are presented in Table 1 below.

**Table 1: Demographic Data**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Subdimension</th>
<th>Clinical (N = 101)</th>
<th>Student (N = 98)</th>
<th>Combined (N = 199)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean</td>
<td>24.31</td>
<td>20.44</td>
<td>22.4</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>3.53</td>
<td>1.24</td>
<td>3.3</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>36.6%</td>
<td>59.2%</td>
<td>47.7%</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>63.4</td>
<td>40.8</td>
<td>52.3</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>80.2%</td>
<td>73.5%</td>
<td>79.9%</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>11.9</td>
<td>17.3</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>4.0</td>
<td>7.1</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>Asian</td>
<td>2.0</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Pac. Islander</td>
<td>1.0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Native American</td>
<td>1.0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1.0%</td>
<td>0.0%</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>7.9</td>
<td>0.0</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>37.6</td>
<td>12.2</td>
<td>25.1</td>
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<td>33.7</td>
<td>25.6</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0.0</td>
<td>22.4</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>20.8</td>
<td>7.1</td>
<td>14.1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>3.0</td>
<td>0.0</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td>Married/equivalent</td>
<td>19.8%</td>
<td>6.0%</td>
<td>13.1%</td>
</tr>
<tr>
<td></td>
<td>Never married</td>
<td>78.2</td>
<td>93.0</td>
<td>85.4</td>
</tr>
<tr>
<td></td>
<td>Other</td>
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<td>1, #3</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.5, #3</td>
</tr>
</tbody>
</table>
Procedure

Consent from participants was obtained using an Informed Consent Form including the purpose of the study, the utilization of study outcomes and participant’s right of confidentiality. Participants were asked to read and sign the Consent Form and advised that their participation in the study was voluntary. The two inventories were administered to the two groups in a set order with the SASSI-3 answered first followed by the APP. The order of administration of the two sections of the SASSI-3 is important in order to control for order effect since the true/false questions are not obviously related to substance use while the face valid items are directly inquiring about substance use. Defensiveness or guardedness would likely be affected if the face valid items were answered first thus affecting the responses. Both groups were advised to answer all questions according to their entire lives versus the other options of specific time-frame offered by the SASSI-3 administration. The rationale for this was to get a more comprehensive assessment of the participants’ substance use history. The rationale for the administering the SASSI-3 before the APP was based on the differing formats of the 2 scales. The SASSI-3 is more time consuming and has distinct sections while the APP is a brief, 21 item, forced choice scale. The principle investigator reasoned that participants may be more likely to be focused and engaged in completing the SASSI-3 if it was presented at the beginning of the session since it requires more time and effort than the APP scale. Both groups were given the instruments in the same order to control for an order effect.

Administration to Student Group

The FSU students were asked to voluntarily participate during their class for extra credit towards their course. The test packet consisted of the Consent Form, APP Scale, and the SASSI-3, which includes a demographic portion and was distributed during a class session to the participants. After an introduction from the course instructor regarding participation in the research, the present investigator read from a script of instructions regarding completion of the two inventories. Students were assured that the results would be reported in aggregate and that the information would be kept strictly confidential. Students in five separate sections of the two courses were administered the packets in a group format during the last 30 minutes of each class. Students were advised to read and sign the Consent Form and begin by answering the inventories. Students were advised that participation was voluntary and that an explanation of
the study in the form of a debriefing would be available to anyone who requested it upon completion of the packet. Students completed the packet within 15-30 minutes and the packets were collected by the investigator. Packets were coded with an S for student group and a numerical value indicating each student participant.

**Administration to Clinical Group**

The clinical group participated by completing the packet during the intake process as part of their assessment for clinical services. Clinical participants were referred through the Northeast Florida Safety Council as a result of their scores on the Driver Risk Inventory (DRI), a standardized interview with questions regarding lifetime substance use, as well as legal and driving history, administered by a Substance Abuse evaluator at Northeast Florida Safety Council. Subjects who scored in the “referral required” category who meet the criteria for substance abuse or dependence according to DSM-IV-TR diagnostic criteria and/or other legal and driving record criteria (i.e. blood alcohol levels, number of arrests, driving record) were asked to choose a participating Provider of clinical services from a list provided to them. Once they chose a Provider, the Northeast Florida Safety Council required them to sign a release of information for the results of the DRI and their record to be forwarded to the selected Provider. Participants then called and schedule a 45-60 minute individual intake session during which they were asked to complete the SASSI-3 and APP and participate in a brief clinical interview. Participants were offered a monetary incentive of a $10 discount for the intake if they agreed to allow their results to be used in the study. All clients referred for services completed these inventories but only clients who agreed to participate and met the study criterion (i.e. ages 18-30) were included in the study. Clients who agreed to participate in the research signed a Consent Form and were given verbal instructions read from a script by the present investigator to complete the 67 true/false items of the SASSI-3, then the Face Valid Alcohol and Face Valid Other Drug Likert scale questions and demographic section of the SASSI-3. Lastly, they were asked to complete the APP Scale by answering yes/no to the 21 items. Upon completion of the inventories, the scales were scored by the present investigator and the results were provided to the clients. A brief clinical interview and review of their record was performed as is customary during the intake process. Next, an individual treatment plan was formulated aimed at addressing substance use issues and increasing psychosocial education regarding substance use disorders. The goal was to assess and provide treatment for substance use disorders and/or other clinical
issues and ultimately, to decrease the clients’ probability of continued use of substances use in risky situations such as driving while impaired. Clients were assured that the results would be kept confidential and that the data would be reported in aggregate form for purposes of the research. Copies of their inventories were kept separate from their clinical charts with the Student subject data. Clinical subject packets were coded as C and assigned a numerical value indicating each clinical participant.

**Measures**

**Substance Abuse Subtle Screening Inventory (SASSI-3)**

The most commonly used screening instruments for detecting SUDs include the CAGE Questionnaire (CAGE; Mayfield, McLeod & Hall, 1974), Michigan Alcoholism Screening Test (MAST; Selzer, 1971) MacAndrew Alcoholism Scale (MAC-R; MacAndrew, 1965), Eysenck Addiction Scale (EPQ-A; Gossop & Eysenck, 1980) and the SASSI-3 (Miller et al, 1997). The SASSI-3 is a more comprehensive instrument consisting of both face-valid and subtle subscales and scores and seems to be “especially effective in identifying early-stage chemically dependent individuals who are either in denial or are deliberately trying to conceal their chemical dependency pattern” (NIAAA. 1995, p.506; Merta, 2001). The most common scales for identifying addictive personality traits include the MAC-R (MacAndrew, 1965) and the EPQ-A (Gossop & Eysenck, 1980).

The Substance Abuse Subtle Screening Inventory (SASSI) was first published in 1988. It is a relatively brief, objective screening tool for human service practitioners who work in a variety of settings. The SASSI was designed to identify individuals who have a high probability of having a diagnosable substance use disorders (SUD) so that they may be further evaluated regarding specific diagnostic criteria. Another goal in developing the SASSI was to create an instrument that would identify individuals with SUDs regardless of whether they are willing or able to acknowledge relevant symptoms and behaviors. It is of value to have an assessment tool that does not rely exclusively on individuals to be fully forthright in reporting symptoms, given the unreliability of self-report. The SASSI includes both face-valid and subtle items that bear no apparent relation to substance abuse. The early development of the instrument included research in which participants were asked to respond to the items under instructions to “fake good” (i.e., to conceal evidence of a substance use disorder (Miller, 1985). A revision of the adult SASSI
(SASSI-2) was published in 1994 (Miller, 1994).

The SASSI-3 represents the most recent revision of the instrument (Miller et al., 1997) and has been extensively researched (Gray, 2001; Clements, 2002; Emanuelson, 2005; Greene, 2002; Miller et al., 1997; SASSI Institute, 1998). It can be completed in 15-20 minutes and is comprised of 67 true-false items in addition to a 26 item self-report section on substance use. The SASSI-3 is comprised of 10 scales which measure the following dimensions: face valid alcohol (FVA); Face Valid Other Drugs (FVOD); Symptoms (SYM); Obvious Attributes (OAT); Subtle Attributes (SAT); Defensiveness (DEF); Supplemental Addiction Measure (SAM); Family vs. Control Measure (FAM); Correctional (COR) and Random Answering (RAP). Based upon the configuration of scales, decision rules are used to measure the degree to which the individual’s response patterns are similar to persons with substance use disorders.

In a study analyzing psychometric properties of the SASSI-3 (Lazowski et al., 1998), the sensitivity and specificity of the instrument were both shown to be above 90%. The predictive utility and accuracy of SASSI-3 classifications are not significantly affected by demographic variables or by the level of adjustment and functioning Global Assessment of Functioning (GAF) although the authors point out that the data were obtained from clinical settings and that the level of accuracy might not generalize to other settings. The SASSI-3 was found to be related to indexes of substance misuse and to other screening measures. Findings also indicated that respondents who were classified as test positive on the SASSI-3 had higher mean scores on other substance-abuse screening measures than did respondents who tested negative on the SASSI-3. Together, these findings provide evidence for convergent validity. Some screening instruments are based exclusively on respondents’ self-reports of symptoms of substance dependence (e.g. AAS, MAST) whereas other consists exclusively of non-face-valid items (e.g. APS, MAC-R). In addition to face-valid items, the SASSI-3 also includes subtle items in order to reduce the overall error rate and improve classification. Since the goal is early identification of individuals who may be substance dependent and who may not be able to acknowledge relevant symptoms, screening instruments such as the SASSI-3 are of particular value.

Piazza et al., (2000) in a review of screening instruments for SUD’s, report that the SASSI-3 is an efficient merger of two types of screens: logically derived (self-report) and empirically derived. The advantages of the SASSI-3 are increased validity and reliability due to ability to detect deception through the inclusion of subtle scales, and defensive scales that can be
compared to face valid items.

Laux et al., (2005) investigated the SASSI-3’s psychometric capabilities in a college student sample. Findings indicate that the SASSI-3’s psychometric properties are equal to or exceed those of the Michigan Alcoholism Screening Test (MAST; Selzer, 1971), the CAGE (Ewing, 1984) and the MacAndrew Alcoholism Scale-Revised (MacAndrew, 1965). The SASSI-3’s overall classification system and the specific FVA (face valid alcohol) subscale appear to have strong test-retest stability, internal consistency and item-to-scale agreement. The FVA subscale emerged as a unitary measure of alcohol use disorders. The FVA alpha (.93) was similar to an alpha reported in another college student sample (.89; Myerholtz & Rosenberg, 1998). The authors report that the SASSI-3’s strengths over other screens are its use of direct, indirect and combined approaches to screening for substance use, its reported ability to screen for alcohol and other drugs of abuse and the use of a battery of subscales to provide clinicians with a variety of data for screening and treatment planning purposes.

In contrast, Clements (2002) found the SASSI-3 to have a much lower sensitivity (.65) and clinical utility in a college student population. The author notes that lowering the cut off scores for subscales, especially FVA significantly enhance the sensitivity rate (.89). This study raises questions about the usefulness of the subtle items of the SASSI-3 in identifying alcohol dependence in a college population and provides additional evidence for the need to examine this instrument using this population.

**Psychometric properties of the SASSI-3**

The SASSI-3 was developed to meet human service practitioners need for an addictions screening tool that does not rely on clients to be completely forthright in reporting relevant behaviors (Miller & Lazowski, 1999). To that end, clinicians’ diagnoses regarding the presence or absence of substance use disorders served as the criterion variable in validity analyses for SASSI-3 with the provision that all such diagnoses also be based on DSM-IV (1994) symptom criteria for diagnosing SUD’s. Thus, individuals who test positive on the SASSI-3 are likely to be diagnosed as having a substance use disorder.

The clinical data set used to formulate and examine aspects of the SASSI-3 consisted of over 2000 respondents. Clinicians in service settings throughout the U.S. including addiction treatment centers, general psychiatric hospitals, a dual diagnosis hospital, a vocational rehabilitation program and a sex offender treatment program provided ninety-seven percent of
the respondents. The remaining 3% were prisoners in a correctional facility or research subjects recruited because they had a family history of alcohol abuse. The decision rules were formulated a cross-validated on a sub-set of these cases (n=839).

Reliability

Two-week test-retest stability coefficients obtained with a sample of 40 respondents range from .92 to 1.00 indicating high short-term stability. The SASSI-3 overall alpha coefficient is .93; face valid alcohol .93 and face valid other drug .95. Alpha coefficients for the other subscales of the SASSI-3 range from .27 to .79. The authors of the SASSI-3 note that the coefficient alpha statistic is not necessarily a primary consideration for the scales of the SASSI-3 since they were not designed to be unidimensional in nature (Lazowski et al., 1998).

Validity

A study of the SASSI-3 classification accuracy found that it correctly identified 94.6% of the people who were diagnosed as having a substance use disorder and correctly identified 93.2% of those who were diagnosed as not having a substance use disorder. In a discriminant function analysis in which all the items were entered as predictor variables of the presence or absence of a substance use disorder revealed a maximum correct classification rate of 97%. When the SASSI-3 decision rules were tested on the cross-validation sample, results indicated an overall accuracy of 93.6% (Lazowski et al., 1998).

The DEF or defensiveness scale can be used to identify individuals who respond to the instrument in a defensive or guarded manner. DEF scale items were selected to discriminate between substance-dependent individuals who completed the instrument under standard instruction and those who were given instruction to try to hide any sign of substance abuse. Therefore, scores on the DEF scale can be used as an index of defensiveness. Classification accuracy was 94.9% for cases where participants’ DEF scores were within one standard deviation of the normative sample DEF scale mean (scores of 7 or less). When DEF scores were elevated (DEF scores of 8 or more) results indicated an overall classification accuracy rate of 85.2%. It appears that the SASSI-3 is robust to variation in defensiveness. The inclusion of subtle items and the research on defensive responding enable SASSI-3 classifications to be fairly accurate (from 83% to 91%) even when DEF scores are somewhat elevated (8 or 9) and somewhat less accurate only at extremely high levels of DEF (10 or 11).

The SASSI-3 includes both face valid and subtle items. The overall accuracy based
exclusively on face valid scales is 79% which is a 14.9% loss relative to the 93.9% overall accuracy obtained when using the full set of decision rules including the subtle scales.

The positive predictive power of the face valid scales is 99.6%. The negative predictive power of the face valid scales is only 49.6%. Half of the individuals who did not acknowledge significant substance abuse on the face valid scales were found in clinical assessments to have a substance use disorder. The classification scheme based exclusively on face valid scales failed to identify 20% of those diagnosed with a substance use disorder who were accurately identified when using the subtle scales in the full set of decision rules. Sensitivity was 93.9% with the full set of decision rules but fell to 73.9% when only face valid scales were used to produce classification results. Incremental accuracy attributable to inclusion of the subtle scales was shown to be 15%.

Accuracy figures range from 98.2% to 85.3% with significant difference in accuracy across treatment settings, phi+. 15, p < .001. The data suggest that the relatively high level of accuracy in the general psychiatric sample reflect the ability of the SASSI-3 to detect substance use disorders within a population of individuals who have other psychiatric disorders as well. Thus, this provides evidence that the SASSI-3 is specifically identifying substance use disorders rather than a broader range of general maladjustment. By contrast, the SASSI-3 was less accurate in identifying substance abusers in addictions treatment settings. The overall SASSI-3 accuracy rate of identifying substance abusers (87.4%) is lower than that of identifying those who are substance dependent (96%).

In summary, cross validation of the SASSI-3 scoring system yielded sensitivity of 93.2%, specificity of 95.2%, positive predictive power of 98.7% and negative predictive power of 77.7%. An examination of the entire validity sample combined (n=839) reveals sensitivity of 93.9%, specificity of 94.2%, and positive predictive power of 98.4% and negative predictive power of 79.8%. The data were also examined to determine the effects of treatment setting, general adjustment, education, employment status, ethnic group membership, gender, age, and marital status on the accuracy of SASSI-3 decision rule results. Findings indicated no significant effects of any of these variables on the accuracy of SASSI-3 classifications with the exception of treatment setting.

APP Scale and Psychometric Properties of the APP
The APP, a forced choice (yes/no), 21 item scale, was developed using data identifying
personality items from a battery of personality tests that were linked to both a family history of alcoholism and a current diagnosis of alcoholism in a cross-sectional general population sample (Barnes et al., 2000). The APP is a relatively new instrument with limited research available regarding psychometric properties. However, the available data, to date, appear to favorably support the validity and reliability of the measure.

Anderson, et al., (2004) examined psychometric properties and the long-term predictive validity of the APP scale in a general population sample in seven year longitudinal follow-up study to the original WHDS (Barnes et al., 2000). Internal consistency and test-retest reliability coefficients were calculated. Three popular personality instruments, the Revised Eysenck Personality Questionnaire (EPQ-R; Eysenck et al., 1985), the NEO Five Factor Inventory Form S (FFI; Costa and McCrae, 1992) and the short form of the Temperament and Character Inventory (TCI; Cloninger et al., 1994), all measured at follow-up, were used to help assess concurrent construct validity. The MAC (MacAndrew, 1965) and the EPQ-A (Gossop and Eysenck, 1980) scales were included for comparison purposes. Results indicate internal consistency (alpha = .74; n= 788) versus MAC (alpha = .62) and EAP-A (alpha = .64). Therefore, the APP was found to be superior in terms of internal consistency to the MAC, and EPQ-A. In terms of predictive validity, the APP was found to be a significant predictor of the development of new alcoholic cases over a 7-year follow-up study after controlling for confounding variables supporting the predictive validity of the APP (Anderson et al., 2004). Also, the pattern of cross-sectional correlations between the APP and the three popular personality instruments EPQ-R, FFI and TCI (Anderson, et al., 2004) provides support for the construct validity of the APP. The APP was the most significant predictor of SUD’s, suggesting that a specialized measure is inherently superior to more general personality systems if the goal is to measure addiction-proneness traits using a single scale. The APP examines personality traits that are premorbid to alcoholism versus traits that have been accentuated by a history of abuse as with the other measures. The authors conclude that the APP test appears to be a reliable, both in terms of internal consistency and stability over time. Therefore, due to the reliability, validity, brevity and cost effectiveness, the measure could likely be easily incorporated into both studies of substance use patterns over time and substance abusers in treatment settings.
Analysis of the Data:

All data were analyzed using PASW Statistics version 18.0 using an alpha level of .05. The study was a construct validity study of the APP with five sub-validity components of internal consistency, factor validity, convergent validity, incremental validity and criterion validity.

Research Question #1. What is the internal consistency of the APP scale?
In order to determine internal consistency for the APP, Cronbach alpha reliability coefficients for the clinical, student and combined groups were derived through the SPSS reliabilities program. The alpha coefficient assumes unidimensionality of the scale. A score above .80 indicates that a given score on the APP can be used with individuals. Sample sizes of Clinical (N=101) and Students (N=98) are sufficient to derive alpha coefficients for each group.

Research Question #2. What is the factor validity of the APP scale?
To determine Factor Validity of the APP, an exploratory factor analysis using orthogonal rotation was conducted to derive the internal structure of the APP. This assumes that factors derived are uncorrelated. The eigenvalue >1.0 rule applied for the identification of factors. The APP was found to be multidimensional and the individual factors were interpreted by the investigator. A combined sample size of 199 is sufficient to conduct an exploratory factor analysis of the APP with 21 items. The ratio of items to participants is 1:9.

Research Question #3. What is the convergent validity of the APP scale using the SASSI-3 Screening Inventory?
Convergent validity was investigated first by calculating Pearson Product Moment correlations between APP scale and the individual scales of the SASS-3. Correlations greater than .50 indicate moderate convergence (i.e. share 25% common variance). This criterion was set by the researcher. Using G* Power, minimum sample size for each correlation is 64 with alpha at .05 and beta .95.

Research Question #4. What is the incremental validity of the APP scale?
In order to determine the incremental validity of the APP scale to the SASSI-3 scale total score, a hierarchical regression analysis was performed using the best SASSI-3 predictor scales derived through a stepwise regression and then adding the APP scale with SASSI-3 total score as the criterion variable. This procedure establishes the extent to which the APP scale contributes unique variation to the prediction of the SASSI-3 total score i.e. probability of substance dependency. Using G* Power, minimum sample size is 138 with five predictors, alpha at .05 and
Research Question #5. What is the criterion validity of the APP scale using two criterion groups: clinical subjects and college students?

An ANOVA was conducted to determine whether there are significant differences between two criterion groups: clinical and students. Part A investigated the criterion validity of the APP scale or its ability to distinguish between the two groups. Part B investigated the SASSI-3 scales and their ability to distinguish between the two groups. Using G*Power, minimum sample size is 210 with 2 groups, alpha at .05 and beta .95. If beta is .80, minimum sample size is 128.

With 199 participants, there is sufficient power to conduct all analysis (Costello & Osborne, 2005).
CHAPTER 4

RESULTS

This chapter presents the statistical results of the study and addresses the five research questions, and their related hypotheses. The five research questions relate to the internal consistency of the APP, the factor validity analysis, convergent validity of the APP, the incremental validity of the APP as a predictor of addiction proneness, and the criterion validity of this instrument.

Research Question #1: What is the internal consistency of the APP scale?

In order to determine the internal consistency, Cronbach alpha reliability coefficients for the clinical, student and combined groups were derived. The alpha coefficient assumes unidimensionality of the scale. A score above .80 indicates that a given score on the APP can be used with individuals.

Hypothesis:
The alpha coefficient will be .80 or above, indicating that the APP has homogeneous items with heterogeneous populations and has strong internal consistency.
The Cronbach Alpha Reliability coefficients are summarized in Table 2 below.

<table>
<thead>
<tr>
<th>TABLE 2: Internal Consistency of the APP Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Clinical</td>
</tr>
<tr>
<td>Student</td>
</tr>
<tr>
<td>Combined</td>
</tr>
</tbody>
</table>

*APP total score coded as 1= yes response to items; 2= no response to items. Therefore, total score ranges from 21-42.

Table 2 displays alpha reliability coefficients and indicates an alpha of .800 in the clinical group, an alpha of .591 in the student group and a combined alpha of .719. Therefore, the hypothesis is accepted for the clinical group but rejected for the student group and the combined group.
Table 3 below summarizes item total correlations which measure the extent to which each item on the APP scale relates to the total scale score. The optimal range is .25 to .75.

<table>
<thead>
<tr>
<th>APP Item</th>
<th>Corrected Item Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you had very strange or peculiar experiences?</td>
<td>.327</td>
</tr>
<tr>
<td>2. Have you often gone against your parent’s wishes?</td>
<td>.392</td>
</tr>
<tr>
<td>3. Are you a steady person?*</td>
<td>.355</td>
</tr>
<tr>
<td>4. Do you wish you could have more respect for yourself?</td>
<td>.306</td>
</tr>
<tr>
<td>5. Have you ever been in trouble with the law?</td>
<td>.062</td>
</tr>
<tr>
<td>6. Do you prefer rock music over ballads?</td>
<td>.052</td>
</tr>
<tr>
<td>7. Have your parents often objected to the type of people you went around with?</td>
<td>.483</td>
</tr>
<tr>
<td>8. Have you lived the right kind of life?*</td>
<td>.303</td>
</tr>
<tr>
<td>9. Have people said that you sometimes act too rashly?</td>
<td>.425</td>
</tr>
<tr>
<td>10. Do you prefer loud music over quiet music?</td>
<td>.161</td>
</tr>
<tr>
<td>11. Are you unable to keep your mind on one thing?</td>
<td>.344</td>
</tr>
<tr>
<td>12. Do you go to church almost every week?*</td>
<td>.170</td>
</tr>
<tr>
<td>13. Do you prefer sports cars over passenger cars?</td>
<td>.104</td>
</tr>
<tr>
<td>14. Do you often feel “fed up”?</td>
<td>.492</td>
</tr>
<tr>
<td>15. Do you have strange or peculiar thoughts?</td>
<td>.446</td>
</tr>
<tr>
<td>16. Would you prefer to be a stunt man/woman over prop man/woman?</td>
<td>.322</td>
</tr>
<tr>
<td>17. Do you prefer endurance sports over games with rests?</td>
<td>.193</td>
</tr>
<tr>
<td>18. Did you ever feel that strangers were looking at you critically?</td>
<td>.345</td>
</tr>
<tr>
<td>19. Did you play hooky from school quite often as a youngster?</td>
<td>.413</td>
</tr>
<tr>
<td>20. Do you prefer electric music over un-amplified music?</td>
<td>.061</td>
</tr>
<tr>
<td>21. Do you give money to charities?*</td>
<td>.213</td>
</tr>
</tbody>
</table>

**Note**: All items have yes/no responses. For items marked by an asterisk, a negative response adds one point to the APP scale score. For all other items an affirmative response adds one point to the APP scale score.

*Items are reverse scored.

**1= yes response to items; 2= no response to items

***Bolded numbers denotes significance (between .25 and .75)

Table 3 indicates that eight of the items fell out of the optimal range of .25- .75 (#5, #6, #10, #12, #13, #17, #20, #21). This indicates that these items contribute little, if any, to the measurement of the construct of addiction proneness.
Research Question #2: What is the factor validity of the APP?
An Exploratory Factor Analysis (EFA) of the APP was conducted using orthogonal rotation to derive the internal structure of the scale. This assumes that factors derived are uncorrelated. The eigenvalue >1.0 rule was applied for the identification of factors. This analysis will determine whether the APP is unidimensional or multidimensional in structure.

Hypothesis:

The APP has a single underlying dimension, with an eigenvalue greater than 1.0.

Eigenvalues of the extracted components of the APP scale are presented in Table 4 below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Total Eigenvalue</th>
<th>% of Variance</th>
<th>Cumulative Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.847</td>
<td>18.321</td>
<td>18.321</td>
</tr>
<tr>
<td>2</td>
<td>2.102</td>
<td>10.008</td>
<td>28.328</td>
</tr>
<tr>
<td>3</td>
<td>1.472</td>
<td>7.010</td>
<td>35.339</td>
</tr>
<tr>
<td>4</td>
<td>1.382</td>
<td>6.581</td>
<td>41.920</td>
</tr>
<tr>
<td>5</td>
<td>1.206</td>
<td>5.741</td>
<td>47.661</td>
</tr>
<tr>
<td>6</td>
<td>1.023</td>
<td>4.873</td>
<td>52.534</td>
</tr>
</tbody>
</table>

The results of the EFA indicate that 6 factors have eigenvalues of 1.0 or above. Thus, the APP is a multidimensional scale. The hypothesis is rejected.
Figure 1 illustrates a scree plot of the eigenvalues and APP items with the varimax rotation.

Figure 1 shows that three factors emerged as interpretable. The scree plot shows that the first three factors fall above the Scree. The three factors were interpreted as 1) Negative Views, 2) Impulsivity/Recklessness and 3) Sensation Seeking.

Table 5 presents the results of the varimax rotated component matrix.
**TABLE 5: Rotated Components Analysis Using Varimax Rotation for Combined Groups**

<table>
<thead>
<tr>
<th>Component</th>
<th>1 Negative Views (NV)</th>
<th>2 Impulsivity/Recklessness (IMP/R)</th>
<th>3 Sensation Seeking (SS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you had very strange or peculiar experiences?</td>
<td>.749</td>
<td>-.105</td>
<td>-.081</td>
</tr>
<tr>
<td>2. Have you often gone against your parent’s wishes?</td>
<td>.431</td>
<td>.009</td>
<td>-.044</td>
</tr>
<tr>
<td>3. Are you a steady person?*</td>
<td>-.295</td>
<td>-.484</td>
<td>-.269</td>
</tr>
<tr>
<td>4. Do you wish you could have more respect for yourself?</td>
<td>.362</td>
<td>.589</td>
<td>-.319</td>
</tr>
<tr>
<td>5. Have you ever been in trouble with the law?</td>
<td>-.261</td>
<td>.036</td>
<td>.074</td>
</tr>
<tr>
<td>6. Do you prefer rock music over ballads?</td>
<td>-.159</td>
<td>-.054</td>
<td>.580</td>
</tr>
<tr>
<td>7. Have your parents often objected to the type of people you went around with?</td>
<td>.319</td>
<td>.247</td>
<td>.029</td>
</tr>
<tr>
<td>8. Have you lived the right kind of life?*</td>
<td>-.049</td>
<td>-.722</td>
<td>-.001</td>
</tr>
<tr>
<td>9. Have people said that you sometimes act too rashly?</td>
<td>.459</td>
<td>.198</td>
<td>-.225</td>
</tr>
<tr>
<td>10. Do you prefer loud music over quiet music?</td>
<td>.014</td>
<td>.034</td>
<td>.729</td>
</tr>
<tr>
<td>11. Are you unable to keep your mind on one thing?</td>
<td>.439</td>
<td>.208</td>
<td>.154</td>
</tr>
<tr>
<td>12. Do you go to church almost every week?*</td>
<td>-.052</td>
<td>.002</td>
<td>-.176</td>
</tr>
<tr>
<td>13. Do you prefer sports cars over passenger cars?</td>
<td>-.033</td>
<td>-.082</td>
<td>.159</td>
</tr>
<tr>
<td>14. Do you often feel “fed up”?*</td>
<td>.624</td>
<td>.374</td>
<td>-.005</td>
</tr>
<tr>
<td>15. Do you have strange or peculiar thoughts?</td>
<td>.734</td>
<td>.083</td>
<td>-.031</td>
</tr>
<tr>
<td>16. Would you prefer to be a stunt man/woman over prop man/woman?</td>
<td>.250</td>
<td>-.084</td>
<td>.229</td>
</tr>
<tr>
<td>17. Do you prefer endurance sports over games with rests?</td>
<td>-.021</td>
<td>.176</td>
<td>.094</td>
</tr>
<tr>
<td>18. Did you ever feel that strangers were looking at you critically?</td>
<td>.583</td>
<td>.262</td>
<td>.005</td>
</tr>
<tr>
<td>19. Did you play hooky from school quite often as a youngster?</td>
<td>.080</td>
<td>.651</td>
<td>.000</td>
</tr>
<tr>
<td>20. Do you prefer electric music over un-amplified music?</td>
<td>.028</td>
<td>.018</td>
<td>.707</td>
</tr>
<tr>
<td>21. Do you give money to charities?*</td>
<td>-.007</td>
<td>-.119</td>
<td>.047</td>
</tr>
</tbody>
</table>

*Bolded numbers denotes significance > .250

Table 5 displays the loadings of APP items on the three interpretable factors. There were nine items loading on Factor 1 (NV). These items appear to be related to the general construct of Negative Views (peculiar experiences .749; gone against parent’s wishes .431, ever been in
trouble with the law - .261, parents objected to people went around with .319, act rashly .459,
unable to keep mind on one thing .439, fed up .624; peculiar thoughts .734; and strangers looking
at you critically .583). There were four items loading on Factor 2 (IMP/R). These items seem to
be related to the construct of impulsivity/recklessness or lack of conformity (i.e. steady person,
-.484; wish more respect for self, .589; living the right kind of life, -.722, and playing hooky from
school, .651). There were three items loading on Factor 3 (SS). These items appear to be
associated with the construct of Sensation Seeking (preferring rock music over ballads, .580;
prefer loud music over quiet, .729; prefer electric music over un-amplified, .707).
The hypothesis that the APP is a unidimensional scale is rejected. The orthogonal rotation
maximizes the differences amongst factors thus further separating the factors. The conclusion is
that while there were six factors with eigenvalues greater than 1.0, results of the scree plot
indicate that there are three interpretable factors named Negative Views,
Impulsivity/Recklessness and Sensation Seeking.

**Research Question #3: What is the convergent validity of the APP using the SASSI-3?**

Convergent validity was determined by deriving Pearson Product Moment Correlations between
the APP and SASSI-3 scales. Correlations greater than .50 indicate moderate convergence,
which means they share 25% common variance.

**Hypothesis:** The APP total score will be significantly (p<.05, r >.138) related to the SASSI-3
subscale and total scores.
Correlations between the APP scale total score and SASSI-3 scales and total score are presented in Table 6.

**TABLE 6: Correlations between APP Total and SASSI-3 Scales and SASSI-3- Total Score for Combined Groups**

<table>
<thead>
<tr>
<th>Scale</th>
<th>SASSI-3 Mean</th>
<th>SD</th>
<th>APP Mean</th>
<th>SD</th>
<th>r</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FVA</strong> Face valid Alcohol</td>
<td>5.49</td>
<td>6.06</td>
<td>8.83</td>
<td>3.53</td>
<td>.527***</td>
<td>.28</td>
</tr>
<tr>
<td><strong>FVOD</strong> Face valid other drugs</td>
<td>4.48</td>
<td>8.34</td>
<td>8.83</td>
<td>3.53</td>
<td>.507***</td>
<td>.26</td>
</tr>
<tr>
<td><strong>SYM</strong> Symptoms</td>
<td>3.24</td>
<td>2.43</td>
<td>8.83</td>
<td>3.53</td>
<td>.526***</td>
<td>.28</td>
</tr>
<tr>
<td><strong>OAT</strong> Obvious attributes</td>
<td>4.31</td>
<td>2.12</td>
<td>8.83</td>
<td>3.53</td>
<td>.368**</td>
<td>.14</td>
</tr>
<tr>
<td><strong>SAT</strong> Subtle attributes</td>
<td>2.79</td>
<td>1.20</td>
<td>8.83</td>
<td>3.53</td>
<td>.291**</td>
<td>.08</td>
</tr>
<tr>
<td><strong>DEF</strong> Defensiveness</td>
<td>5.33</td>
<td>2.22</td>
<td>8.83</td>
<td>3.53</td>
<td>-.046</td>
<td>.02</td>
</tr>
<tr>
<td><strong>SAM</strong> Supplemental addiction measure</td>
<td>6.09</td>
<td>2.10</td>
<td>8.83</td>
<td>3.53</td>
<td>.520***</td>
<td>.27</td>
</tr>
<tr>
<td><strong>FAM</strong> Family</td>
<td>8.57</td>
<td>1.85</td>
<td>8.83</td>
<td>3.53</td>
<td>-.305**</td>
<td>.09</td>
</tr>
<tr>
<td><strong>COR</strong> Correctional</td>
<td>4.96</td>
<td>2.66</td>
<td>8.83</td>
<td>3.53</td>
<td>.467**</td>
<td>.22</td>
</tr>
<tr>
<td>SASSI-3 Total</td>
<td>1.70</td>
<td>.875</td>
<td>8.83</td>
<td>3.53</td>
<td>.379**</td>
<td>.14</td>
</tr>
</tbody>
</table>

** p<.01
*** p<.001

APP Scale scores range from 0-21 where items were scored 0=no and 1= yes.
SASSI-3 Total scale was scored 1=not substance dependent, 2= maybe (high defensiveness score indicates other scale scores are artificially lower) and 3= yes substance dependent.

Table 6 shows the correlations between the APP total score and SASSI-3 scales and Total score i.e. the probability of having substance dependence. The SASSI-3 scales of Face Valid Alcohol and Face Valid Other Drugs have higher standard deviations than their means indicating a highly
skewed distribution. Therefore, the results of these scales should be interpreted with caution due to the violation of the assumption of normal distribution.

The correlations of the APP Total score and the SASSI-3 scales are all significant at \( p < .001 \) level since they are above .05 except for the defensiveness (DEF) scale. However, only four (FVA, FVOD, SYM, and SAM) of the nine scales have a moderate relationship >.50. The APP scale does appear to have moderate convergent validity with four of the nine SASSI-3 scales but not with the total SASSI-3 score \( r = .379 \). Therefore, the hypothesis is accepted for eight of the nine SASSI-3 subscales and for the Total. Only the correlation between the APP and the SASSI-3 Defensiveness scale failed to reach significance. The conclusion is that since the APP possesses moderate convergence for four of the nine scales and weak convergence for 4 of the scales and the total score, and zero for one scale (DEF), the two measures may be considered related but independent.

**Research Question #4: What is the incremental validity of the APP?**

A hierarchical regression analysis using the SASSI-3 predictor scales and APP Total scores was employed to predict substance dependence.

**Hypothesis:**
The APP captures additional variation in the prediction of probability of substance dependence.

Table 7 summarizes the results of a Hierarchical Regressions Analysis using the SASSI-3 predictor scales and then adding the APP Total score to test incremental validity of the APP as a predictor of substance dependence.

**TABLE 7: Model Summary with SASSI-3 scores entered first followed by the APP as predictors of probability of substance dependency (n=199)**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R sq.</th>
<th>Adj. r sq.</th>
<th>R sq. change</th>
<th>F change</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.668a</td>
<td>.446</td>
<td>.434</td>
<td>.446</td>
<td>39.01</td>
<td>.001</td>
</tr>
<tr>
<td>2</td>
<td>.675b</td>
<td>.456</td>
<td>.442</td>
<td>.010</td>
<td>3.603</td>
<td>.059</td>
</tr>
</tbody>
</table>

a. Predictors: FVA, FVOD, SYM, SAM derived through preliminary stepwise regression
b. Predictors: FVA, FVOD, SYM, SAM, APP Total
Table 7 shows that the APP scores did not capture significant (p <.05) incremental variation in predicting the SASSI-3 total score. It appears that the two measures are related constructs but that the APP does not add any significant or unique value to predicting substance dependence. The hypothesis that the APP will capture additional variation and add value in predicting substance dependence is rejected. The APP adds little in the way of incremental validity when used with the SASSI-3 to predict substance dependence with these two combined populations.

**Research Question # 5, Part A: What is the criterion validity of the APP using two populations: Clinical subjects and College Students?**

An ANOVA was conducted to ascertain whether there are significant differences between the two criterion groups with respect to a) addiction proneness and b) substance dependence. Part A investigated the criterion validity of the APP or its ability to distinguish between the two groups and part B investigated the SASSI-3 scales and their ability to distinguish between the two groups.

**Hypothesis #5, Part A:**
The APP will significantly discriminate between the clinical and student populations.

Results of the criterion validity of the APP scale in distinguishing between the two groups are presented in Table 8.

**Table 8: ANOVA Comparing Clinical and Student Populations using the APP as the Dependent Variable**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>F</th>
<th>P</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical</td>
<td>101</td>
<td>9.00</td>
<td>3.826</td>
<td>.450</td>
<td>.503</td>
<td>.097</td>
</tr>
<tr>
<td>Student</td>
<td>98</td>
<td>8.66</td>
<td>3.217</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05
Table 8 shows that the APP did not significantly (p <.05) discriminate between the clinical and student populations. The hypothesis that the APP will discriminate between the two groups was rejected. The conclusion is that clinical and student groups are not significantly different with respect to addiction-proneness and, therefore, fails to demonstrate criterion validity for the APP with these groups.

Research Question # 5, Part B: What is the criterion validity of the SASSI-3 using two populations: clinical subjects and college students?

Hypothesis #5, Part B:
The SASSI-3 scales and SASSI-3 total score will significantly differentiate between the clinical and student populations.
Table 9 shows results of the criterion validity study employing the SASSI-3 using clinical and student populations.

### Table 9: Univariate Tests of SASSI-3 Scales to Differentiate Clinical and Student Populations

<table>
<thead>
<tr>
<th>SASSI-3 scales/group</th>
<th>Means</th>
<th>SD</th>
<th>F</th>
<th>P</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVA face valid alcohol clinical student</td>
<td>6.65</td>
<td>4.29</td>
<td>6.995</td>
<td>.006</td>
<td>.405</td>
</tr>
<tr>
<td></td>
<td>4.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FVOD face valid other drug clinical student</td>
<td>6.34</td>
<td>2.56</td>
<td>10.083</td>
<td>.001</td>
<td>.486</td>
</tr>
<tr>
<td></td>
<td>5.472</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYM symptoms clinical Student</td>
<td>3.59</td>
<td>2.87</td>
<td>4.541</td>
<td>.034</td>
<td>.301</td>
</tr>
<tr>
<td></td>
<td>2.585</td>
<td>2.204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OAT obvious attributes clinical student</td>
<td>4.67</td>
<td>3.93</td>
<td>6.313</td>
<td>.013</td>
<td>.354</td>
</tr>
<tr>
<td></td>
<td>2.006</td>
<td>2.174</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAT subtle attributes clinical student</td>
<td>3.06</td>
<td>2.51</td>
<td>10.941</td>
<td>.001</td>
<td>.471</td>
</tr>
<tr>
<td></td>
<td>1.231</td>
<td>1.105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEF defensiveness clinical student</td>
<td>5.96</td>
<td>4.68</td>
<td>17.805</td>
<td>.000</td>
<td>.612</td>
</tr>
<tr>
<td></td>
<td>2.486</td>
<td>1.697</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAM supplemental addiction measure clinical student</td>
<td>6.86</td>
<td>5.30</td>
<td>31.827</td>
<td>.000</td>
<td>.797</td>
</tr>
<tr>
<td></td>
<td>1.929</td>
<td>1.986</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAM family clinical student</td>
<td>8.51</td>
<td>8.62</td>
<td>.168</td>
<td>.682</td>
<td>-.059</td>
</tr>
<tr>
<td></td>
<td>1.792</td>
<td>1.908</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COR correctional clinical student</td>
<td>5.46</td>
<td>4.46</td>
<td>7.218</td>
<td>.008</td>
<td>.383</td>
</tr>
<tr>
<td></td>
<td>2.770</td>
<td>2.446</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SASSI-Total clinical student</td>
<td>.195</td>
<td>.145</td>
<td>17.73</td>
<td>.000</td>
<td>.596</td>
</tr>
<tr>
<td></td>
<td>.876</td>
<td>.801</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*SASSI-Total scored as 1=not substance dependent; 2= maybe, due to high defensiveness score; 3= yes substance dependent.*
Table 9 indicates that nine of the 10 SASSI-3 scales differentiate these two groups. Only the family scale (FAM) was not related to group membership. Therefore, the hypothesis is accepted and the SASSI-3 possesses criterion validity. In all scales in which there were significant (p<.05) differences between groups, the clinical group earned higher scores than the student group with respect to the 9 dimensions of substance dependence. Moreover, the effect sizes of these nine scales were >.25 indicating moderate to strong (d >.50) effect. Defensiveness (DEF) and supplemental addiction measure (SAM) were the strongest discriminators of the two groups.
CHAPTER 5
DISCUSSION

The purpose of the study was to investigate the validity of the APP Scale in terms of internal consistency, factor validity, convergent validity, incremental validity, discriminant validity and criterion validity. This instrument represents a unique scale developed for the purpose of identifying individuals at risk or vulnerable to developing substance use disorders given specific personality traits. Previous measures have focused on screening and assessing individuals who have established substance use disorders. The utility of a measure of premorbid vulnerability is in providing intervention and prevention. The study provided mixed results in terms of the utility of the APP scale in research and clinical practice. The results are discussed as they apply to the two populations sampled, college students and clinical subjects adjudicated for treatment.

Summary and Conclusions:

Research study #1 investigated the internal consistency of the APP Scale. It found a strong alpha value of .80 for the clinical sample. However, the student and combined sample alphas were not sufficiently strong to justify its use in either clinical or research contexts. These results could be due to the different response patterns of the two groups and/or the forced-choice structure of the scale. The alpha coefficients in this study are consistent with the findings in previous research (Barnes et al, 2000; Anderson, 2003; Anderson et al., 2006) using general populations and clinical populations.

Research study #2 investigated the factor validity of the APP scale in order to examine the internal structure of the instrument. This study was aimed at establishing whether or not the APP scale has a single underlying dimension or multiple dimensions. Three subscales emerged, through an exploratory factor analysis (EFA), and these factors were consistent with those found by Anderson (2003). The factors identified were Negative Views (NV), Impulsivity/Recklessness (IMP/R) and Sensation Seeking (SS). These results are consistent with the previous literature which identified personality traits referred to as psychoticism and neuroticism, externalizing versus internalizing, and behavioral disinhibition (Babor et al., 1992;
Blackson et al., 1994; Zucker et al., 1996; Anderson, 2003). This finding suggests that the construct of addiction proneness may be too complex to be measured in terms of a single construct. This provides further evidence of the limited reliability of the measure given that the item pool is not homogeneous. Consequently, the APP in its present form should not be used as a screening instrument to identify addiction proneness in clinical settings.

Study #3 examined the convergent validity of the APP with the SASSI-3 and found a moderate but not strong relationship between the two measures. While they share some common variance, the small effect sizes indicate limited overlap between the measures while the results suggest that the two measures appear to be indicators of similar constructs, i.e. addiction proneness (APP) and probability for substance dependence (SASSI-3). The results also indicate that the two constructs differ. This is an important finding since attempting to measure addiction proneness would be expected to predict vulnerability for the development of substance dependence. Finally, the APP was found to be significantly correlated with all SASSI-3 subscales with the exception of the defensiveness scale (DEF). This scale was developed to capture respondents’ level of guardedness or unawareness of substance abuse problems. Unusually high or low scores on this scale reflect attempts to fake good or fake bad. Evidence suggests that the combined group answered the SASSI-3 items with limited guardedness.

In study #4, the incremental validity of the APP scale was investigated using the SASSI-3 total score and four predictor scales. These scales were identified through a stepwise regression analysis to determine whether the APP score would yield significant incremental value in predicting substance dependence. Findings indicated that there was no significant value in using the APP to predict substance dependence and that its use as a predictor or screener with these populations is limited. As a measure meant to screen for personality traits predicting development of substance use disorders, the APP, at least in its present form, appears to have very limited utility in that it is unable to increase the prediction of this problem behavior. Also, since the SASSI-3 has four scales out of nine which appear to best predict probability of substance dependence, perhaps an abbreviated measure of the SASSI-3 could be used as a screener. These results may in part be due to the shared variance between the two measures, but there appears to be no increased variation and therefore, no incremental validity with these two populations.
Study #5 investigated the criterion validity of the two measures and found that the SASSI-3 score was able to distinguish between the clinical and student groups while the APP score was not. Thus, the APP has limited discriminant validity with these two populations. This finding is unexpected since the clinical group is already experiencing consequences of a substance use disorder in that these participants are in treatment. This may be further evidence that addiction proneness and probability of substance dependence are different constructs.

In summary, the findings of the five validity studies conducted in this research project suggest that the APP lacks internal consistency with a non-clinical student population. There appear to be three subscales measuring additive prone personality traits reflected in the previous literature. These traits were Negative Views or Neuroticism, Impulsivity/Recklessness, and Sensation Seeking or Psychoticism. However, there does not appear to be a single, well-defined underlying dimension. Thus, the overall or total score may not be useful for predicting addiction proneness in non-clinical populations. In addition, while the APP has moderate convergent validity with the SASSI-3, the two appear to be measuring different constructs. Also, the APP has no incremental validity in that it adds no unique information in measuring probability of substance dependence. The criterion validity of the APP is limited since the measure was unable to distinguish between a clinical population and a student population. It was expected that the measure would discriminate between various populations since it was developed as a screening or predictive measure of vulnerability to developing substance use disorders.

Limitations of the Study

In this section, threats to internal and external validity of the study will be discussed.

In terms of internal validity, there were issues of possible experimenter bias since the present investigator administered the measures to both groups, and also scored and interpreted the data. This procedure was due to restrictions of time and practicality of completing the research. Therefore, since there was no independent corroboration of the testing procedures for either group, the possibility of experimenter bias exists.

Also, the two groups completed the instruments in different settings and formats. The college students were administered the measures in a group format, in classroom settings while the clinical group data were collected individually during the initial intake in an outpatient office.
setting. This could have impacted the way in which subjects responded to the measures. The college student group’s data were used strictly for research purposes while the clinical subjects were aware that the results of their inventories would also be used as part of determining the treatment plan, as well as length and cost of treatment. Clinical subjects are mandated by the Department of Motor Vehicles to complete treatment in order to reinstate their driving privileges. Clients referred for evaluation and treatment for substance use disorders under these circumstances are more likely to exhibit higher rates of defensiveness (guardedness) and lower motivation to participate openly in treatment. Thus, it is likely that the two groups would have different motivation for some of their responses. In the present study, the clinical population was less forthright in their responses as indicated by the SASSI defensiveness scale. In fact, clients referred for treatment due to having a DUI charge are often hostile to the notion that they need treatment, especially during the initial evaluation session.

In terms of threats to external validity, the two sample groups may not be representative of the larger population due to several factors. Both groups likely have biases due to the regional setting (Southern U.S). The college students were recruited from higher level, junior and senior undergraduate courses in the department of Educational Psychology at Florida State University. The clinical subjects were recruited from a population of DUI offenders referred for treatment in Jacksonville Florida to a private, outpatient clinician's office. It is worth noting here that the clinical group may represent a less extreme clinical population since they are outpatients in a psycho-educational treatment, referred due to driver risk indicators including DUl’s as opposed to participants in a more intensive level of treatment. Also, the results of data collected from students in upper level classes and those choosing elective courses in education and human relation classes may not be representative of the general population. With the clinical group, those who choose to be evaluated and treated in a private practice setting versus group setting offered at a community service agency likely have different demographics. For example, differences in SES, ethnic background, and educational level may exist. Consequently, participants in this study may not represent the larger population of DUI offenders referred for treatment. Due to regional or geographical based cultural biases, the data collected may not be generalizable to larger general populations.
Implications for Practical Use

The results of this study suggest that the APP, in its present form, would not be recommended for use in applied, clinical contexts. This conclusion is based on weak internal consistency, absence of a uniform underlying factor of addiction proneness, the lack of incremental validity using the established SASSI-3 with the groups studied, and overall weak construct validity. The APP was unable to discriminate between the two groups while the SASSI-3 did discriminate between the groups. Therefore, the APP seems to add no additional information to a well established instrument and could not be used in place of the SASSI-3. In addition, in its present form, it would not be useful as an adjunct to the SASSI-3. The APP was developed to measure addiction-proneness and it is unclear from this study whether this construct is well defined and accessible through the use of the APP. The SASSI-3, which measures probability of having a substance use disorder, and the APP, meant to measure addiction-proneness, are measuring similar yet different constructs. There is some evidence that the APP may have sufficient reliability with clinical groups such as the one used in this study. However, the low reliability with the college student group would tend to negate the purpose of the measure which was to provide early detection of those at risk for developing substance use disorders.

Implications for Future Research and Recommendations

Given the preceding discussion regarding the limitations of the APP scale due in part to limited psychometric properties, it follows that more research is needed to improve the scales’ reliability and its construct validity. Specifically, the APP items do not appear to be measuring an underlying construct of addiction proneness as expected. There appear to be three subscales which do corroborate previous findings in that these subscales reflect the growing body of evidence that addiction proneness is correlated with personality traits of psychoticism and neuroticism. While these subscales could prove useful in predicting addiction proneness, the overall score is not useful since it cannot be interpreted. The APP would need to be further refined to enhance the psychometric properties of the instrument. This may be accomplished by increasing the number of items, identifying items that more accurately relate to addiction
proneness, and changing the wording of items which may be vague or outdated in their language. Another improvement may be to change the response format from a forced choice, true/false scale to a Likert-type scale which would provide a range of options for the respondent. Overall, the APP seems to be attempting to measure too complex a construct with too simplistic or imprecise an instrument.

The phenomena of addiction proneness appears to be complex and multidimensional and more research is warranted to accurately identify and define the construct. Barnes et al., (2000) efforts to identify the construct through use of existing personality and substance use disorder measures with clinical and general populations represents a major contribution to this area of study. The instrument was first developed as a measure of pre-alcoholic vulnerability and further refined to include other types of drugs and addiction. In clinical settings, it is widely acknowledged that despite the drug of choice or addictive behavior of choice, the underlying personality dynamics appear to be consistent. These dynamics involve primarily escapism (relief use) or sensation seeking (seeking euphoria). Further, the notion that there appear to be two types or clusters of addicts and two pathways to developing substance use disorders has been well established in the literature.

Further, different population samples could be used with larger sample sizes to improve the generalizability of the APP. For example, using college students from different regions and areas of study, clinical samples in various types of treatment settings and modalities such as group treatment versus individual treatment, community service samples versus private practice samples, and more intensive versus less intensive levels of treatment. It may be beneficial to sample a wider age range starting as young as age 12 since this may reveal tendencies toward SUDs while in young adult samples, SUDs may already be present. In the current study, the clinical and student population results overlapped. This overlap could indicate that both groups have already experienced the occurrence of substance use disorders.

The refinement of a scale that helps identify what makes individuals vulnerable to developing (SUDs) is a worthy endeavor and dictates further research. There is a need to better identify individuals at risk and target prevention and intervention efforts given the tremendous impact SUDs have on individuals, families and society. Once the construct of addiction proneness is better understood and measured, it may be possible to target more specific prevention and
intervention strategies for specific types of addicts. For example, individuals exhibiting higher rates of sensation seeking could be encouraged to learn coping skills and ways to redirect their needs towards less self-destructive activities. Individuals with a propensity to be impulsive and reckless could be taught through cognitive behavioral strategies to establish a “speed bump” or connection between action and consequence. Individuals who exhibit tendencies towards neuroticism or internalizing behaviors such as depression could be offered supportive therapy in conjunction with psychotropic medication versus using drugs to self-medicate. In clinical settings, a brief, precise measure which is easily administered scored and cost effective is optimal. As behavioral scientists, psychologists who are involved in research could focus efforts on identifying and measuring constructs which clinicians can then use to enhance their efforts at intervention.

In summary, the present study sought to examine the construct validity of the APP scale with a college student population and a clinical population with 5 sub-studies of validity. It was found that the APP was not useful as a predictor of addition proneness. This instrument needs rather extensive development work in order to identify the construct, addiction proneness, more clearly and to measure the construct more precisely. Addiction proneness appears to be a complex phenomena mediated by a latent predisposition and affected by insulating or aggravating influences such as family history, biochemical and genetic factors, learning, cultural influences and life experiences. The present study illuminates the need to first define a construct with specificity prior to attempting to measure the construct in a meaningful or applicable way. The research in this area does seem to support the prevailing biopsychosocial model of addictions and personality, therefore highlighting the multifaceted nature of psychological issues versus previous medical models. The greatest challenge in this area of research is in enhancing efforts to better define addiction proneness and vulnerability to SUDs and how to capture this through more comprehensive and precise measures. Further research with the APP aimed at refinement of the items would likely enhance the APP’s psychometric properties and this would be a worthy contribution to the area of measuring addiction proneness and thus have clinical applications for prevention and intervention of developing addictions.
APPENDIX A

Addiction-Prone Personality (APP) Scale Items

1. Have you had very strange or peculiar experiences?
2. Have you often gone against your parent's wishes?
3. Are you a steady person? *
4. Do you wish you could have more respect for yourself?
5. Have you ever been in trouble with the law?
6. Do you prefer rock music over ballads?
7. Have your parents often objected to the kind of people you went around with?
8. Have you lived the right kind of life? *
9. Have people said that you sometimes act too rashly?
10. Do you prefer loud music over quiet music?
11. Are you unable to keep your mind on one thing?
12. Do you go to church almost every week? *
13. Do you prefer sports cars over passenger cars?
14. Do you often feel "fed up?"
15. Do you have strange or peculiar thoughts?
16. Would you prefer to be a stunt-man/woman over a prop-man/woman?
17. Do you prefer endurance sports over games with rests?
18. Did you ever feel that strangers were looking at you critically?
19. Did you play hooky from school quite often as a youngster?
20. Do you prefer electric music over un-amplified music?
21. Do you give money to charities? *

Note: all items have yes/no responses; for items marked by an asterisk *, a negative response adds one point to the APP scale score; for all other items, an affirmative response adds one point to the APP scale score
APPENDIX B

APP Norms

Norms from a general population sample (Winnipeg, Manitoba) are provided from Barnes et al, (2000) and outlined below.

APP Norms for General Population (WHDS) Sample

<table>
<thead>
<tr>
<th>APP Scale</th>
<th>GENDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENDER</td>
<td>Mean</td>
</tr>
<tr>
<td>0 female</td>
<td>5.4783</td>
</tr>
<tr>
<td>1 male</td>
<td>7.0825</td>
</tr>
<tr>
<td>Total</td>
<td>6.2604</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APP Scale</th>
<th>AGEGRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEGRP</td>
<td>Mean</td>
</tr>
<tr>
<td>18 to 34.9 years of age</td>
<td>8.5939</td>
</tr>
<tr>
<td>35 to 49.9 years of age</td>
<td>5.7904</td>
</tr>
<tr>
<td>50 to 67 years of age</td>
<td>4.2925</td>
</tr>
<tr>
<td>Total</td>
<td>6.2604</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APP Scale * DSMDIAG lifetime diagnosis of SUDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSMDIAG lifetime diagnosis</td>
</tr>
<tr>
<td>0 no abuse or dependence</td>
</tr>
<tr>
<td>1 abuse or dependence</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
APP scale norms in the general population sample indicate that male gender, age range 18-35 and a lifetime diagnosis of SUDs have higher overall scores on addiction proneness while in the clinical sample, gender was not significantly different but overall scale scores were significantly higher than in the general sample.

<table>
<thead>
<tr>
<th>GENDER</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 female</td>
<td>12.3125</td>
<td>112</td>
<td>4.41135</td>
</tr>
<tr>
<td>1 male</td>
<td>12.8239</td>
<td>284</td>
<td>4.52679</td>
</tr>
<tr>
<td>Total</td>
<td>12.6793</td>
<td>396</td>
<td>4.49480</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRUG OF CHOICE</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. alcohol only</td>
<td>11.7917</td>
<td>240</td>
<td>4.35342</td>
</tr>
<tr>
<td>2. other drugs only</td>
<td>13.7600</td>
<td>50</td>
<td>4.42424</td>
</tr>
<tr>
<td>3. alcohol and other drugs</td>
<td>14.8987</td>
<td>79</td>
<td>3.89804</td>
</tr>
<tr>
<td>Total</td>
<td>12.7236</td>
<td>369</td>
<td>4.45686</td>
</tr>
</tbody>
</table>

Data from Anderson’s (2006) study with a clinical sample in treatment at University of New Mexico indicate that drug of choice influences APP scores with stimulant users having higher scores than alcohol only or other drug users.

<table>
<thead>
<tr>
<th>STIM_TYP predominant stimulant type</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cocaine</td>
<td>13.2609</td>
<td>69</td>
<td>3.37662</td>
</tr>
<tr>
<td>2 methamphetamine with or without cocaine</td>
<td>14.5750</td>
<td>40</td>
<td>3.07085</td>
</tr>
<tr>
<td>Total</td>
<td>13.7431</td>
<td>109</td>
<td>3.31496</td>
</tr>
</tbody>
</table>
APPENDIX C

SASSI-3

SASSI-3 Substance Abuse Subtle Screening Inventory

For free consultation on this profile 1-888-SASSI • 1-888-227-2774 • M-Th 8-6 • F 11-5 EST

Name: ___________________________________________ Gender: _______ Age: _______
Client ID: ________________________________________ Test Date: _______

Adult Female Profile

Check every rule, yes or no.

- FVA 20 or more? __________
- FVOD 21 or more? __________
- SVM 7 or more? __________
- OAT 10 or more? __________
- SAT 6 or more? __________
- OAT 7 or more and SAT 5 or more? __________
- FVA 9 or more on FVOD 15 or more and SAM 8 or more? __________
- OAT 5 or more and DEF 8 or more and SAM 8 or more? All three? __________
- FVA 14 or more on FVOD 8 or more and SAT 2 or more and DEF 4 or more and SAM 4 or more? All four? __________

THE DECISION RULE:

Any rule answered "yes"? HIGH PROBABILITY of having a Substance Dependence Disorder

All rules answered "no"? LOW PROBABILITY of having a Substance Dependence Disorder

Check if RAP is 3 or more. These may not be meaningful. Try to resolve problem before proceeding.

SASSI

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In P.E.R. 7598

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The Decision Rule:

**Any rule answered “yes”?**

> **High Probability** of having a Substance Dependence Disorder

**All rules answered “no”?**

> **Low Probability** of having a Substance Dependence Disorder

---

**Check every rule, yes or no.**

- **Rule 1:** FVA 18 or more? [ ] yes [ ] no
- **Rule 2:** FVOD 16 or more? [ ] yes [ ] no
- **Rule 3:** SYM 7 or more? [ ] yes [ ] no
- **Rule 4:** OAT 10 or more? [ ] yes [ ] no
- **Rule 5:** SAT 6 or more? [ ] yes [ ] no
- **Rule 6:** OAT 7 or more and SAT 5 or more. [ ] Both? [ ] yes [ ] no
- **Rule 7:** FVA 9 or more or FVOD 15 or more and SAM 8 or more. [ ] Both? [ ] yes [ ] no
- **Rule 8:** OAT 5 or more and DEF 8 or more and SAM 8 or more. [ ] All three? [ ] yes [ ] no
- **Rule 9:** FVA 8 or more and FVOD 6 or more and SAT 2 or more and DEF 4 or more and SAM 4 or more. [ ] All four? [ ] yes [ ] no

---

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APPENDIX D

BIOPSYCHOSOCIAL MODEL OF SUBSTANCE USE DISORDERS

GLOSSARY OF TERMS:

Agreeableness: a tendency to be compassionate and cooperative with others.

Big Five Factor Model: McCrae & Costa’s model of personality comprised of dimensions of neuroticism (tendency to experience negative affect), Extroversion (gregariousness, excitement-seeking), openness to experience (adventurousness, broad-mindedness), agreeableness (helpfulness, compassion) and conscientiousness (dependability, responsibility).

Big Three Factor Model: Eysenck’s model of personality comprised of three broad dimensions of neuroticism (anxious, depressed, guilt feelings, tense, irrational, moody, shy tendencies) psychoticism (aggressive, cold, egocentric, impersonal, impulsive, antisocial, creative, tough minded tendencies) and Extroversion (sociable, lively, assertive, sensation-seeking, dominant tendencies).

Binge drinking or heavy, episodic drinking: consumption of five or more drinks for men or four or more drinks for women in about 2-hour period.

COA or children of alcoholics: individuals who have been raised in a family environment or by a parent(s) who meet clinical criterion for alcohol or substance dependence and are at higher risk for substance abuse/dependence and/or psychological issues as a result.

Conscientiousness: a tendency to show self-discipline, act dutifully, and aim for achievement.

Disease-like type: Jellinek’s typology of alcoholics who are viewed as physically dependent on alcohol. Gamma or binge drinkers are included in this type and are characterized by loss of control once drinking starts but are able to abstain from alcohol between binges. Delta types, in contrast, remain in control of drinking during the episode but are unable to abstain from drinking.

Disinhibition: personality trait associated with substance abuse described as impulsive, novelty/sensation-seeking, low conscientiousness/constraint tendencies.

Ego Strength: a personality dimension comprised of attributes of agreeableness, conscientiousness; frustration tolerance; self-discipline; achievement striving

Essential type: Knight’s psychodynamic classification of types of alcoholics characterized by individuals that are passive and fixated at the oral stage of psychosocial development.
Externalizing disorders: personality disorders that encompass disinhibitory personality traits (impulsivity, novelty/sensation seeking and low conscientiousness/constraint) and antisocial personality that act as risk factors/mediators/moderators and consequences of substance abuse.

Extroversion: a tendency towards gregariousness, excitement seeking, attention seeking.

Field Dependence: a tendency to rely on either internal or external referents in making perceptual judgments.

Harm avoidance: a personality trait associated with substance abuse described as cautious, apprehensive, inhibited and sensitive to punishment tendencies.

Impulsivity: a personality trait associated with substance abuse described as a tendency to behave without forethought or considering the risk(s) involved in the behavior and a tendency to exhibit sudden, unpredictable, spontaneous behaviors without due deliberation or regard for the consequences and that occur under the influence of a compelling pressure that restricts the individuals’ freedom of will.

Internalizing disorders: personality disorders that encompass negative emotionality or affective traits or neuroticism, mood and anxiety disorders that act as risk factors/mediators/moderators and consequences of substance abuse.

Introversion: a tendency towards shyness, social withdrawal and avoidance of excitement or attention.

Negative Views: a tendency toward negative emotionality or pessimistic views; superstitiousness, suspiciousness.

Neuroticism: a tendency to easily experience unpleasant emotions such as anxiety, anger, or depression; emotional instability.

Non-disease type: Jellinek’s typology of alcoholics who are viewed as not physically dependent on alcohol and include alpha and beta types.

Novelty seeking/sensation seeking/stimulus reducing: a personality trait associated with substance abuse described as impulsive, excitable, exploratory, fickle, and disinhibited tendencies and seeking of varied, novel, complex and intense sensations and experiences with the willingness to take physical, social, legal and/or financial risk for the sake of such experiences.

Openness to experience: appreciation for art, emotion, adventure, and unusual ideas; imaginative and curious.

Psychoticism: a tendency to exhibit anti-social behaviors or lack of compassion, lowered social consciousness, inhibitions and cooperativeness or antagonistic with others; a higher tendency
toward impulsivity, recklessness, irresponsibility, and a higher tendency towards sensation seeking or novelty seeking.

Reactive type: Knight’s psychodynamic classification of types of alcoholics characterized by individuals that are more compulsive and reliable and fixated at the anal stage of psychosocial development; later onset of use.

Reward dependence: a personality trait associated with substance abuse described as ambitious, sympathetic, warm, industrious, persistent, moody and sentimental tendencies.

Type 1 or milieu/secondary/relief type alcoholic: Cloninger’s classification of a type of alcoholism characterized by later age of onset of use, experience guilt and fear in association with drinking, loss of control, introversion, relief drinking, emotionally dependent, perfectionistic, rigid, anxious and infrequently engaging in alcohol-related anti-social conduct; higher neuroticism; more prominent in women.

Type 2 or male/primary type alcoholic: Cloninger’s second type of alcoholic characterized by earlier age of onset of use and alcohol related problems, less ability to abstain from alcohol use, more frequent alcohol-related anti-social behavior, less loss of control once drinking commences and less guilt or fear associated with drinking than type 1 alcoholics; higher Extroversion; more prominent in men.

Type A alcoholic: Babor’s typology of alcoholism defined by later onset, less severe dependence, fewer alcohol-related problems, fewer childhood risk factors and less psychopathology.

Type A substance abuser: Feingold’s typology extending Cloninger’s alcoholic types to other substance abusers; equivalent to Type 1 alcoholics with higher neuroticism and chronic stress.

Type B alcoholic: Babor’s typology of alcoholism defined by early onset, more severe dependence, more chronic treatment history, childhood risk factors, familial alcoholism, polydrug use, greater psychopathological dysfunction and more life stress.

Type B substance abuser: Feingold’s typology of substance abusers, equivalent to type 2 alcoholics with background of antisocial personality traits such as poor socialization, sensation seeking, impulsivity and aggression and history of delinquency and criminality; characterized by earlier onset, more severe course of symptoms and positive family history.
RE-APPROVAL MEMORANDUM

Date: 3/18/2010

To: Sandi Sage

Dept.: EDUCATIONAL PSYCHOLOGY AND LEARNING SYSTEMS

From: Thomas L. Jacobson, Chair

Re: Re-approval of Use of Human subjects in Research
Validity of the Addiction-Prone Personality Questionnaire

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by 3/16/2011, you are must request renewed approval by the Committee.

If you submitted a proposed consent form with your renewal request, the approved stamped consent form is attached to this re-approval notice. Only the stamped version of the consent form may be used in recruiting of research subjects. You are reminded that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are advised to review the protocols as often as necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

Cc:
HSC No. 2010.4012
APPENDIX F

Informed Consent

I voluntarily and without element of force or coercion, consent to be a participant in the research project entitled “The Validity of the Addiction Prone Personality Test.”

This research is being conducted by Sandi Sage, a doctoral student in the Counseling Psychology Program and James Sampson, a Professor in the Program of Counseling Psychology at Florida State University. The purpose of this study is to evaluate the effectiveness of instruments which have been developed to identify individuals with differing levels of substance use according to criteria such as demographic variables (age, gender, etc), patterns of use in the past 6 months and personality attributes. This information will be used for research purposes only in partial fulfillment of the requirements of a Doctoral Degree in Education and Learning Systems at Florida State University. I understand that I will be asked questions about my feelings, thoughts and behaviors related to substance use as well as general information about myself.

I understand that I will be asked to complete paper and pencil questionnaires. The total time commitment will be about 20-30 minutes. If I participate in the project, I will be compensated for my time either through a monetary incentive or by extra credit toward my college course, depending on my group status. I understand that my participation is voluntary and I may stop participation at any time. All my answers to the questions will be kept confidential and identified by a subject code number. My name will not appear on any of the results. No individual responses will be reported. Only group findings will be reported.

I understand that there is a possibility of a minimal level of risk involved if I agree to participate in this study. I might experience anxiety when thinking about substance use. The researcher will be available to talk with me about any emotional discomfort I may experience while participating. Also, I can receive counseling services at the Florida State University Student Counseling Center #850-644-2003 if I am a student at Florida State University or if not, I may contact the researcher at #407-733-2005.

I understand that there are benefits for participating in this research project. I will be providing mental health care professionals with valuable insight into substance use, demographic variables and personality attributes. This knowledge can assist them in
providing mental health services that help people remain healthy and functional. This research can also help to advance the state of the art in the field of substance use and personality attributes.

I understand that it is important that I answer all questions in an honest manner. Specific instructions for each instrument will be explained by the researcher. Findings of the study will be reported in summary form and individual scores and information will be held confidential. Debriefing or information regarding results of the study will be provided for all who request it.

I understand that this consent may be withdrawn at any time without prejudice, penalty or loss of benefits to which I am otherwise entitled. I have been given the right to ask and have answered any inquiry concerning the study. Questions, if any, have been answered to my satisfaction.

I understand that I may contact Sandi Sage and/or James Sampson Ph.D., Florida State University, Department of Educational and Learning Systems, #850-644-4592 for answers to questions about this research. If I have questions about my rights as a subject/participant in this research, or if I feel I have been placed at risk, I can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Office of the Vice President for Research at #850-644-8633. Group results will be sent to me upon my request.

I have read and understand this consent form.
REFERENCES


National Institute on Alcohol Abuse and Alcoholism. (2000). *10th annual report to the U.S. Congress on alcohol and health*. Washington, DC.


The National Center on Addiction and Substance Abuse at Columbia University. (1999). *No safe haven: Children of substance-abusing parents (PDF-989K)*.


BIOGRAPHICAL SKETCH

Sandi Sage

Sandi Sage is from Toronto, Canada where she obtained her undergraduate degree in Psychology (BSc) at the University of Toronto in 1986. She completed her Master’s Degree in Counseling Psychology and Human Systems in the Department of Education at Florida State University in 1987 and returned to Toronto to work as a therapist/case manager at the Addiction Research Foundation for two years. She began the Doctoral Program in Counseling Psychology at Florida State University in 1989 and completed her coursework in 1992. She relocated to Sunrise, Florida and completed her Predoctoral Internship at Sunrise Rehab Hospital from 1992-1993. She began working as a therapist in South Florida and relocated to New York City in 1995 and continued to work as a therapist in a group practice until relocating to Jacksonville, Florida in 1999. Since completing her doctoral coursework, she has worked in various settings as a therapist including Shands Jacksonville Hospital, Correctional Centers, and private outpatient clinics and has now been in private practice for the past 12 years in Jacksonville. Her specialties include all types of addictions, trauma, couples counseling, grief counseling, stress and anger management, mood and anxiety disorders, personality disorders and Employee Assistance Programs. She has specialized training in Critical Incidence Response and provides psycho-educational seminars for corporations and agencies upon request on such topics as substance abuse, grief and loss, trauma, suicide prevention, depression and anxiety and stress and anger management. She completed her doctoral research after many years “ABD” and is now seeking a Program in forensics and evaluation for her Post Doctorate training and studying for the licensure exam.