Family History, Sensation Seeking and Impulsivity as Predictors of Alcohol Abuse

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Abstract

The present research examined family history, sensation seeking, and impulsivity as predictors of alcohol abuse. Past studies have shown that alcohol abuse seems to have a genetic influence, yet personality traits such as sensation seeking and impulsivity have also been shown to relate to problematic use. The purpose of this research is to investigate these issues further, as well as examine the utility of the TOVA as a measure of impulsivity. It was hypothesized that sensation seeking and impulsivity will be better predictors of alcohol abuse in college students compared to family history. This hypothesis was supported to an extent. Replicating prior research sensation seeking was a significant predictor of alcohol abuse in college students. Impulsivity was only a significant predictor when the BIS measure was used; however its unique contribution was eliminated once sensation seeking was added to the model. These finding suggest that the TOVA is not a better behavioral measure of impulsivity, nor is family history a significant predictor of problematic drinking in this sample.
Family History, Sensation Seeking and Impulsivity as Predictors of Alcohol Abuse

Research on substance abuse has focused on various predictors of problematic use, in the hopes of being able to prevent or intervene before addiction arises. Although substance abuse can occur at any age and in any environment, it appears that college age individuals are at an even greater risk (Simons, Gaher, Correia, Hansen, & Christopher, 2005). Zuckerman (1994) supports this claim by stating that alcohol, which is the most common form of substance abuse in adolescents, reaches its highest consumption rate between the ages of 18-25. Alcohol, alongside tobacco, is typically the first drug that an individual experiments with (Zuckerman, 2007).

Why are college students at such a high risk for alcohol abuse? One idea is that students want to conform to the behaviors of peers, and alcohol consumption occurs as a result of social pressures to fit in (Webb, Baer, & McKelvey, 1995). However, research shows that consumption usually begins in adolescence and is a voluntary action. Those that continue to consume alcohol for peer related pressures only, are not likely to become alcohol abusers compared to those possessing other traits (Zuckerman, 1994). Other identifiable traits may include a family history of alcohol abuse, sensation seeking, and impulsivity (Roberti, 2004).

Familial Factors

In regards to the genetic contributions of alcohol abuse, the findings are mixed. The majority of the findings point to a genetic predisposition (Tarter, 1988). Compared to the general population, relatives of alcoholics are 3 to 5 times more likely to develop alcoholism themselves (Cloniger, 1987). A study done on children of alcoholics revealed that these children reported more alcoholic drinks consumed during a week, more times being intoxicated, and higher expectancies of future intoxication compared to children of non-alcoholics (Chalder, Elgar, &
Adoption studies have found that biological children of alcoholic parents are more likely to misuse alcohol, even if raised since birth by an adoptive family with no alcohol problems. In comparison, those children who are raised by adoptive parents with alcohol problems are no more likely than other children to develop alcohol problems themselves (Cloniger, Bohman, & Sigvardsson, 1981). Siblings of alcoholics are more likely to be alcohol dependent as well. It is estimated that alcoholism has a heritability of 50-60%, especially in Type II alcohol dependence (Hiroi & Agatsuma, 2005) and in men, meaning that men have a greater chance of abusing alcohol if one of their parents were a Type II alcoholic (Johnson & Vernon, 2004). Some studies find a genetic contribution for alcoholism is more prevalent in men however others find that genetics play a role for both males and females (Nolen-Hoeksema, 2004).

Although there has been little advancement locating specific genes that may place individuals at risk for alcohol dependence, research has identified alcohol dehydrogenase (ADH) and aldehyde dehydrogenase (ALDH) as two genes that may play a role. Each person has two alleles or gene copies, and those who have homozygous ADH1B alleles have a low risk for alcohol dependence. Those with heterozygotes however are at greater risk for development (Whitfield, 2002). The same result is found for ALDH. Individuals who are homozygous for ALDH2 are at less risk for alcohol dependence compared to those who are heterozygous for ALDH2 (Iwahashi, 1995). Both types have been associated with higher levels of acetaldehyde production during alcohol metabolism. Acetaldehyde increases a person’s sensitivity to alcohol, hence decreasing one’s consumption (Wall, Shea, Luczak, Cook, & Carr, 2005). Passing on these genes, or the lack thereof, may help explain why alcohol abuse runs in the family.

Although alcohol abuse seems to have a genetic influence, some researchers do not believe that it is inherited in a Mendelian manner (Cloniger, 1987), but instead there is an
interaction between genes and environmental factors (Bardo, Donohew, & Harrington, 1996). Chalder et al (2005) found that children of alcoholics were not likely to consume alcohol because they enjoyed the taste, but due to motives based on conformity, enhancement and coping. They also reported drinking as a way to escape from life stressors. Cloniger (1987) focuses on sociocultural variables as well as genetics. An alcoholic’s behavior may be accounted for by mechanisms of learning as well as motivation. Exploring and seeking out novel experiences are heritable, which may explain why alcohol abuse runs in families. Individuals become motivated to seek out alcohol and its rewarding effects, which in turn becomes a learned behavior (Cloniger, 1987). Finn et al (2000) declared that certain personality traits are inherited or an individual can be predisposed to social deviance that manifests itself in the active seeking of alcohol. This temperament is then paired with positive alcohol consumption expectancies. These positive expectancies have been found to be reasonably heritable, in which the individual inherits the excitement seeking temperament, which becomes tied with positive alcohol experiences/expectancies and the individual consumes alcohol on a regular basis (Finn et al, 2000).

**Sensation Seeking**

Sensation seeking as a personality trait has been studied extensively by Zuckerman (1979, 1994, and 2007). He defined this trait as the quest for various activities that are new, difficult and extreme, and that ultimately lead to an increase in stimulation. People who possess this trait are willing to take physical and social risks in order to reach this high level of arousal (Zuckerman, 1994). There is a strong relationship between sensation seeking and extroversion and psychoticism personality dimensions. Those who score high on sensation seeking scales are often impulsive, engage in intense physical activity, such as mountain climbing and have
multiple sexual partners (Bardo et al., 1996). However those who do not engage in physical risks or social risks (financial and legal) turn to other outlets, such as drug and alcohol use (Roberti, 2004).

Jaffe and Archer (1987) found that in young adults, sensation seeking was the most effective predictor of the use of 7 out of 10 drugs, including hashish, marijuana, amphetamines, and LSD (Zuckerman, 1994). In relationship to drug and alcohol use, sensation seeking seems to be more important in the early development of use, rather than the later stages. This is likely because the sensation seeking temperament leads the individual to try and engage in risky or new experiences, which then leads to alcohol consumption, whereas in the later stages of use, alcohol is needed primarily to maintain their disposition and ability to operate normally (Zuckerman, 1994).

While examining novelty seeking behaviors, Bardo et al (1996) found that sensation seeking can be used as a predictor of alcohol use in humans, and Wagner (2001) discovered that participants who reported using alcohol or drugs were more likely to score high on levels of sensation seeking. In an examination of exposure theories, Horvath, Milich, Lynam, Leukfeld, & Clayton (2004) looked at personality traits and substance use of students in 9th and 10th grade to see which one was the stronger predictor of substance use between the ages of 19-21. It was found that students who demonstrated high levels of sensation seeking in high school also demonstrated higher levels of substance use when they were older. However, it was also found that those students who scored higher on levels of substance use while in high school, had increased levels of sensation seeking when they reached the ages of 19-21. This demonstrates a potential reciprocal relationship in which substance abuse is associated with changes in personality later in life (Horvath et al., 2004).
There seems to be a greater risk for college students to develop substance abuse. College students who score high on sensation seeking scales are also heavy drinkers (Zuckerman, 2007). Curiosity and pleasure are motives for substance use. Curiosity is associated with preliminary and sporadic use, whereas pleasure is associated with abuse. Sensation seeking has been found to be related to both curiosity and pleasure (Zuckerman, 2007). Due to such findings, it is often hard to distinguish whether sensation seeking is a directly or indirectly related to alcohol abuse. Some studies have found indirect links, where sensation seeking is related to the perceived risks and benefits of alcohol use (Hampson, Severson, Burns, Slovic, Fisher, 2001); however a study by Katz, Froome, and D’Amico (2000) did not find a relationship with expectancies and instead found a direct relationship between sensation seeking and heavy drinking. Yanovitzky (2006) looked at sensation seeking to see if was a directly or indirectly contributor to alcohol use in college students. He found that sensation seeking alone can influence use of alcohol in college students, and that it increases the likelihood that the student would associate with alcohol using peers more frequently. Therefore, he found that sensation seeking can both directly and indirectly increase the likelihood that college students will use alcohol (Yanovitzky, 2006).

**Impulsivity**

Intense levels of impulsivity are characterized by the failure to realize the consequences of one’s behavior (Zuckerman & Kuhlman, 2000). Therefore a potentially important factor triggering vulnerability to substance abuse is extreme impulsivity (Klinteberg, von Knorring, & Oreland, 2004). Impulsivity is involved with executive cognitive functioning, and is usually elevated in alcohol abusive individuals. Therefore, deficits in executive cognitive functioning are associated with the risk of abusing alcohol (Pfefferbaum, Sullivan, Rosenbloom, Mathalon, & Lim, 1998). A research study supporting this view, compared controls to abstinent alcohol
dependent participants, and found that the previously dependent participants made more errors on impulsive tasks and current alcohol dependent patients scored higher on impulsivity and aggression scales and made more risky decisions (Bjork, Hammer, Grant, & Danube, 2005).

Impulsivity may also be related to an earlier age of onset for alcohol use (Bjork et al, 2005). Thompson, Whitmore, Raymond and Crowley (2006) state that adolescents receiving treatment for substance abuse were tested for impulsivity using immediate memory tasks and delayed memory tasks. It was found that participants with substance abuse problems showed greater impulsivity on the immediate memory task, but not the delayed memory tasks, suggesting that adolescents with substance use disorders have trouble with inhibition and focusing attention on visual discrimination tasks, or adolescents who lack inhibition are at risk for substance abuse. Self reported measures of impulsivity were found to be related to the immediate memory tasks, but not the delayed memory tasks, which may have been because the DMT incorporated a filler stimulus which may have reduced the patient’s impulsive inclinations (Thompson, et al., 2006).

Not all studies measuring impulsivity and alcohol abuse find significant relationships between the two. For example one study using a continuous performance test found no difference between those participants suffering from alcohol abuse and control subjects for errors on the Go-No Go task (Fallgatter, Wiesbeck, Weijers, Boening, & Strik, 1998). This CPT is intended to measure impulsivity by assessing execution (go) and inhibition (no go). During the execution phase, participants are required to hit a response key when a certain letter appears on a computer screen, while during the inhibition phase, the appearance of target letters cue the participant to suppress their response. Fallgatter et al’s (1998) non-significant findings may have been due to the fact that the CPT measure used in this study demonstrated lengthy presentation times and between stimulus periods making the task uncomplicated and effortless for both
subjects regardless of alcohol use. Hence, the Go-No Go task may not be the best measure of impulsivity (Fallgatter et al., 1998).

The purpose of the present research was to examine the roles of family history, sensation seeking, and impulsivity and their relationship to problems with alcohol use, in particular the extent to which each predicts problematic use. In addition, the measurement tools used to assess impulsivity was explored further. Self-report scales and continuous performance tests are the two main measurements of impulsivity. Self report has been found to reveal impulsivity as a trait, whereas CPT’s give more control by measuring the actual impulsive behavior (Reynolds, Ortengren, Richards, & de Wit, 2006).

Perhaps a better measure of impulsivity is the Test of Variables of Attention (TOVA), a CPT used in the diagnosis of attention deficit hyperactivity disorder. The TOVA is commonly used to measure ADHD, and is rarely used, if ever, in examining the relationship between impulsivity and other behavior and traits. Due to problems with common CPT measures of impulsivity, the present study examined the utility of the TOVA to measure impulse behaviors of the participants. This CPT contains two sections; target infrequent and target frequent. The target infrequent section is similar to other CPTs and measures an individual’s ability to pay attention to a task. The target frequent section looks at the individual’s ability to inhibit their response, which makes it a good candidate to use when examining impulsivity and alcohol abuse. Commission errors on the TOVA, as well as reaction time are viable options for measures of impulsivity.

In addition to examining the utility of the TOVA in this context, it was hypothesized that higher levels of sensation seeking and impulsivity will be better predictors of alcohol abuse.
compared with family history, due to the evidence demonstrating these two personality traits as indicators of heavy binge drinking qualities in college students.

Method

Participants

Participants in this study were 90 Marietta College students (27 male, 63 female) enrolled in a psychology course. Students were obtained from a voluntary subject pool, and were given course credit for their participation.

Materials

The material used in this study was a packet comprised of self report instruments and questionnaires, as well as a Continuous Performance test (CPT). There will be a total of four questionnaires and one CPT. The organization of the questionnaires were counterbalanced and presented randomly.

Children of Alcoholics Screening Test (CAST)

The CAST was designed to identify children whose parents abuse alcohol or who suffer from alcoholism. It is comprised of 30 yes or no questions relating to the individual’s experiences, emotional responses, and behaviors to parent’s alcohol consumption (Chalder et al., 2005). Six or more yes answers on the CAST are required for the individual to be deemed a child of an alcoholic. The CAST has demonstrated high levels of validity (Sheridan, 1995) and reliability (Yeatman, Bogart, Geer, & Sirridge, 2006). This test was used as a measure of family
history of alcohol abuse, and to differentiate between children of alcoholics and children of non-alcoholics.

**Alcohol Use Disorders Identification Test (AUDIT)**

The AUDIT is used as a measure of individual alcohol use and consumption. It is used in various medical and research settings to identify individuals at risk for dependency or hazardous drinking (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). The AUDIT is comprised of 10 questions relating to the individual's drinking habits. A total score of 8 suggests a risky pattern of drinking which could be detrimental to the individual. A score of 13 or more suggests alcohol dependence. Using community and clinical samples, the AUDIT has been found to be a valid test of risky alcohol consumption (Allen, Litten, Fertig, & Babor, 1997) and high in internal consistency reliability (Ivis, Adlaf, & Rehm, 2000). For this study, the AUDIT was used to identify the individuals already at risk for alcohol abuse.

**Sensation Seeking Scale (SSS)**

The SSS is comprised of four subscales: Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility. A total score is then obtained to assess the individuals' overall sensation seeking tendencies, which will be used to distinguish between high and low sensation seekers. This scale is used frequently when assessing risk-taking behaviors and has been repeatedly evaluated as high in validity and reliability (Zuckerman, 1994).

**Barratt Impulsivity Scale (BIS)**

The BIS consists of 30 measures that examine trait impulsivity. It is a self-report measure that assesses attentional, motor, and non-planning impulsiveness in individuals (Dom, Hulstijn,
The BIS has been found to be both reliable and valid (Patton, Stanford, & Barratt, 1995). This scale will be used as a comparison to the TOVA measures.

**Test of Variables of Attention (TOVA)**

The TOVA is a Continuous Performance Test (CPT) commonly used to identify individuals with attention deficit hyperactivity disorder. This test is comprised of two conditions measuring one’s ability to focus and pay attention to presented stimuli, as well as impulsivity or the ability of the individual to inhibit a response. The TOVA is approximately 21 minutes long. The TOVA has been found to be both reliable and valid and can be used cross culturally (Huang, Chao, Wu, Chen, Chen, 2007). In this study, total commission errors and mean reaction time was the primary focus and was used to measure the impulsivity of the participants.

**Procedure**

This study was approved by the Internal Review Board at Marietta College. Participants came into the research lab one at a time where they were seated and informed consent was obtained. During this time a brief explanation and overview of the study was provided to the participants. Participants were then seated in a cubicle and given instructions and directions on how to use the TOVA computer program. After completing the TOVA, participants were then presented with the CAST, AUDIT, SSS and BIS. Each session took approximately one hour to complete.

After the participants had finished all questionnaires and the CPT, they were debriefed and told the purpose and intentions of the study. All questions were answered to the best of the researcher’s ability and results of the present study were sent to participants upon request.
Results

The current study investigated the predictive relationship between sensation seeking, impulsivity, family history of alcohol abuse and current alcohol use among college students. It was hypothesized that sensation seeking and impulsivity would be better predictors of current alcohol use.

An initial simultaneous multiple regression, incorporating scores on the SSS, BIS, TOVA (commission errors and mean response time), and CAST was conducted to determine the best linear combination of these variables for predicting scores on the AUDIT. An alpha level of .05 was used. The means, standard deviations, and intercorrelations are reported in Table 1. Although the combination of these variables significantly predicted current alcohol abuse, $F(5, 82) = 10.26, p < .001$, only sensation seeking $r = .60$, $p$ (one-tailed) $< .001$, and Barratt impulsivity scores $r = .33$, $p$ (one-tailed) $= .001$, were significantly correlated with the outcome measure. The beta weights presented in Table 2, demonstrate the predictive value of each variable on current alcohol use. The adjusted $R$ squared value was .35, indicating that 35% of the variance in current alcohol use can be explained by the model.

The first analysis revealed that sensation seeking and impulsivity (as measured by the BIS) are the two main variables with potential predictive value for alcohol use. A hierarchical regression analysis was conducted to further investigate the predictive power of these two variables. Since commission errors and response time on the TOVA and family history were not predictive of alcohol use, they were not included in this analysis. Based on prior research, sensation seeking was entered into the regression model first, followed by impulsivity scores. The means, standard deviations, and intercorrelations are reported in Table 3. With an alpha
level set at .05, the combination of these two variables significantly predicted alcohol abuse, $F(2, 85) = 25.19, p < .001$. However, sensation seeking was the only significant contributor to the model, $F(1, 86) = 49.51, p < .001$. The beta weights reported in Table 4, reveal the predictive value of sensation seeking over impulsivity. Approximately 36% of the variance in current alcohol use can be explained by sensation seeking alone as signified by the adjusted $R^2$. This variance remains the same with impulsivity scores included in the model.

To further investigate the shared variance between sensation seeking scores and BIS scores, another regression analysis was conducted, but this time alternating the order of the variables in the model. With an alpha level of .05, BIS scores were placed into the hierarchical regression analysis, followed by sensation seeking. The means, standard deviations, and intercorrelations can be found in Table 5. This model was also significant, $F(2, 85) = 25.19, p < .001$, with both variables significantly contributing to the predictive value of the model. Table 6 illustrates that although by itself, impulsivity can predict current alcohol use, the addition of sensation seeking makes the model a better predictor. Hence, any unique contribution of impulsivity disappears once sensation seeking is included. The $R^2$ value indicates that again, 36% of the shared variance can be explained by this model.

Due to the complexity and vastness of the impulsivity trait, further analysis were conducted to investigate the different aspects of impulsivity and to see if the BIS is measuring something different than the TOVA. The trait was broken down into three subscales, motor impulsiveness, nonplanning impulsiveness, and attentional impulsiveness. Using an alpha level of .05 a simultaneous regression analysis was conducted combining sensation seeking and the three BIS subscales. The means, standard deviations, and intercorrelations are reported in Table 7. This model significantly predicted current alcohol use, $F(4, 83) = 12.68, p < .001$, with an $R^2$
of .35. However, as seen in Table 8, the beta weights illustrate that only sensation seeking significantly contributes to the predictive value of the model.

Because different factors have been found to predict alcohol abuse in males and females, analyses were rerun using only males and only females. Results were consistent to the analysis of the overall sample, with sensation seeking being the only significant contributor to the predictive value of the model.

In conclusion, the hypothesis was partially supported. Using the TOVA as a measure of impulsivity, the first model demonstrated that impulsivity does not significantly contribute to current alcohol use. Using the BIS as a measure instead however, demonstrates that both impulsivity and sensation seeking are significant predictors of current alcohol use among college students, however any unique variance of the BIS is gone once sensation seeking is added to the equation. This also suggests that, contrary to the initial hypothesis, the TOVA does not seem to be an accurate measure of impulsivity at least not in the same way that the BIS defines impulsivity.

Discussion

The present study sought to further investigate the predictors of problematic alcohol use in college students. Specifically, the predictive value of sensation seeking, impulsivity, and familial factors was examined. Another aspect of this research was to introduce the TOVA as a potential impulsivity measure due to problems with previous measures of that nature. Replicating previous research, it was found that sensation seeking and impulsivity were significant predictors of student alcohol use when the BIS measure of impulsivity was used, but due to the overlap of variance explained by both variables, sensation seeking appeared to be the best predictor.
Prior research has claimed sensation seeking and impulsivity are separate entities (Roberti, 2004), yet others have found that some aspects of impulsivity scales, including the BIS, capture key components of sensation seeking (Patton, Stanford, & Barratt, 1995). The two traits are very complex and encompass a wide range of characteristics and behaviors. Zuckerman (1994) proposed an impulsive, unsocialized sensation seeking (ImpUSS) as a component in his scale in which higher scores indicate a lack of planning and increased risk taking. This portion of the SSS provides evidence for the overlap between impulsivity measures and the sensation seeking scale by measuring sensation seeking based on impulsive behaviors (Roberti, 2004). Other studies link scores on the BIS to risk taking behaviors such as drunken driving, drug use, and fighting (Stanford, Greve, Boudreaux, Mathias, & Brumbelow, 1996). The current research findings further support this overlapping relationship between impulsivity and sensation seeking.

Although the TOVA and BIS allegedly measure impulsive behavior, only the score on the BIS had any predictive value on alcohol use. Therefore the hypothesis that the TOVA would be a better instrument in assessing impulsive behavior was not supported. Although this finding may question the utility of the commission errors and response time as measures of impulsivity, a more likely explanation is that the TOVA is measuring a different component of the complex trait. The aspect of impulsivity that it is capturing does not seem to be valuable in the prediction of alcohol use. Accordingly, BIS scores also become less valuable in alcohol use prediction once sensation seeking is added.

The low predictive value of family history in a college population is similar to previous studies looking at this population. Although family history does play a role in alcohol abuse, it seems to be a better predictor of abuse later in life, demonstrating the actual physiological addiction not the experimental socialized drinking found in a younger population (Zuckerman,
1994). In this college age sample sensation seeking, which declines with age, is the best predictor of binge-drinking qualities in students, which is consistent with prior research stating that by itself, sensation seeking can both directly and indirectly influence college students to use alcohol (Yanovitzky, 2006). These findings further support previous research that sensation seeking and impulsivity are better predictors of alcohol abuse in college students (Roberti, 2004).

These findings have important implications for college students who have risk taking, impulsive personalities. These traits put them at risk for developing alcohol abuse or problematic drinking. Interventions designed to prevent or intervene with risky drinking behaviors should consider the importance of these two personality characteristics over family history.

Future research should also aim to find better CPT measures of impulsivity. The current findings further support prior research (Reynolds et al., 2006) suggesting that self-report measures of impulsivity are not correlated with behavioral tasks in that those who scored high in impulsivity on the BIS did not make more commission errors on the TOVA nor have an increase in reaction time. Although impulsivity is a major component of ADHD it seems as though the TOVA and the BIS are assessing different aspects of the trait. A more accurate measure of the actual impulsive behavior is needed. Other variables besides sensation seeking that may play a role in predicting alcohol abuse should also be examined. It is important to keep in mind that other factors are likely playing a role in the development of alcohol abuse in young adults.

Although this study incorporated a relatively large sample, there was a higher percentage of females compared to males. Also, less than half the sample population met the required score to be labeled as a problematic drinker on the AUDIT. This restricted range of participants may have played a role in the lack of significant findings.
Other potential limitations must also be considered. The data obtained was analyzed using a forced entry regression model, in which the order of the variables was chosen by the researcher based on prior research. Future research may want to look into other types of predictor models when analyzing similar data. Homogeneity of the sample may be another problem. Participants were primarily Caucasian undergraduate students which may not generalize to different age groups or more diverse populations. Future research should acknowledge these issues as well as examine other potential factors that may predict alcohol abuse.
References


New York: Cambridge University Press.


Appendix A
Children of Alcoholics Screening Test (CAST)

Please check the answer below that best describes your feelings, behavior and experiences related to a parent’s alcohol use. Take your time and be as accurate as possible.

- Have you ever thought that one of your parents had a drinking problem?
- Have you ever lost sleep because of a parent’s drinking?
- Did you ever encourage one of your parents to quit drinking?
- Did you ever feel alone, scared, nervous, angry, or frustrated because a parent was not able to stop drinking?
- Did you ever argue or fight with a parent when he or she was drinking?
- Did you ever threaten to run away from home because of a person’s drinking?
- Has a parent ever yelled at or hit you or other family members when drinking?
- Have you ever heard your parents fight when one of them was drunk?
- Did you ever protect another family member from a parent who was drinking?
- Did you ever feel like hiding or emptying a parent’s bottle of liquor?
- Do many of your thoughts revolve around a problem drinking parent or difficulties that arise because of his or her drinking?
- Did you ever wish that a parent would stop drinking?
- Did you ever feel responsible for or guilty about a parent’s drinking?
- Did you ever fear that your parents would get divorced due to alcohol misuse?
- Have you ever withdrawn from and avoided outside activities and friends because of embarrassment and shame over a parent’s drinking problem?
- Did you ever feel caught in the middle of an argument or fight between a problem drinking parent and your other parent?
- Did you ever feel that you made a parent drink alcohol?
- Have you ever thought that a problem drinking parent did not really love you?
__Did you ever resent a parent’s drinking?
__Have you ever worried about a parent’s health because of his or her alcohol abuse?
__Have you ever been blamed for a parent’s drinking?
__Did you ever think your father was an alcoholic?
__Did you ever wish your home could be more like the homes of your friends who did not have a parent with a drinking problem?
__Did a parent ever make promises to you that he or she did not keep because of drinking?
__Did you ever think your mother was an alcoholic?
__Did you ever wish that you could talk to someone who could understand and help the alcohol related problems in your family?
__Did you ever fight with your brothers and sisters about your parent’s drinking?
__Did you ever stay away from home to avoid the drinking parent or the other parent’s reaction to the drinking?
__Have you ever felt sick, cried, or had a “knot” in your stomach after worrying about a parent’s drinking?
__Did you ever take over any chores and duties at home that were usually done by a parent before he or she developed a drinking problem?
Appendix B

Alcohol Use Disorders Identification Test (AUDIT)

One Standard Drink is:

One glass of beer  or  One can/bottle of beer  or  One shot of liquor  or  One glass of wine

Please check the answer that is correct for you:

1. How often do you have a drink containing alcohol?
   __Never    __Monthly or less    __2-4 times a month    __2-3 times a week    __4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?
   __1 or 2    __3 or 4    __5 or 6    __7 to 9    __10 or more

3. How often do you have 6 or more drinks on occasion?
   __Never    __Less than Monthly    __Monthly    __Weekly    __Daily or almost daily

4. How often during the last year have you found it difficult to get the thought of alcohol out of your mind?
   __Never    __Less than Monthly    __Monthly    __Weekly    __Daily or almost daily

5. How often during the last year have you found that you were not able to stop drinking once you had started?
   __Never    __Less than Monthly    __Monthly    __Weekly    __Daily or almost daily

6. How often during the last year have you been unable to remember what happened the night before because you have been drinking?
   __Never    __Less than Monthly    __Monthly    __Weekly    __Daily or almost daily

7. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?
   __Never    __Less than Monthly    __Monthly    __Weekly    __Daily or almost daily

8. How often during the last year have you had a feeling of guilt or remorse after drinking?
   __Never    __Less than Monthly    __Monthly    __Weekly    __Daily or almost daily

9. Have you or someone else been injured as a result of your drinking?
   __No    __Yes, but not in the last year    __Yes, during the last year

10. Has a relative, friend, doctor, or any other health worker been concerned about your drinking or suggested you cut down?
    __No    __Yes, but not in the last year    __Yes, during the last year
Appendix C

Sensation Seeking Scale

*Directions:* Each of the items below contains two choices A and B. Please indicate which of the choices most describes your likes or the way you feel. In some cases you may find items in which both choices describe your likes or feelings. Please choose the one which better describes your likes and feelings. In some cases you may find items in which you do not like either choice. In these cases mark the choice you dislike least. Do not leave any items blank. It is important you respond to all items with only one choice, A or B. We are interested only in your likes or feelings, not in how others feel about these things or how one is supposed to feel. There are no right or wrong answers as in other kinds of tests. Be frank and give your honest appraisal of yourself.

1. A. I like wild, uninhibited parties.
   B. I prefer quiet parties with good conversation.

2. A. There are some movies I enjoy seeing a second or even a third time.
   B. I can’t stand watching a movie that I’ve seen before.

3. A. I often wish I could be a mountain climber.
   B. I can’t understand people who risk their necks climbing mountains.

4. A. I dislike all body odors.
   B. I like some of the earthy body smells.

5. A. I get bored seeing the same old faces.
   B. I like the comfortable familiarity of everyday friends.

6. A. I like to explore a strange city or section of town by myself, even if it means getting lost.
   B. I prefer a guide when I am in a place I don’t know well.

7. A. I dislike people who do or say things just to shock or upset others.
   B. When you can predict almost everything a person will do and say, he or she must be a bore.

8. A. I usually don’t enjoy a movie or play when I can predict what will happen in advance.
   B. I don’t mind watching a movie or play when I can predict what will happen in advance.

9. A. I have tried marijuana or would like to.
   B. I would never smoke marijuana.

10. A. I would not like to try any drug that might produce strange and dangerous effects on me.
    B. I would like to try some of the new drugs that produce hallucinations.
11. A. A sensible person avoids activities that are dangerous.
   B. I sometimes like to do things that are a little frightening.

12. A. I dislike swingers (people who are uninhibited and free about sex).
   B. I enjoy the company of swingers.

13. A. I find that stimulants make me uncomfortable.
   B. I often like to get high (drinking alcohol or smoking marijuana).

14. A. I like to try new foods that I have never tasted before.
   B. I order the dishes with which I am familiar so as to avoid disappointment and unpleasantness.

15. A. I enjoy looking at home movies or travel slides.
   B. Looking at someone’s home movies or travel slides bores me tremendously.

16. A. I would like to take up the sport of water skiing.
   B. I would not like to take up water skiing.

17. A. I would like to try surfboard riding.
   B. I would not like to try surfboard riding.

18. A. I would like to take off on a trip with no pre-planned or definite routes or timetable.
   B. When I go on a trip I like to plan my route and timetable carefully.

19. A. I prefer the down-to-earth kinds of people as friends.
   B. I would like to make friends in some of the “far out” groups such as artists or “ punks.”

20. A. I would not like to learn to fly an airplane.
    B. I would like to learn to fly an airplane.

21. A. I prefer the surface of the water to the depths.
    B. I would like to go scuba diving.

22. A. I would like to meet some persons who are homosexual (men or women).
    B. I stay away from anyone I suspect of being gay or lesbian.

23. A. I would like to try parachute jumping.
    B. I would never want to try jumping out of a plane with or without a parachute.

24. A. I prefer friends who are excitingly unpredictable.
    B. I prefer friends who are reliable and predictable.

25. A. I am not interested in experience for its own sake.
    B. I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional, or illegal.

26. A. The essence of good art is in its clarity, symmetry of form, and harmony of colors.
B. I often find beauty in the “clashing” colors and irregular forms of modern paintings.

27. A. I enjoy spending time in the familiar surroundings of home.
B. I get very restless if I have to stay around home for any length of time.

28. A. I like to dive off the high board.
B. I don’t like the feeling I get standing on the high board (or I don’t go near it at all).

29. A. I like to date members of the opposite sex who are physically exciting.
B. I like to date members of the opposite sex who share my values.

30. A. Heavy drinking usually ruins a party because some people get loud and boisterous.
B. Keeping drinks full is the key to a good party.

31. A. The worst social sin is to be rude.
B. The worst social sin is to be a bore.

32. A. A person should have considerable sexual experience before marriage.
B. It’s better if two married persons begin their sexual experience with each other.

33. A. Even if I had the money, I would not care to associate with flighty rich person such as those in the jet set.
B. I could conceive of myself seeking pleasure around the world with the jet set.

34. A. I like people who are sharp and witty, even if they do sometimes insult others.
B. I dislike people who have their fun at the expense of hurting the feelings of others.

35. A. There is altogether too much portrayal of sex in movies.
B. I enjoy watching many of the sexy scenes in movies.

36. A. I feel best after taking a couple of drinks.
B. Something is wrong with people who need liquor to feel good.

37. A. People should dress according to some standard of taste, neatness, and style.
B. People should dress in individual ways even if the effects are sometimes strange.

38. A. Sailing a long distance in a small sailing craft is foolhardy.
B. I would like to sail a long distance in a small but seaworthy sailing craft.

39. A. I have no patience with dull or boring persons.
B. I find something interesting in almost every person I talk to.

40. A. Skiing down a high mountain slope is a good way to end up on crutches.
B. I think I would enjoy the sensation of skiing very fast down a high mountain slope.
# Appendix D

## Barratt Impulsivity Scale (BIS)

**DIRECTIONS:** People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

<table>
<thead>
<tr>
<th></th>
<th>Rarely/Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Almost Always/Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I plan tasks carefully.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I do things without thinking.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I make-up my mind quickly.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I am happy-go-lucky.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I don’t “pay attention.”</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I have “racing” thoughts.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I plan trips well ahead of time.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I am self controlled.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I concentrate easily.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I save regularly.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I “squirm” at plays or lectures.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I am a careful thinker.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I plan for job security.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I say things without thinking.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I like to think about complex problems.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>I change jobs.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>I act “on impulse.”</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>I get easily bored when solving thought problems.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>I act on the spur of the moment.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>I am a steady thinker.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>I change residences.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>I buy things on impulse.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>I can only think about one thing at a time.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>I change hobbies.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>I spend or charge more than I earn.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>I often have extraneous thoughts when thinking.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>I am more interested in the present than the future.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>I am restless at the theater or lectures.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>I like puzzles.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>I am future oriented.</td>
<td>O O O O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 1

*Means, Standard Deviations, and Intercorrelations for Current Alcohol Use and Predictor Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current alcohol use (AUDIT)</td>
<td>5.48</td>
<td>5.46</td>
<td>.60**</td>
<td>.33*</td>
<td>.06</td>
<td>-.10</td>
<td>.12</td>
</tr>
<tr>
<td>Predictor variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Sensation seeking (SSS)</td>
<td>17.18</td>
<td>7.01</td>
<td>-</td>
<td>.43**</td>
<td>.05</td>
<td>-.06</td>
<td>.04</td>
</tr>
<tr>
<td>2. Impulsivity (BIS)</td>
<td>62.85</td>
<td>11.35</td>
<td>-</td>
<td>.11</td>
<td>-.09</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>3. Impulsivity (TOVA Commission Errors)</td>
<td>12.08</td>
<td>8.96</td>
<td>-</td>
<td>-</td>
<td>-.32*</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>4. Impulsivity (TOVA Response Time)</td>
<td>312.83</td>
<td>39.93</td>
<td>-</td>
<td>-</td>
<td>-.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Family history (CAST)</td>
<td>2.70</td>
<td>6.45</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05; **p < .001
Table 2

*Simultaneous Regression Analysis Summary for Sensation Seeking, Impulsivity (BIS), Impulsivity (TOVA Commission Errors), Impulsivity (TOVA Response Time), and Family History of Alcohol Abuse Predicting current Alcohol Use*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SEB</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score on SSS</td>
<td>.43</td>
<td>.08</td>
<td>.56*</td>
</tr>
<tr>
<td>Total Score on BIS</td>
<td>.05</td>
<td>.05</td>
<td>.10</td>
</tr>
<tr>
<td>Commission Errors on TOVA</td>
<td>-.00</td>
<td>.06</td>
<td>-.00</td>
</tr>
<tr>
<td>Mean Response Time on TOVA</td>
<td>-.01</td>
<td>.01</td>
<td>-.06</td>
</tr>
<tr>
<td>Total Score on CAST</td>
<td>.08</td>
<td>.07</td>
<td>.10</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.74</td>
<td>5.07</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. $R^2 = .35; F(5, 82) = 10.26, p < .001$

*p < .001*
Table 3

*Means, Standard Deviations, and Intercorrelations for Current Alcohol Use and Predictor Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current alcohol use (AUDIT)</td>
<td>5.48</td>
<td>5.46</td>
<td>.60**</td>
<td>.33*</td>
</tr>
</tbody>
</table>

Predictor variable

1. Sensation seeking (SSS)       | 17.18| 7.01| -    | .43**|
2. Impulsivity (BIS)             | 62.85| 11.35| -    |

*p < .05; **p < .001
Table 4

*Hierarchical Regression Analysis Summary for Sensation Seeking and Impulsivity (BIS)*
*Predicting Current Alcohol Use*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SEB</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score on SSS</td>
<td>.47</td>
<td>.07</td>
<td>.60*</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score on SSS</td>
<td>.44</td>
<td>.07</td>
<td>.56*</td>
</tr>
<tr>
<td>Total Score on BIS</td>
<td>.04</td>
<td>.05</td>
<td>.09</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.86</td>
<td>2.64</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. $R^2 = .36$; $F(2, 85) = 25.19, p < .001$

*p < .001*
Table 5

*Means, Standard Deviations, and Intercorrelations for Current Alcohol Use and Predictor Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>$SD$</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current alcohol use (AUDIT)</td>
<td>5.48</td>
<td>5.46</td>
<td>.33*</td>
<td>.60**</td>
</tr>
<tr>
<td>Predictor variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Impulsivity (BIS)</td>
<td>62.85</td>
<td>11.35</td>
<td>-</td>
<td>.43**</td>
</tr>
<tr>
<td>2. Sensation seeking (SSS)</td>
<td>17.18</td>
<td>7.01</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

$p < .05$; $**p < .001$
Table 6

Hierarchical Regression Analysis Summary for Impulsivity (BIS) and Sensation Seeking Predicting Current Alcohol Use

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>$SE_B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score on BIS</td>
<td>.16</td>
<td>.05</td>
<td>.33*</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score on BIS</td>
<td>.04</td>
<td>.05</td>
<td>.09</td>
</tr>
<tr>
<td>Total Score on SSS</td>
<td>.44</td>
<td>.07</td>
<td>.57**</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.86</td>
<td>2.64</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. $R^2 = .36; F(2, 85) = 25.19, p < .001$

*p < .05; **p < .001
Table 7

*Means, Standard Deviations, and Intercorrelations for Current Alcohol Use and Predictor Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current alcohol use (AUDIT)</td>
<td>5.48</td>
<td>5.46</td>
<td>.60**</td>
<td>.36**</td>
<td>.24*</td>
<td>.26*</td>
</tr>
<tr>
<td>Predictor variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Sensation seeking (SSS)</td>
<td>17.18</td>
<td>7.01</td>
<td></td>
<td>.55**</td>
<td>.30*</td>
<td>.25*</td>
</tr>
<tr>
<td>2. Motor Impulsiveness (BIS)</td>
<td>22.27</td>
<td>4.34</td>
<td>.63**</td>
<td></td>
<td>.55**</td>
<td></td>
</tr>
<tr>
<td>3. Nonplanning Impulsiveness (BIS)</td>
<td>23.47</td>
<td>5.03</td>
<td></td>
<td></td>
<td>.52**</td>
<td></td>
</tr>
<tr>
<td>4. Attentional Impulsiveness (BIS)</td>
<td>17.11</td>
<td>4.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05; **p < .001
Table 8

*Simultaneous Regression Analysis Summary for Sensation Seeking, Motor Impulsiveness, Nonplanning Impulsiveness, and Attentional Impulsiveness Predicting Current Alcohol Use*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SEB</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score on SSS</td>
<td>.47</td>
<td>.08</td>
<td>.60*</td>
</tr>
<tr>
<td>Motor Impulsiveness (BIS)</td>
<td>-.07</td>
<td>.17</td>
<td>-.06</td>
</tr>
<tr>
<td>Nonplanning Impulsiveness (BIS)</td>
<td>.03</td>
<td>.13</td>
<td>.03</td>
</tr>
<tr>
<td>Attentional Impulsiveness (BIS)</td>
<td>.17</td>
<td>.15</td>
<td>.13</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.58</td>
<td>2.68</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. $R^2 = .35; F(4, 83) = 12.68, p < .001$

*p < .001*