Comparison of Several Substance Use Assessment Instruments and the Clinical Interview in the Diagnosis of Substance Use Disorders

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Comparison of Several Substance Use Assessment Instruments and the Clinical Interview in the Diagnosis of Substance Use Disorders

Abstract
The purpose of the study was to explore a currently existing diagnostic structure at a university counseling center located in the midwest to determine the most effective protocol for diagnosing substance use disorders in a college student population.

One hundred eighty-six client files from a state-accredited alcohol and drug counseling agency at a small university in the midwest were included in the study. A file consisted of a clinical interview and completed scores on the Addiction Acknowledgment Scale (AAS), Addiction Potential Scale (APS), Modified-Michigan Alcoholism Screening Test (M-MAST), at least one of the three Substance Abuse Subtle Screening Inventory (SASSI) forms, and a DSM-III-R diagnosis made by a certified chemical dependency counselor. The predictor variables were the total scores and subscale scores of the six assessment instruments. The criterion variables were the DSM-III-R diagnostic classifications of alcohol abuse and alcohol dependence. The study utilized multivariate analysis of variance and multivariate correlational methods. A discriminant function analysis was completed to determine the effectiveness of the instruments to correctly classify substance use disorders.

The MANOVA results indicated statistically significant differences between the mean scores of the M-MAST, AAS, APS, and the three SASSI forms for those clients diagnosed with alcohol abuse or alcohol dependence. The discriminant function analysis indicated the M-MAST, AAS, Adolescent SASSI, Adult SASSI, and SASSI-2 to correctly classify over 75% of the study sample. The APS correctly classified the lowest percentage of the study sample. The linear combination of the M-MAST, AAS, APS, and Adolescent SASSI correctly classified the highest percentage of grouped cases as compared to the other linear combinations.

Instrument scores on the M-MAST, AAS, Adult SASSI, and Adolescent SASSI were significantly related to the diagnoses of alcohol abuse and alcohol dependence as indicated by the MANOVA results. Differences were found among the six assessment instruments in correctly classifying the diagnostic classifications of alcohol abuse and alcohol dependence among the study sample. The results indicate that counseling centers might consider using only the M-MAST, AAS, and Adolescent SASSI and excluding the APS from their assessment protocol. Also, the SASSI-2 results must be interpreted with caution based on a limited sample size.

Keywords
college students, substance use disorders, alcohol abuse, alcohol dependence, Addiction Acknowledgment Scale (AAS), Addiction Potential Scale (APS), Modified-Michigan Alcoholism Screening Test (M-MAST), Substance Abuse Subtle Screening Inventory (SASSI)

Disciplines
Clinical Psychology

Comments
- A dissertation submitted to the graduate faculty of the University of South Dakota in partial fulfillment for the degree of DOCTOR OF EDUCATION
- Dr. Grace Mims, Committee Chairperson
- © 1996 Mark Elliot Christians

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A Comparison of Several Substance Use Assessment Instruments and the Clinical Interview in the Diagnosis of Substance Use Disorders

by

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B.A., Dordt College, 1985
M.Ed., Northern Arizona University, 1986

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

Division of Counseling and Psychology in Education in the Graduate School University of South Dakota August 1996
ABSTRACT

Christians, Mark Elliot (Ed.D., Counseling and Psychology in Education, The University of South Dakota, 1996).

A Comparison of Several Substance Use Assessment Instruments and the Clinical Interview in the Diagnosis of Substance Use Disorders.

Dissertation directed by Dr. Grace Mims.

Purpose of the Study

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Procedures of the Study

One hundred eighty-six client files from a state-accredited alcohol and drug counseling agency at a small university in the midwest were included in the study. A file consisted of a clinical interview and completed scores on the Addiction Acknowledgment Scale (AAS), Addiction Potential Scale (APS), Modified-Michigan Alcoholism Screening Test (MMAST), and the three SASSI forms for alcohol, marijuana, and cocaine dependence. The study was analyzed using a discriminant analysis of variance and several bivariate correlation methods.
Test (M-MAST), at least one of the three Substance Abuse Subtle Screening Inventory (SASSI) forms, and a DSM-III-R diagnosis made by a certified chemical dependency counselor. The predictor variables were the total scores and subscale scores of the six assessment instruments. The criterion variables were the DSM-III-R diagnostic classifications of alcohol abuse and alcohol dependence. The study utilized multivariate analysis of variance and multivariate correlational methods. A discriminant function analysis was completed to determine the effectiveness of the instruments to correctly classify substance use disorders.

Results
The MANOVA results indicated statistically significant differences between the mean scores of the M-MAST, AAS, APS, and the three SASSI forms for those clients diagnosed with alcohol abuse or alcohol dependence. The discriminant function analysis indicated the M-MAST, AAS, Adolescent SASSI, Adult SASSI, and SASSI-2 to correctly classify over 75% of the study sample. The APS correctly classified the lowest percentage of the study sample. The linear combination of the M-MAST, AAS, APS, and Adolescent
SASSI correctly classified the highest percentage of grouped cases as compared to the other linear combinations.

**Conclusions**

Instrument scores on the M-MAST, AAS, Adult SASSI, and Adolescent SASSI were significantly related to the diagnoses of alcohol abuse and alcohol dependence as indicated by the MANOVA results. Differences were found among the six assessment instruments in correctly classifying the diagnostic classifications of alcohol abuse and alcohol dependence among the study sample. The results indicate that counseling centers might consider using only the M-MAST, AAS, and Adolescent SASSI and excluding the APS from their assessment protocol. Also, the SASSI-2 results must be interpreted with caution based on a limited sample size.

This abstract of approximately 350 words is approved as to form and content. I recommend its publication.

Grace Ann McNeis, Ph.D.

Professor directing dissertation
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CHAPTER I

Introduction

The problem of alcohol and drug abuse is reaching epidemic proportions on college and university campuses throughout the United States (Brennan, Walfish, & AuBuchon, 1986). Several studies have documented the profound negative impact of alcohol and drug use and abuse on college students (Archer & Jaffe, 1987; Dana, Andrews, Kochis, & Pratt, 1993). Prendergast (1994) found heavy drinking use (i.e., use of an average of more than one ounce of absolute alcohol per day in the past 30 days) was reported by 22% of the 7,000 survey respondents at 22 New York state colleges. Presley and Meilman (1992) found that 45% of the students surveyed reported using alcohol on a weekly or more frequent basis with the average weekly consumption being 5.11 drinks (Note: One drink is defined as either one 12-ounce can of beer, one 5-ounce glass of wine, or 1.5 ounces of hard liquor). Eigen (1991) found the annual beer consumption of American college students to be just short of four billion cans and "if these
cans were stacked end to end upon each other, the stack would reach the moon and go 70,000 miles beyond" (p. 6).

Examples of significant negative consequences of alcohol use among college students include missing classes, hangovers, personal injury, accidents, driving under the influence, poorer academic performance, or getting into arguments or fights (Bloch & Ungerleider, 1988; Greene & Werner, 1992). Some of the more profound negative health consequences of alcohol abuse include death, acute alcohol intoxication, suicide, blackouts, unsafe sex, hallucinations, and various cancers (Kinney & Leaton, 1982; Life Skills Education, 1992; Radcliffe & Rush, 1988; Wechsler, 1994).

Lall and Schandler (1991) surveyed nearly three hundred college students and found a negative correlation between average weekly alcohol consumption and student grade point averages, while 8% indicated the presence of alcoholism based on the Michigan Alcoholism Screening Test (MAST) scores. Seay and Beck (1984) used the MAST with nearly four hundred college students to screen for alcoholism and found 25% were classified as having a drinking problem and 7% were
classified as alcohol dependent. In a similar study, Greene and Werner (1992) surveyed over three hundred students at a private southern university and found that 75% had consumed alcohol in the past thirty days, 51% reported drinking on three or more occasions, and 17% on ten or more occasions.

A recent study cited alcohol and drug abuse as being among the most pervasive mental health problems in contemporary society (Weed, Butcher, McKenna, & Ben-Porath, 1992). The professional counselor employed in a college counseling center is faced with the daunting challenge of effectively serving those students with alcohol and drug problems. Providing alcohol and drug assessment services is one method of serving the college student population. Colleges and universities provide a spectrum of alcohol and drug services, ranging from minimal prevention efforts by untrained professionals to comprehensive assessment services delivered by trained chemical dependency counselors (Eigen, 1991).

Colleges and universities have historically focused on general prevention efforts regarding alcohol and other drugs (Keeling, 1994). Currently 88% of all
institutions in the United States are actively involved in the prevention of alcohol and drug problems on their campuses (Gadaleto & Anderson, 1986). Despite the national emphasis on drug prevention, the consumption of alcohol by college students has remained relatively unchanged since the late 1970’s (Gadaleto & Anderson, 1986).

Despite the perceived prevalence of problem drinking among college students, there does not exist a superior instrument for assessing the drinking behavior of college students (Lall & Schandler, 1991). Approaches to screening for alcohol abuse and dependence have traditionally relied upon self-report assessments of drinking frequency, quantity, and psychosocial consequences (Greene & Werner, 1992). The counseling field has been active in its efforts to discover a more effective method of assessing drug and alcohol problems in individuals of all ages.

Alcohol and drug treatment facilities have been pioneers in the diagnostic assessment of individuals using, abusing or addicted to chemicals. Typically, the diagnosis is based upon a culmination of objective and subjective evaluations of the individual, including
standardized assessment results and a clinical interview conducted by a chemical dependency counselor (Seligman, 1986).

**Significance of the Problem**

The study had significance for several reasons. First, the student counseling center being studied obtained research data to assist in evaluating existing alcohol and drug assessment procedures. One potential outcome is adopting a more streamlined approach to providing assessment services to clients. The data may indicate that certain instruments do not need to be administered to the clients if an accurate diagnosis can be made without them.

Second, limited research had been done with the Substance Abuse Subtle Screening Inventory (SASSI), and the two new substance abuse subscales of the MMPI-2, the Addiction Acknowledgement Scale (AAS), and the Addiction Potential Scale (APS) (Cooper & Robinson, 1987; Klikunas, 1988; Miller, 1985; Weed et al., 1992). Therefore, this study added to the body of knowledge concerned with diagnosing alcohol abuse or alcohol dependence in a college student population. This
was the first study to analyze the Michigan Alcoholism Screening Test, the three SASSI forms, the AAS, and the APS simultaneously with a sample of college counseling center clients.

Third, other college and university student counseling centers have access to data related to the drug and alcohol assessment instruments used in the study. The two new alcohol subscales of the MMPI-2, the AAS and APS, were developed in the late 1980’s, and currently limited research has been done on them.

The SASSI is a relatively new instrument which would benefit from additional research focusing on the college student population. The SASSI currently uses adolescent and adult profile norms, yet limited college student norms have been established to this date (Miller, 1985; Cooper & Robinson, 1987). The data from this study could be useful to the SASSI developers in updating the instrument to include norms specifically based on college students.

The MAST was the fourth assessment instrument included in the study. The MAST is the most researched of the four instruments and has received conflicting

Statement of the Purpose

The purpose of the study was to explore a currently existing diagnostic structure to determine the most effective protocol for diagnosing substance use disorders in a college student client population at a university counseling center located in the midwest.

Research Questions:
1. What are the total scores on each assessment instrument (M-MAST, AAS, & APS) as they compare to the client’s diagnosis?
2. What are the subscale scores on the three forms of the Substance Abuse Subtle Screening Inventory instrument as they compare to the client’s diagnosis?
3. Which instrument (M-MAST, AAS, APS, Adolescent SASSI, Adult SASSI, or Adult SASSI-2) best predicts the diagnosis of alcohol abuse or alcohol dependence?
4. Which combination of instruments best predicts the diagnosis of alcohol abuse or alcohol dependence?

Definitions

A few terms requiring additional explanation and definition are used in the study. The definitions are taken verbatim from the DSM-III-R on substance use disorders (APA, 1987).

Alcohol and Drug Assessment:

The process whereby an individual (or client) completes one or several instruments and meets with a chemical dependency counselor to discuss his/her current and past use of controlled substances. The counselor evaluates major life areas (i.e., physical health, vocational development, social adaptation, legal involvements and psychological functioning) and assesses the extent to which alcohol and drug use have interfered with the client’s functioning in each of these areas (International Certification Reciprocity Consortium/Alcohol and Other Drug Abuse, Inc., 1993). The counselor combines the standardized instrument data with the information collected during the clinical
interview to arrive at an appropriate diagnosis. The length of the assessment may vary from one to several counseling sessions.

Alcohol Abuse (305.00):

A. A maladaptive pattern of psychoactive substance use indicated by at least one of the following:

1. continued use despite knowledge of having a persistent or recurrent social, occupational, psychological, or physical problem that is caused or exacerbated by used of the psychoactive substance.
2. recurrent use in situations in which use is physically hazardous (e.g., driving while intoxicated).

B. Some symptoms of the disturbance have persisted for at least one month, or have occurred repeatedly over a longer period of time.

C. Never met the criteria for psychoactive substance dependence for this substance (APA, 1987, p. 169).
Alcohol Dependence (303.90):

The essential feature of this disorder is a cluster of cognitive, behavioral, and physiologic symptoms indicating the person has impaired control of psychoactive substance use and continues use of the substance despite adverse consequences.

A. At least three of the following criteria must be present:

1. substance often taken in larger amounts or over a longer period than the person intended.
2. persistent desire or one or more unsuccessful efforts to cut down or control substance use.
3. a great deal of time spent in activities necessary to get the substance.
4. frequent intoxication or withdrawal symptoms when expected to fulfill major role obligations at work, school, or home; or when substance use is physically hazardous.
5. important social, occupational, or recreational activities are given up or reduced because of the substance.
6. continued substance use despite knowledge of having a persistent or recurrent social, psychological, or physical problem that is caused or exacerbated by the use of the substance.
7. marked tolerance: need for markedly increased amounts of the substance in order to achieve intoxication or desired effect, or markedly diminished effect with continued use of the same amount.
8. characteristic withdrawal symptoms.
9. substance often taken to relieve or avoid withdrawal symptoms.

B. Some symptoms of the disturbance have persisted for at least one month, or have occurred repeatedly over a longer period of time (APA, 1987, p. 167-168).

C. Criteria for severity of substance dependence:
1. Mild: The symptoms result in only mild impairment in occupational functioning or in usual social activities or relationships with others.
2. Moderate: Symptoms or functional impairment between "mild" and "severe".

3. Severe: Many symptoms which markedly interfere with occupational functioning or with usual social activities or relationships with others.

4. In Partial Remission: During the past six months, some use of the substance and some symptoms of dependence.

5. In Full Remission: During the past six months, either no use of the substance, or use of the substance and no symptoms of dependence.

Diagnostic and Statistical Manual of Mental Disorders--Third Edition-Revised (DSM-III-R):

A multiaxial categorical classification that divides mental disorders into types based on criteria sets with defining features. Persons are essentially classified as either meeting or not meeting criteria for a given disorder. The purpose of the DSM-III-R is "to provide clear descriptions of diagnostic categories to enable clinicians and investigators to diagnose,
communicate about, study and treat people with various mental disorders" (APA, 1987, p. vii).

The DSM-III-R was used as the primary diagnostic reference during the time period of this research study. Although the DSM-IV was published in 1994, the student counseling center did not begin using the DSM-IV until mid-1995 after the State Department of Human Services approved the DSM-IV's use in accredited agencies. Therefore, all the substance use disorder diagnoses examined in this study utilized the DSM-III-R criteria rather than the DSM-IV criteria.

**Delimitations**

The design of the study had certain boundaries which were controlled, including:

1. The study population was confined to those clients who completed an alcohol assessment procedure at a state-accredited counseling and support agency setting between September 1, 1992 and May 31, 1995. The study focused on one university and no effort was made to generate additional data from another college or university student population.
2. The data were collected in one location over a two and one-half year period. The population consisted of student clients who were referred to the university counseling center for an alcohol and drug assessment. Clients were either self-referred, mandated by the campus judicial board or local court system, or encouraged by a friend, family member, or faculty member to complete an alcohol assessment.

**Limitations**

A universal characteristic of research is the presence of various limitations affecting the design and outcome of a study. The limitations potentially affecting this study include:

1. Some clients may have attempted to manipulate the outcome of the alcohol assessment by falsely answering the instrument items in an attempt to alter the diagnosis. Individuals who have drug and alcohol problems often deny they have a problem and cover up the negative consequences they have experienced. The client may have been motivated to avoid various consequences resulting
from the assessment. Some potential consequences include a recommendation for in-patient or out-patient treatment, attending an alcohol education class, or attending a Driving Under the Influence of alcohol class. The campus judicial board can recommend probation, suspension, or expulsion from the university based on the assessment results.

2. The results of the study have limited generalizability outside the institution being studied.

3. There may have been variability in the manner in which the counselors conducted the clinical interview. This variability may have influenced the diagnostic outcome reached by the counselor.

Organization of the Study

Chapter 1 is an introduction to the purpose and significance of evaluating an alcohol assessment protocol. Chapter 2 is a review of selected literature pertaining to the impact of alcohol on college campuses, the historical trends in diagnosing alcohol abuse and dependence in a college population, as
well as a summary of previous research relevant to the instruments to be used in this study. The methodological procedures of the study are outlined in Chapter 3. Chapter 4 presents the results of the data collection and data analysis processes. Chapter 5 is a summary of the study results, discussion of the results, and recommendations for future research based on the results of this study.
CHAPTER II

Review of Selected Literature

The purpose of this chapter is to review the literature related to substance use and abuse within the college student population. In addition, this chapter will identify literature relevant to the six assessment instruments (i.e., Michigan Alcoholism Screening Test; Adolescent form, Adult form, and SASSI-2 form of the Substance Abuse Subtle Screening Inventory; Addiction Acknowledgment Scale and Addiction Potential Scale of the MMPI-2) utilized in this study to diagnose substance use disorders. The researcher’s literature review included a computer search of PALS, ERIC, PSYC LIT, SOCIOFILE, MEDLINE, and DISSERTATION ABSTRACTS.

Substance Use and Abuse Within the College Student Population

Prevalence of Substance Use

There appears to be conflicting reports as to the alcohol consumption levels and alcohol-related problems reported by college students. Inconsistent and inaccurate data may contribute to these conflicting
reports because many studies rely on self-report surveys. For example, Beck and Seay (1984) found that a clear discrepancy exists between the behavior of college students and their assessment of their alcohol-related behavior.

University administrators and mental health professionals continue to be concerned about students' use of alcohol because the 18-25 year old category has reported more frequent alcohol use (64%) than any other age category in the United States (U.S. Department of Human Services, 1991). Dana, Andrews, Kochis and Pratt (1993) found that "nationally, 13% of college-age males and 6% of college-age females are alcohol dependent as defined by marked increases in their levels of tolerance to alcohol and by serious social, psychological, or occupational problems caused by alcohol use" (p. 92).

The literature presents three perspectives regarding college students use of alcohol. First, there appear to be findings which support the prevalence of an increased use of alcohol by college students. Second, there are studies which proport that the use of alcohol has been a stable or static
phenomenon over the past twenty years. Third, other studies have shown a decrease in alcohol use rates by college students.

Some studies have found college students to be increasing their use of alcohol (Bugen & Hill, 1979; Eigen, 1991). In addition, college students appear to be at particularly high risk, since (a) college students drink more than their non-college counterparts, (b) college students are vulnerable to other risk factors which alcohol exacerbates, such as suicide, automobile crashes, and falls, and (c) many college and university customs, norms, traditions encourage dangerous alcohol use practices and patterns (Eigen, 1991).

Prendergast (1994) reviewed recent literature on the extent of substance use and abuse among college students, the problems associated with substance use, and the correlates of substance use within the population. The alcohol use prevalence ranged from 80% at a southern university to 97% at a liberal arts college in New England. The most significant finding of Prendergast is that "while the proportion of students who drank declined over the 13 years, there was also
a shift to a heavier level of drinking" (p. 101),
commonly referred to as binge drinking. Wechsler,
Davenport, Dowdall, Moeykens and Castillo (1994)
examined the extent of binge drinking by college
students (N = 17,592) at 140 United States four-year
colleges. The results indicated that 44% were binge
drinkers, 41% were nonbinge drinkers and 15% were
nondrinkers. Meilman, Stone, Gaylor, and Turco (1990)
used the 1987 Health Service Survey of Alcohol and
Drug Use and found "male students to drink on a daily,
or almost daily basis at a rate of more than four
times of women" (p. 391).

Schuckit, Klein, Twitchell and Springer (1994)
compared changes in alcohol and drug use and associated
problems in young men on the same college campus
between 1980 and 1992. The results revealed a decrease
in the use illicit drugs, although there was an
elevation in the prevalence of many alcohol-related
problems.

Meilman and Presley (1992) administered the Core
Alcohol and Drug Survey to 96 two-year and four-year
institutions who received grant awards in 1989 from the
Fund for the Improvement of Post-Secondary Education
(FIPSE). About half (45 percent) of the students surveyed reported using alcohol on a weekly basis and 42% of students reported having binged on alcohol in the last two weeks (binge defined as consuming five or more drinks in one sitting). An interesting finding from Meilman and Presley is that students attending colleges with enrollments less than 2,500 consume more alcohol in comparison to students at larger institutions.

A dominant trend found in the literature is that alcohol use by college students has remained stable during the past twenty years. Many studies have focused on the drinking patterns of college students over various time periods. For example, Engs and Hanson (1992) conducted a national study comparing the alcohol use of college students in four time periods (1982, 1985, 1988, and 1991) to determine whether the proportion of students reporting problems as a result of alcohol consumption changed over time. Using significantly large sample sizes, 1982 (N = 4,405), 1985 (N = 3,453), 1988 (N = 4,343), and 1991 (N = 3,907), Engs and Hanson concluded that no significant changes in the proportion of "heavy
drinkers" had occurred over the four time periods.

Similarly, Patterson, Meyers, and Gallant (1988) surveyed 742 undergraduate students at a southern university and their results indicated the use of alcohol remained about the same from 1972 to 1986. Pope, Ionescu-Pioggia, Aizley and Varma (1990) distributed anonymous questionnaires (N = 369) to the 1989 college seniors at registration and compared them to the senior classes of 1969 and 1978. Alcohol use remained stable among the study samples at a rate of 96% in 1969, 97% in 1978, and 97% in 1989.

To add support to the stability of drinking patterns among college students, Engs and Hanson (1986a) compared the drinking problems of a sample of college students from the United States in 1984-1985 with a comparable sample drawn in 1982-1983. The data suggested little change in drinking problems over time, except for a decrease in driving after drinking and while driving, down from 60% in 1982-83 to 54.5% in 1984-85. These data do not support the assumption that collegiate drinking problems are increasing.

There appears to be ample evidence which supports the static nature of alcohol use among college
students. Globetti, Globetti and Lo (1992) studied the alcohol and drug use among a sample of 146 graduate students. The results indicated that 69% of the sample reported monthly alcohol use. Similarly, Gonzalez (1991) sampled 353 undergraduates in 1983 and 254 students in 1988. In 1983, 86% indicated they were drinkers, while in 1988, 78% were drinkers. Gonzalez found no significant differences in the quantity and frequency of alcohol consumption between the 1983 and 1988 samples.

A few contemporary studies have indicated that alcohol use among college students appears to be decreasing. Eigen (1991) found a small, but significant, downward trend in prevalence of alcohol use among college students. In 1980, 81.8 percent of college students had drunk alcohol in the last 30 days. By 1985, the percent had decreased to 80.3 and when measured in 1990, it had declined to 74.5 percent.

Surveys administered in 1985-1986 and 1987-1988 to students at 56 four-year colleges found a drop in the proportion of students who drank at least once in the past year, from 83% to 79% (Engs & Hanson, 1988). In addition, the NHSS survey of college students
showed that lifetime prevalence of alcohol use declined slightly from 94% in 1980 to 92% in 1992, and monthly prevalence from 82% to 71% (National Institute on Drug Abuse, 1993).

Similarly, Meilman and Presley (1992) found positive trends from 1989-1991 with students reporting a slight decrease in the number of drinks consumed per week and in the number of alcohol binges in the last two weeks. Meilman et al. (1990) studied consumption patterns of 349 undergraduate students and found the intensity and frequency of drinking had diminished from 1977 to 1987.

Indicators and Correlates of Alcohol Abuse and Dependence

The literature identified a number of factors which correlated with alcohol abuse and dependence among college students. These factors included class rank, gender, culture, religion, and academic performance.

College students in the 18-25 year old category report more frequent alcohol use (64%) than any other age category in the United States (U.S. Department of
Human Services, 1991). In addition, Prendergast (1994) found that 43% of college students identify themselves as heavy drinkers as compared to 34% of young adults who do not attend college.

In investigating the relationship between class rank and alcohol use, Greene and Werner (1992) assessed problem drinking among entering college freshmen, as identified by the Perceived Benefit of Drinking Scale (PBDS) and the CAGE (Cutdown, Annoyed, Guilty, Eye Opener) Questionnaire. Using a sample of 308 freshmen students, the results indicated 75% had drunk alcohol in the past thirty days, 51% had drunk on three or more occasions, and 17% on ten or more occasions.

While most students entering college have experimented with alcohol use, Friend and Koushki (1984) found that 16% of entering freshmen students were influenced by the college environment to begin alcohol use. The percentage of drinkers seems to steadily increase during college years with 81.5% of entering freshmen who drink, compared to 95.2% of Sophomores, 97.8% of Juniors, and 98.8% of Seniors who drink (Friend & Koushki, 1984).
Brennan, Walfish and AuBuchon (1986) reviewed articles published between 1953 and 1984 and focused on the relationships among demographic traits, personality characteristics, and alcohol use and abuse in college students. The results of the gender comparisons in Brennan et al.’s literature review indicated that male college students drink more than females and drink more often than females. Beck and Seay (1984) found males scored significantly higher than females on the Michigan Alcoholism Screening Test (Selzer, 1971), which is a screening instrument for alcoholism.

Wood, Nagoshi, and Dennis (1992) provided further support of increased alcohol use and problems among male students as compared to female students. The authors found significant differences between male and female students (N = 288) who completed a 16-page alcohol questionnaire. It was reported that "males reported greater alcohol use, higher impulsivity, lower empathy, higher perceived norms for alcohol use, greater expectations of alcohol effects, higher desirabilities of these effects, and more reasons for drinking than females" (Wood, Nagoshi, & Dennis, 1992, p. 469).
Culture and race also have been studied in relation to alcohol use and abuse. Brennan et al. (1986) found that white students drank more than Black college students and experienced more negative consequences resulting from alcohol use. Prendergast (1994) supported the findings of Brennan et al. regarding differences in alcohol consumption between white and black college students. He found African American students are more likely to be abstainers, to begin drinking later, and to have somewhat lower drinking levels compared with White students. Engs and Hanson (1986b) also found more significant alcohol-related problems among white students.

The religious affiliation of college students appears to have some relationship with their alcohol-related behavior. Brennan et al. (1986) found Catholic and Protestant students tended to drink larger quantities and more frequently than Jews. Prendergast (1994) concluded that students who identified themselves as Protestant or Roman Catholic were one and a half to two times more likely than Jewish students to report some type of problem drinking.
Another factor which appears to be correlated with increased use and problems with alcohol is academic performance. Bugen and Hill (1979) found students with a lower grade point average (GPA) consistently reported drinking more often, drinking greater amounts, and becoming intoxicated more frequently than students with a higher GPA. Beck and Seay (1984) found students with lower GPA's scored higher on the degree of alcoholism and higher on the number of negative consequences than students with higher GPA’s.

In addition, Engs and Hanson (1986b) examined the correlates of drinking problems of a sample of college students throughout the United States in 1984-85 with a comparable sample drawn in 1982-83. The results indicated that drinking problems were more prevalent among males and those with low grade point averages. Brennan et al. (1986) found freshmen males to be the only academic class who had significantly lower GPA’s relative to frequent heavy drinking.

Rivinus (1987) found academic failure to be the most common symptom of a problem with alcohol or drugs, along with legal problems such as arrest for disorderly conduct or driving under the influence of alcohol.
Meilman and Presley (1992) also found more frequent involvement with alcohol to be accompanied by lower GPA's.

In summary, although class rank, gender, culture, religion, and academic performance may be correlated with alcohol-related problems, they should not be interpreted as causal factors. More research is needed to more fully understand the relationship between demographic variables and alcohol use and abuse.

Institutional Efforts in Drug Prevention

In response to the current state of alcohol consumption rates among college students, universities are becoming actively involved in drug prevention and treatment efforts. For example, a variety of prevention programs have incorporated an educational programming emphasis, along with regulations and policies which address alcohol and other drugs. In addition, a continuum of treatment opportunities have been implemented on university campuses which utilize trained professional staff to meet the needs of the students (Bloch & Ungerleider, 1988; Eigen, 1991).
Description of Drug Prevention Approaches.

Greene and Werner (1992) stated that "problem drinking on college campuses is a complex issue requiring comprehensive campus-wide approaches to prevention, intervention, and treatment" (p. 491). Gadaleto and Anderson (1986) found significant increases in the percentage of institutions reporting efforts in alcohol education and prevention (69%, 1979; 79%, 1982; 88%, 1985). Nearly half (48%) of the campuses in 1985 reported having an individual designated to serve as the alcohol education coordinator as compared to 14% of the campuses in 1979. Colleges and universities are taking seriously the challenge to change students' attitudes and behavior related to alcohol. Lavin (1980) stated that "it is essential for health professionals to become actively involved in the preventive and educational aspects of alcohol and drug programming" (p. 99).

Changing the attitudes and behavior of college students is not accomplished by simply giving them factual information. Beck and Seay (1984) found that disseminating information is not effective in counteracting drinking problems since the alcohol
dependent students knew as much about the dangers of alcohol as did non-alcohol dependent students. The authors concluded that an early identification process is needed that will focus on the behavioral consequences of drinking. Gonzalez (1991) suggested that generalized alcohol awareness efforts such as media events, workshops, orientation programs were not effective in increasing levels of alcohol knowledge or reducing consumption and alcohol-related problems. Despite the relative ineffectiveness of information-based prevention programs, Gliksman (1988) recommended that alcohol prevention programs alert students about the alcohol-related events and negative consequences they will be encountering while in college.

Bloch and Ungerleider (1988) examined whether a comprehensive prevention program has been successful in having prevention services reach students who are at greatest risk. The results indicated that only a moderate level of awareness existed concerning where to obtain treatment and informational services. The data suggests that the "high-risk drug and alcohol users are no more aware of the services and receive no more assistance than those who consume substances in more
moderate levels" (Bloch & Undergleider, 1988, p. 312). On the other hand, Meilman (1992), found a 33% increase in the number of students reporting awareness of campus alcohol and drug prevention efforts.

Colleges and universities have the opportunity to reduce the current and future risks to their student body (Eigen, 1991). One method of dealing with alcohol-related problems is through campus regulation efforts. The most traditional form of regulation is restricting or banning the use of alcohol. Almost all campuses prohibit drunken behavior on the part of students. However, as Eigen (1991) points out, the differential enforcement of campus alcohol policies tends to send mixed messages to students.

Another widely used method of regulation on university campuses is the requirement that nonalcoholic beverages be made available at all functions where alcohol is served. Ninety-five percent of American institutions of higher education now have this requirement (Gadaleto & Anderson, 1991). This allows non-drinking students to participate in the same social events as their peers. In addition, serving food at parties where alcohol is served
A number of studies highlight effective prevention programs. Sadler and Scott (1993) describe the First Offenders Program (FOP) as an educational alternative to the previously used lecture format. The FOP utilizes a "knowledge-attitudes-behavior model" with an emphasis on either abstinence and/or responsible decision-making. Prior to the FOP, a recidivism rate of 4.5% was common and since the program's inception the rate has dropped to 0.2% (Sadler & Scott, 1993).

Another example of a creative prevention program is presented by Rathbun (1993), The Alcohol Screening Instrument for Self-Assessment (ASISA), which is an online assessment instrument for faculty, students, and staff. The ASISA is a composite instrument of the CAGE (Cutdown, Annoyed, Guilty, Eye Opener) and the AUDIT (Alcohol Use Disorders Identification Test). The ASISA was placed on two computer networks at the University of Michigan. Approximately 150 to 200 students, faculty, and staff accessed the instrument during the first 12 months of operation (Rathbun, 1993).
Description of Treatment Approaches.

Dean, Dean, and Kleiner (1986) described practical steps necessary to establish campus alcohol/drug treatment programs. They recommended a multivariate approach which emphasized careful assessment resulting in tailored treatment techniques. They found one-half of the institutions offered some type of alcohol and/or drug treatment services. The authors believed that treatment is "best directed and offered through the counseling center because psychological assessment, testing, referral and treatment are organized in this unit" (Dean et al., 1986, p. 97). Gadaletto and Anderson (1986) lend support to Dean et al.'s (1986) recommendation of utilizing the campus counseling center since they found the counseling center to be the most frequently used form of assistance for students with a drinking problem, with 90% in 1979 and 95% in 1985. White and Mee-Lee (1988) provided a comprehensive description of how an inpatient treatment service can help college students with substance use disorders by using a multidimensional comprehensive assessment instrument, Recovery Attitude and Treatment Evaluator (RAATE).
Many changes have occurred within the field of drug prevention. Universities are implementing numerous programs aimed at reducing the alcohol-related problems on their campuses. Keeling (1994) summarized his views on prevention and treatment programs by stating, "Were we to get students and communities to feel the collective pain of problem drinking, to notice, care about, and act on behalf of others, we would need few other alcohol prevention programs" (1994, p. 246).

**Alcohol Use Assessment Tools**

Since the focus of this study is to compare the DSM-III-R diagnosis with scores on several assessment instruments, this section of the literature review will include a brief discussion on the Diagnostic and Statistical Manual of Mental Disorders (DSM), as well as a comprehensive review of each instrument.

**The Role of the DSM in Assessing Alcohol-Related Problems**

The Diagnostic and Statistical Manual of Mental Disorders has been in existence since 1952 with the introduction of the DSM I. The DSM is a multiaxial categorical classification that divides mental
disorders into types based on criteria sets. Substance use disorders are one type which are addressed in the DSM system. Additional revisions have been published in 1968 (DSM II), 1974 (DSM III), and 1987 (DSM-III-R). The most recent version, the DSM-IV, was published in 1994. Since the research for this study was based on the DSM-III-R criteria, the literature review will focus primarily on the DSM-III-R as it relates to substance use disorders.

A few studies have investigated the utility of the DSM-III-R in diagnosing substance use disorders in the general population. For example, Grant and Harford (1990) evaluated the risk of alcohol dependence as defined by the DSM-III-R at different levels of ethanol intake. A sample of 2,167 adults aged 18 or older were asked to report their quantity of alcohol consumption and an estimate of the daily ethanol intake during the past year was calculated. Comparing the ethanol intake with the DSM-III-R criteria, 20.4% of the respondents were found to be alcohol dependent. The majority of this 20% were "male, white, high school and college graduates, under the age of 30 and currently married or living with someone" (Grant & Harford, 1990, p. 451).
Similarly, Grant (1993) determined the risk of alcohol dependence at varying levels of ethanol intake using a large adult population (N = 22,102). Using the 1988 National Health Interview Survey, Grant (1993) found 12.1% of the current drinkers to be alcohol dependent. Factors which were associated with a higher risk of dependence included gender (specifically male), early onset of drinking, and consuming five or more drinks in one sitting.

Grant and Harford (1994) used the 1989 National Longitudinal Survey on Youth (N = 12,686) to present one-year prevalence estimates of alcohol abuse and dependence. A set of 29 symptom-item questions designed to operationalize the DSM-III-R criteria resulted in a one-year prevalence of 13.95% for alcohol abuse and dependence, with dependence (9.68%) exceeding the abuse sample (4.27%). The consistency between these results and those found by Grant (1993) seem to strongly support the generalizability of abuse and dependence diagnoses.

One study surveyed 989 college students to compare substance use patterns between students meeting lifetime DSM-III alcohol misuse criteria and students
not meeting the misuse criteria (MacDonald, Barry, & Fleming 1992). The Diagnostic Interview Schedule (DIS) measured the substance use patterns and history. The authors found 29% (N = 294) met lifetime DSM-III criteria for alcohol misuse.

There is disagreement in the literature regarding the use of distinct sets of criteria for alcohol abuse and alcohol dependence in the DSM. Widiger and Smith (1994) reviewed the concepts of substance abuse and substance dependence as described in the DSM-III, DSM-III-R, and DSM-IV and offered an alternative proposal. The authors contended that "there continues to be no meaningful distinction between substance abuse and substance dependence" (Widiger & Smith, 1994, p. 277). The criteria for substance abuse overlaps with the criteria for substance dependence; therefore, Widiger and Smith (1994) recommended collapsing the criteria sets into one diagnosis. The term "substance abuse" would be dropped and the newly created diagnosis would be called "dyscontrol disorder", replacing the term "substance dependence". Despite the urging of Widiger and Smith, the American Psychiatric Association (1994) continued to utilize the criteria sets for
substance abuse and substance dependence and published them in the DSM-IV.

The DSM has been, and will continue to be, a useful clinical frame of reference for diagnosing substance use disorders. More studies are needed to support or contradict the recommended changes in future versions of the DSM.

The Michigan Alcoholism Screening Test (MAST)

A description of the MAST, including its reliability, validity, strengths, and weaknesses will be presented. In addition, recommendations for using the MAST as an assessment tool will be discussed.

Selzer (1971) developed the original form of the MAST, consisting of twenty-five "face-valid" questions used to detect alcoholism. Selzer (1971) assessed the validity of the MAST by obtaining the records of medical facilities, social agencies, local hospitals, probation offices, and arrest and traffic records to track the names of any of the MAST respondents.

The MAST was administered to five groups of subjects: 116 hospitalized alcoholic dependent individuals, 103 white male university students, 99
drivers convicted of driving under the influence, 110 persons convicted of drunk and disorderly behavior, and 98 persons undergoing a driver's license review based on excessive accidents and moving violations. Selzer (1971) considered a score of three or less to be nonalcoholic, four points suggestive of alcoholism, and five or more points denoted alcoholism. The MAST correctly classified 98% of the alcohol dependent group and 85% of the comparison group. The author suggested adding two points for each drunken driving or drunk and disorderly behavior arrest and counting five points for a positive response to a history of delirium tremens.

Several studies have explored the reliability and validity of the MAST. Selzer, Vinokur, and van Rooijen (1975) researched a shortened version of the MAST (13 items) and a slightly modified version of the original MAST. Selzer et al. (1975) presented the self-administered MAST to four different groups and concluded that the "self-administered MAST questionnaire has substantial reliability and validity with the scores relatively unaffected by age and the denial of socially undesirable characteristics" (p. 123).
In addition, Skinner and Sheu (1982) examined the test-retest reliability of the Lifetime Drinking History and the MAST with a random sample of 83 persons with alcohol-related problems. Ninety-four percent of the sample scored a five or higher and the MAST had a test-retest reliability coefficient of .84 after a mean length of time of 4.8 months.

Gibbs (1983) analyzed twelve empirical studies on the MAST to summarize evidence of validity and reliability. The average alpha coefficient for the full MAST was 0.87 with a range from 0.83 to 0.93.

Storgaard, Nielsen, and Gluud (1994) studied the validity of the MAST as a screening questionnaire for alcohol problems. They excluded publications of modified versions of the MAST containing fewer than 24 items. The MAST gave validity measures ranging from 0.24 to 0.96 (predictive positive values) and predictive negative values ranging from 0.78 to -1.0. The sensitivity values ranged from 0.36 to 1.0 and specificity values from 0.36 to 0.96.

Zung and Charalampous (1975) sampled two groups of DUI offenders. Problem drinkers constituted 68% of the first group and 56% of the second group. The
MAST items discriminated adequately between problem drinkers and adjustive drinkers, thus supporting the internal validity of the MAST. Therefore, a strength of the MAST is its demonstrated reliability and validity.

Other strengths which document the MAST as an effective alcohol assessment tool have been discussed in the literature, including its application to diverse groups of subjects. For example, the MAST has been administered to alcohol dependent persons, persons convicted of DUI, drug abusers, psychiatric patients, general medical patients, college students, hospital personnel, and convicted felons (Hedlund & Vieweg, 1984; Moore, 1971; Salstone, Halliwell, & Hayslip, 1994; Skinner, 1979).

Another strength of the MAST is its high level of agreement with the diagnosis reached by a physician and/or a psychiatrist. Moore (1972) compared the MAST scores of 270 women and 130 adult male psychiatric patients with the psychiatrist's diagnosis and an overall agreement rate of 78% was achieved. Similarly, McAuley, Longabaugh, and Gross (1978) compared the effectiveness of the self and family forms of the MAST.
There was a 67% agreement rate between the physician’s diagnosis and MAST-patient scores and an 80% agreement rate between the physician’s diagnosis and the MAST-family scores.

In addition, Magruder-Habib, Fraker, and Peterson (1983) compared the judgments of clinicians with MAST scores. There was an agreement rate of 77% with a sample of outpatient medical center clients using a MAST cutoff score of 6. Mischke and Venneri (1987) evaluated the MAST, the Mortimer-Filkens Questionnaire, and the CAGE with a sample \(N = 718\) of respondents convicted of DUI. The results indicated that the MAST achieved the highest level of correlation with counselor decisions and identified 85% of the significant problems defined by counselors, whereas the MFQ and CAGE identified 65% and 60%, respectively.

In contrast to the previous studies, Moore (1971) randomly sampled 200 patients at a community hospital and found 10% to be alcohol dependent and 3.5% questionably alcohol dependent by the MAST and/or physician’s diagnoses. The MAST identified 90% of the alcohol dependent persons and the doctors identified 50%. Moore concluded that the MAST was more sensitive
than the written impressions of the attending doctors. Despite the relative strengths of the MAST, there is also evidence of apparent weaknesses with the MAST. First, Otto and Hall (1988) examined the vulnerability of the MAST to positive dissimulation, or the subjects propensity to minimize the problem. Three groups of male veterans (i.e., alcohol, psychiatric, and medical) at a VA clinic were sampled. The MAST identified only two of twenty alcohol dependent persons who were told to avoid detection.

A similar result was found by Sinnett, Benton, and Whitfill (1991) who administered the MAST and Alcohol Addiction Test to 36 normal college students under three conditions: honest, simulate alcoholism, and dissimulate alcoholism. Twelve men and 24 women took both questionnaires and the results indicated that normal subjects can simulate alcoholism under testing conditions. This raises questions about the effect of denial on screening for alcoholism with the MAST.

Another potential weakness of the MAST was raised by Brady, Foulks, Childress and Pertschuk (1982). They provided a thorough analysis of the 18 studies
published on the MAST between 1971 and 1982. The authors questioned the application of the MAST in cross-cultural comparisons.

Along with the apparent weaknesses, the MAST has also been criticized for several reasons. First, Gibbs (1988) concluded that the MAST tended to over-diagnose alcoholism. A second criticism by some, yet considered a strength by others, is the tendency of the MAST to give false positive results as opposed to false negative results (Moore, 1972). A third criticism is that the MAST is too lengthy. To address this concern, Crews and Sher (1992) suggested shortening the instrument to nine items, which they concluded appeared to improve the reliability and validity of the MAST.

Of particular interest to this study is the application of the MAST to a college student population. Favazzo and Cannell (1977) administered the MAST to 245 undergraduate students on two campuses and found 18% of students at the large university campus scored in the alcoholism range, whereas 28.6% of students at the small private college scored a five or higher.
Silber, Capon, and Kuperschmit (1985) evaluated the ability of the MAST to identify alcohol-related problems at a university student health center. The MAST was administered to 200 students and 16% of the total population screened was found to be at risk for alcoholism. Hay (1988) administered the MAST to 154 new clients at a university counseling center and 22% of the clients scored a five or higher.

Anderson (1987) adapted the MAST questionnaire suggested by Silber et al. (1985) to a computer format. A large percentage (73%) of students felt the MAST accurately represented their drinking habits. The anonymous interaction of the student with the computer may provide an atmosphere for more honest answers (Anderson, 1987).

Martin, Liepman, and Young (1990) administered the full MAST to 114 undergraduates along with one additional phrase attached at the end of item number nine (in bold): "Have you ever attended a meeting of Alcoholics Anonymous because of your own problem drinking?". Seven subjects attained higher MAST scores only because they attended an AA meeting, but not for their own problem drinking. The authors suggested
changing the wording of item nine to reduce the number of false positives produced in a college student population.

Lall and Schandler (1991) examined the relationship between MAST scores, drinking history, and self-reported grade point average. A sample of 261 undergraduates volunteered from several academic courses and the results indicated the relationship between years drinking and weekly consumption to be inverse and significant. A negative correlation ($r = -.32$) between GPA and weekly alcohol consumption was also found.

Svanum and McGrew (1995) evaluated the ability of several subtle and direct alcoholism screening scales to identify DSM-III-R substance dependence in a university setting. A sample of 495 students completed the Diagnostic Interview Schedule, the Michigan Alcoholism Screening Test (MAST), the Substance Abuse Subtle Screening Inventory (SASSI), and five direct screening questions concerning the consequences of alcohol and drug use. The participants' ages ranged from 17 to 70, with a mean age of 24. Approximately 11% of the sample met the DSM-III-R
criteria for a substance use disorder with symptoms present within the past year, according to DIS responses. The average MAST score was 4.3 and the five screening questions obtained a mean of 0.5. Pearson product-moment correlations showed substance dependence to be weakly associated with responses on both the MAST ($r = .28$, $p < .01$) and the classification results of the SASSI ($r = .18$, $p < .01$).

A common recommendation found in the literature relates to the cut-off score used to interpret the MAST. Klikunas (1989) compared the MAST, Substance Abuse Subtle Screening Inventory (SASSI), and MacAndrew Alcoholism Scale (AMAC) with a sample of alcohol dependent persons, normals, psychiatric out-patients, co-dependent family members, and drug addicts ($N = 238$). Although the MAST performed adequately compared to the SASSI and AMAC, Klikunas (1989) states "the MAST's performance with the test sample at all cutting scores reflected a liberal tendency toward overdiagnosis of alcoholism or substance abuse" (p. 177). Klikunas (1989) recommended raising the MAST cut-off score to 10 or 12 to reduce the likelihood of diagnosing false positives.
Ross, Gavin, and Skinner (1990) evaluated the utility of the MAST and Alcohol Dependence Scale (ADS) in screening for alcohol abuse and dependence disorders in a substance abuse population. The weighted sample consisted of 390 males and 121 females. Twelve percent were misclassified by the MAST using a cutoff score of 12/13 with a false negative rate of 7% and false positive rate of 25%. Ross et al. (1990) gives further support to using a higher MAST cut-off score by recommending a score of 18 for patients who have met all DSM-III criteria for alcohol abuse or dependence currently.

A similar recommendation was offered by Brady et al. (1982) who suggested using a MAST cut-off score of ten or above to reduce the probability of diagnosing false positives. Given the varied recommendations of cut-off scores ranging from 10 to 18, it appears to be the responsibility of the therapist or practitioner to utilize the most appropriate MAST cut-off score for their client population based on the available empirical evidence.
The Substance Abuse Subtle Screening Inventory (SASSI)

A review of the literature of the SASSI will focus on its development, construct validity and its utility with a variety of populations.

The SASSI, developed by Miller (1985), is a single-page, paper-and-pencil questionnaire. On one side are 52 true-false questions seemingly unrelated to chemical abuse, making them less threatening to the respondent. On the opposite side are the Risk Prediction Scales (RPS) which are 12 alcohol-related questions (Face Valid Alcohol) and 14 drug-related questions (Face Valid Other Drug). The SASSI takes approximately ten to fifteen minutes for clients to complete both sides and scoring can be completed in approximately one minute. A diagnosis can be reached after consulting the decision rules form. The SASSI items were empirically derived from items borrowed from the Minnesota Multiphasic Personality Inventory, the Psychological Screening Inventory, the Michigan Alcoholism Screening Test, and many other sources which differentiate between abusers and nonabusers (Kerr, 1994).
The SASSI can be administered in three separate forms, the Adolescent form, the Adult form, and the SASSI-2 form. The three forms of the SASSI contain six subscales, along with the Face Valid Alcohol and Face Valid Drug scales which are found on all three forms.

First, the Adolescent form was developed for persons between the ages of 12 and 18. The Adolescent form contains the Obvious Attributes scale (OAT) which measures the symptoms of substance abuse the client will openly admit to. The Subtle Attributes scale (SAT) measures the potentiality of becoming dependent on alcohol or drugs. The Defensiveness scale (DEF) identifies the client's attempts to conceal their substance abuse problem. The Defensive Dependent vs. Defensive Non Dependent scale (DEF2) is used with the DEF scale to distinguish the degree of dependency or non-dependency on chemicals. The Correctional scale (COR) measures the similarity of the client’s responses to people with history of criminal activity. The final scale on the Adolescent form, Random Answering Pattern (RAP), identifies response patterns which are not related to content of the test items. Elevated RAP
scores would possibly invalidate the entire profile (Kerr, 1994; Miller, 1985; Vacc, 1994).

Second, the Adult form is suited for persons over the age of 18. The Adult form contains six subscales also found in the Adolescent form (i.e., Alcohol, Drug, Obvious Attributes, Subtle Attributes, Defensiveness, and Defensive Dependent vs. Defensive Non Dependent). Two scales which differ are the Alcohol vs. Drug scale (ALD) which measures the client's preference toward alcohol or other drugs and the Family vs. Controls (FAM) scale which purported to measure codependency as evidenced by similarities to family members of alcohol and drug abusers (Kerr, 1994; Miller, 1985; Vacc, 1994).

Third, the Adult SASSI-2 form replaced the Adult SASSI form on July 15, 1994 (Miller, 1994). The SASSI-2 differs from the Adult SASSI in several ways. The Correctional (COR) and Random Answering Pattern (RAP) scales were added (see description in Adolescent SASSI section), the Supplemental Addiction Measure (SAM) replaced the DEF2 scale. The SAM scale was developed to be "clinically richer and more user-friendly than DEF2" (Miller, 1994, p. S-11). The
SASSI-2 retained the Alcohol, Drug, Obvious Attributes, Subtle Attributes, Defensiveness, and Family vs. Controls scales (see descriptions in Adolescent and Adult form sections).

Klikunas (1989) evaluated the construct validity of the SASSI as a screening test for alcoholism. Five groups (50 alcohol dependent persons, 50 normals, 50 psychiatric outpatients, 50 co-dependent family members and 38 drug addicts) were administered the SASSI, MAST, and the MacAndrew Scale of the MMPI-2. Using the criterion groups of abuser and non-abuser, the MAST was the most accurate in identifying alcohol dependent individuals compared with the SASSI and AMAC. The discriminant function analysis revealed the SASSI to correctly classify 86% of the study sample compared to 96% for the MAST and 70% for the AMAC. Klikunas recommended the SASSI be administered without the Alcohol vs. Drugs (ALD) and Family vs. Controls (FAM) scales as well as using the two group criterion of abusers and non-abusers.

Knot and O’Neill (1990) also examined the construct validity of the SASSI and concluded that the SASSI allows the "diagnostician to pinpoint chemical
dependency based on the client’s values, attitudes, and beliefs before the harmful consequences appear" (p. 6). The authors believed the SASSI can produce greater clinical accuracy and legal acceptance compared to other assessment instruments.

While the SASSI has been used with a wide variety of populations, very few studies have focused on the application of the SASSI to college students. Therefore, the literature review will include its application to additional populations.

Cooper and Robinson (1987) explored the relative norms of the SASSI with a general college population. The sample consisted of 298 male and 83 female students entering their freshmen year (M age = 18). The Risk Prediction Scales (RPS) and the SASSI were administered during the student orientation program. The RPS scales define three categories of use, including nonusers and nonabusers, moderate abusers, and dysfunctional abusers. The sample found 324 (86%) were nonusers and nonabusers, 46 (12%) were moderate abusers, and six (2%) were severe abusers. The authors stated that "the college population indicated less use and fewer consequences of alcohol and drug use by scoring lower
on the alcohol and drug use scales while scoring higher on the subtle abuse scale (SAT)" (Cooper & Robinson, 1987, p. 181). They found no significant differences on the obvious attributes (OAT), the denial (DEN), and the personal-family (FAM) scales. However, they did find a gender effect among the college sample with the males scoring higher on the OAT and FAM scales and lower on the DEN scale. It appears that college populations could be more open in reporting use, but have developed fewer problems associated with long-term use (Cooper & Robinson, 1987).

Creager (1989) reviewed the potential benefits of the SASSI to mental health professionals, including university student health personnel, college mental health centers, and a variety of substance abuse programs and correctional facilities. The benefits included the convenient administration and scoring, the accuracy in identifying chemical abusers, and its brevity (Creager, 1989).

Karacostas and Fisher (1993) compared SASSI scores of 88 adolescents who had a learning disability (LD) with 103 who did not have a learning disability (NLD). Of the 30 students classified as chemically dependent,
70% were students with LD (p. 491). A discriminant analysis found 108 (67%) of the non-chemically dependent subjects and 22 (73%) of the chemically dependent subjects were correctly assigned into groups.

Fuller, Fishman, Taylor and Wood (1994) examined the validity of the SASSI along with several other screening instruments for assessing substance abuse in a brain-injured population. They administered the CAGE, brief MAST, the Addiction Severity Index, and SASSI to ten consecutive patients admitted to a brain injury clinic. Although the SASSI correctly identified three of the five patients as psychoactive substance dependent (sensitivity: 60%) and correctly ruled out all five who did not have PSD (specificity: 100%), it was not as sensitive as the CAGE and BMAST. The authors acknowledged the small sample size as being a major weakness of the study.

Svanum and McGrew (1995) evaluated the ability of several subtle and direct alcoholism screening scales to identify DSM-III-R substance dependence in a university setting. A sample of 495 students completed the Diagnostic Interview Schedule, the Michigan Alcoholism Screening Test (MAST), the
Substance Abuse Subtle Screening Inventory (SASSI), and five direct screening questions concerning the consequences of alcohol and drug use. The participants' ages ranged from 17 to 70, with a mean age of 24. Approximately 11% of the sample met DSM-III-R criteria for a substance use disorder with symptoms present within the past year, according to DIS responses. The average MAST score was 4.3 and the five screening questions obtained a mean of 0.5. The SASSI decision rules classified 77 participants as substance abusers. Pearson product-moment correlations showed substance dependence to be weakly associated with responses on both the MAST \( (r = .28, p < .01) \) and the classification results of the SASSI \( (r = .18, p < .01) \).

Despite the mixed results of the SASSI in various research protocols, Miller (1990) remains committed to the SASSI and states "the SASSI may have the lowest false alarm rate of any measure I am aware of in the field of addiction" (p. 15).
The Minnesota Multiphasic Personality Inventory-2 (MMPI-2)

The MMPI has been used in the assessment of alcoholism and substance abuse for several years (Friedrich & Loftsgard, 1978; Lachar, Berman, Grisell, & Schooff, 1976; MacAndrew, 1981; MacAndrew, 1986). More recently, the MMPI-2 has made attempts to improve the alcohol assessment scales and investigate the compatibility of the MMPI-2 norms with college students.

Butcher, Bowman, Dahlstrom, and Graham (1990) investigated the utility of using MMPI-2 general population norms with college students, since college students tend to score one to one and one-half standard deviations above the normative sample. The authors sampled students at four universities and found the MMPI-2 norms to be relevant and appropriate for college students.

Caldwell (1991) reviewed the MMPI-2 and was critical of the upper-class socioeconomic bias of the volunteer participants in the new normative sample for the MMPI-2. The author suggested plotting the raw scores on the MMPI-2 on both the MMPI and MMPI-2.
profile sheets to negate some of the differences between the two forms. Duckworth (1991) critiqued the MMPI-2 and urged counselors to use the MMPI-2 cautiously and to be sure the interpretation based on the MMPI-2 profile is accurate for that individual. Both studies offer suggestions which would be applicable to professionals working with college students.

Another study examined the stability and internal consistency of the MMPI-2 in a college student sample (Matz, Altepeter, & Perlman, 1992). The MMPI-2 was administered twice to each individual within a 26 day retest time period. Significant differences were found in 16 of the 25 scales, but all were considered clinically insignificant since the mean differences were less than four t-score points.

Another concern with the MMPI-2 is its resistance to dishonesty. Otto, Lang, Megargee, and Rosenblatt (1988) examined six MMPI-2 alcohol subscales and four dissimulation measures to determine if subjects could purposefully alter the outcome of the profile results. The results indicated that subjects can present themselves in a positive light if they are motivated.
to conceal their substance abuse problem. However, the dissimulation scales were still able to distinguish between the honest and dishonest response patterns of the subjects (Otto et al, 1988).

The MMPI-2 has established itself as a reliable and valid instrument when used with a college student population (Butcher et al., 1990). The newest additions to the MMPI-2 subscales aimed at discriminating between substance abusers and non-abusers are the Addiction Acknowledgment Scale and the Addiction Potential Scale.

The Addiction Acknowledgment Scale (AAS).

The AAS, developed by Butcher (1991b), is a 13-item face-valid scale embedded in the Minnesota Multiphasic Personality Inventory-2. The AAS began as a "collection of 14 items selected for scale membership on the basis of their obvious content relation to substance abuse problems" (Weed, Butcher, McKenna & Ben-Porath, 1992, p. 394). Three items not contributing to internal consistency were deleted, while two additional items were included on the basis of their high correlations with the 11 item test score, good internal consistency, and their content consistency.
with the existing items. Test-retest reliabilities by Weed et al. (1992) are acceptably strong at .84 for females and .89 for males.

Similarly, Greene, Weed, Butcher, Arredondo and Davis (1992) cross-validated the AAS and the Addiction Potential Scale (APS) using samples of 126 alcohol dependence inpatients and 189 psychiatric inpatients. A comparison of means, standard deviations, and discriminations between pooled standard deviations revealed a validity coefficient of .80 for males and .70 for females.

Svanum, McGrew and Ehrmann (1994) studied the validity of the AAS normative data using an index of the degree of discrimination ($A_Z$). An index of 1.0 indicates a perfect classification and an $A_Z$ average of approximately .90 was found. For female subjects, the $A_Z$ index reached .92. Svanum et al. studied a separate sample of 308 college students and the AAS curve detected substance dependent persons with an $A_Z$ of .81, "and these results suggest that the AAS may be the most useful MMPI-2 based substance abuse scale" (1994, p. 436).
The Addiction Potential Scale (APS).

The APS, developed by Butcher (1991b), is a 39-item scale, "constructed empirically by contrasting item endorsement frequencies from a large substance abuse sample with those from normative and psychiatric inpatient samples" (Green et al., 1992, p. 405). Butcher found only 180 of the MMPI-2’s 567 items as potentially useful by this criterion and were moved into the next stage of the scale development. Following a series of chi-square comparisons and content analyses, 39 items remained to represent the APS scale. The APS raw scores are converted to a linear t-score. The recommended cut-off t-score for both males and females is at or above 65. Scores at or above 65 indicate the individual has a significant problem with the substance(s).

Weed et al. (1992) found the test-retest reliabilities to be acceptable at .77 for females and .69 for males. The APS was cross-validated by Greene et al. (1992) in the same manner as the AAS. The discrimination in standard deviation units between the valid psychiatric sample and the substance abuse sample was .90 for males and .70 for females.
Svanum et al. (1994) investigated the validity of the APS with a sample of 308 college students. An $A_z$ of .60 was obtained for the APS, whereas the AAS obtained an $A_z$ of .81. Therefore, Weed and colleagues (1992) found the APS and AAS to be most accurate in discriminating substance abuse patients from psychiatric and normative counterparts when used in combination.

Butcher (1991b) explored the possibility of discriminating alcohol dependent patients from psychiatric patients and "normals" simultaneously. The MMPI-2 was administered to three subject groups: a community sample, a psychiatric sample and an alcohol dependent sample. Using a t-score cutoff of 65, the APS classified 79% of the samples correctly.

Weed et al. (1992) used three subject groups, the MMPI-2 normative sample ($N = 2,600$), a sample of psychiatric inpatients ($N = 423$), and a substance abuse treatment sample ($N = 1,212$), to assess the clinical usefulness of the AAS and APS. The authors feel the APS would be "more effective at ruling out secondary psychiatric problems within a chemical dependency sample than it would be identifying secondary substance
abuse problems in a psychiatric hospital" (Weed et al., 1992, p. 401).

Greene, Weed, Butcher, Arredondo, and Davis (1992) attempted to replicate Weed et al.'s (1992) findings using different samples. The authors sampled 126 patients from a treatment program in a private hospital and 189 patients at a psychiatric hospital. The results indicated that the AAS and APS were found to discriminate between psychiatric and substance abuse samples. Another key finding from Green et al. (1992) is the "superiority of these newly developed scales to other substance abuse scales carried over from the MMPI to the MMPI-2" (p. 409).

Weed, Butcher and Williams (1994) examined two new scales of the MMPI-2 which are the adolescent counterparts to the APS and AAS. Three sample groups were used, a normative sample (N = 1,620), a psychiatric sample (N = 251), and a substance abuse sample (N = 462). The two adolescent subscales detected alcohol and other drug problems better than the MAC-R and APS.
The AAS and APS have established a positive empirical foundation from which to build upon in the future. These instruments will benefit from additional studies which replicate previous results and other studies which broaden the application of the AAS and APS to a variety of subject groups.
CHAPTER III

Methodology

The purpose of this study was to analyze a sample of clients who completed a drug and alcohol assessment at a university counseling center. The alcohol and drug counseling services of the university counseling center were accredited by the State Department of Human Services on October 24, 1991. Therefore, client data collected following the accreditation date would not have been equivalent or comparable to the client data collected prior to accreditation. Prior to being accredited, the counseling center utilized a different assessment protocol.

Sample Description

The sample consisted of clients (N = 365) who were referred to a state-accredited alcohol and drug counseling agency between September 1, 1992 and May 31, 1995. The counseling center was located on a small, comprehensive university campus in the midwest. The referral sources included self, family, friend, campus judicial board, employer, court, social services,
physician, and others.

Of the 365 total clients who were referred for an assessment, 186 complete and useable client files were included in the study. A complete file consisted of a clinical interview, completed scores on the Modified-Michigan Alcoholism Screening Test (M-MAST), the Addiction Acknowledgment Scale (AAS), the Addiction Potential Scale (APS), at least one form of the Substance Abuse Subtle Screening Inventory (SASSI), and a DSM-III-R diagnosis made by a certified Level III chemical dependency counselor.

**Instrumentation**

Several instruments were utilized in the study.

The following is a brief description of each instrument along with documentation of reliability and validity data:

**Michigan Alcoholism Screening Test (MAST)**

The MAST, developed by Selzer (1971), is an inventory consisting of 25 differentially weighted yes-no questions that inquire directly about drinking behaviors. The statements concern "the respondent’s medical, legal, and psychosocial problems, control of..."
alcohol intake, and involvement with helping agencies as regards excessive drinking" (Zung, 1982, p. 425). Individual items are assigned scores of zero, one, two, or five points if answered in a significant direction. Scores on the MAST range from 0 to 53 and a score of five or greater is considered indicative of alcohol dependence (Selzer, 1971). The total score can be ordered along a scoring continuum for assessment (Skinner, 1979), or it can be referred to a recommended cut-off score for screening problem drinkers (Selzer, 1971). The instrument to be used in the study was modified by the agency staff to fit a university student population. The words "school" and "roommate" were added to two items to tailor the M-MAST to a college setting.

The reliability coefficients for the original MAST range from .83 to .95 (Pokorny, Miller, & Kaplan, 1972; Zung, 1982). Two studies provided information concerning test-retest reliability. First, Zung (1982) reported MAST total score reliability coefficients of .97 for a one day test-retest interval, .86 for a two day interval, and .85 for a three day interval with a sample of 120 psychiatric inpatients. Second, Skinner
and Sheu (1982) obtained a reliability coefficient of .84 for an average 4.8 month test-retest interval using a sample of 91 acute psychiatric patients.

Several studies investigated the validity of the MAST and its ability to differentiate alcohol dependent persons from other groups. Selzer (1971) reported MAST scores of five or more identified 98% of his alcoholic group and scores of four or less correctly classified 95% of the control group. A shorter version of the MAST (BMAST) was used by Pokorny et al. (1972) with two samples of 60 alcohol dependent inpatients and 62 general psychiatric inpatients. The BMAST's sensitivity was .95 for alcohol dependent persons and .96 for psychiatric inpatients.

Storgaard, Nielsen, and Gluud (1994) also studied the validity of the MAST as a screening questionnaire for alcohol problems. The MAST gave validity measures ranging from 0.24 to 0.96 (predictive positive values) and predictive negative values ranging from 0.78 to -1.0. The sensitivity values ranged from 0.36 to 1.0 and specificity values from 0.36 to 0.96. In addition, Gibbs (1983) analyzed twelve empirical studies on the MAST to summarize evidence of validity
and reliability. The average alpha coefficient for the full MAST was 0.87 with a range from 0.83 to 0.93. Therefore, the MAST has been found to be a reliable and valid instrument.

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

The SASSI, developed by Miller (1985), is a single-page, paper-and-pencil questionnaire. On one side are 52 true-false questions seemingly unrelated to chemical abuse, making them less threatening to the respondent. On the opposite side are the Risk Prediction Scales (RPS) which are 12 alcohol-related questions and 14 drug-related questions. The SASSI takes approximately 10 to 15 minutes for clients to complete both sides and scoring can be completed in approximately one minute. A series of decision rules assist the practitioner in making a diagnosis based on subscale scores. The SASSI items were empirically derived from items borrowed from the Minnesota Multiphasic Personality Inventory, the Psychological Screening Inventory, the Michigan Alcoholism Screening Test, and many other sources which differentiate between abusers and nonabusers (Kerr, 1994).
Adolescent SASSI Form.

The Adolescent Form of the SASSI is designed for use with individuals between the ages of 12 to 18. The Adolescent form reports results on eight subscales: Face Valid Alcohol (FVA), Face Valid Other Drug (FVOD), Obvious Attributes (OAT), Subtle Attributes (SAT), Defensiveness (DEF), Defensive Dependent vs. Defensive Non Dependent (DEF2), Correctional (COR), and Random Answering Pattern (RAP).

Adult SASSI Form.

The Adult Profile Form is designed for respondents 18 years of age through adulthood. The Adult form reports results on eight subscales: Face Valid Alcohol (FVA), Face Valid Other Drug (FVOD), Obvious Attributes (OAT), Subtle Attributes (SAT), Defensiveness (DEF), Defensive Dependent vs. Defensive Non Dependent (DEF2), Alcohol vs. Drug (ALD), and Family vs. Controls (FAM); (Miller, 1985).
Adult SASSI-2 Form.

The Adult SASSI-2 form replaced the Adult SASSI form on July 15, 1994 (Miller, 1994). Three new scales were added to the SASSI-2 (Correctional, Supplemental Addiction Measure, and Random Answering Pattern) and two scales were eliminated (Defensive vs. Defensive Non Dependent, Alcohol vs. Drugs).

The test-retest reliability of SASSI is based on results reported by Klikunas (1988) in an unpublished doctoral dissertation. The reliability was reported for 24 subjects on a four to six week interval and found moderate to good test-retest reliability. The reliability coefficients were reported as follows: .87 (OAT), .91 (SAT), .86 (DEN), .91 (DAN), .78 (ALD), and .76 (FAM) for the Adult form.

The validity of the SASSI has been studied by several authors. Miller (1985) describes the SASSI scales and decision rules in the SASSI manual leading to over a 90% accuracy rate in "classifying male and female control subjects and also male and female illicit drug abusers and male alcoholics in residential treatment" (p. 4-3). After a few modifications were made, "88% of the clients in a detoxification sample,
68% of primary and family member abusers and 92% of family nonabusers were correctly classified on the SASSI alone" (Miller, 1985, p. 4-3).

Cooper and Robinson (1987) found Miller's studies to be 89% to 97% accurate in classifying abusers, with only a 5% to 10% rate of misclassification of nonabusers. A sample of 376 freshmen college students were given the SASSI and it significantly discriminated between nonabusers, moderate abusers, and severe abusers (Cooper & Robinson, 1987).

Klikunas (1988) studied the construct validity of the SASSI and states, "while the SASSI represents a major effort to increase the sophistication and discriminatory power of alcoholism screening tests, it is also limited by its lack of controlled cross-validation data" (p. 87).

A similar concern regarding the SASSI's validity is raised by Vacc (1994) in the supplement to the Eleventh Mental Measurements Yearbook, "Unfortunately, adequate description concerning representativeness of the populations involved in the reported validity data is not provided. Notably absent is empirical information concerning chronological age, social
Minnesota Multiphasic Personality Inventory-2 (MMPI-2) 

Addiction Acknowledgment Scale (AAS).

The AAS, developed by Butcher (1991), is a 13-item face-valid scale embedded in the Minnesota Multiphasic Personality Inventory-2. "The AAS began as a collection of 14 items selected for scale membership on the basis of their obvious content relation to substance abuse problems" (Weed et al., 1992, p. 394). Three items not contributing to internal consistency were deleted, while two additional items were included on the basis of their high correlations with the 11 item test score, good internal consistency, and their content consistency with the existing items. Test-retest reliabilities by Weed et al. (1992) are acceptably strong at .84 for females and .89 for males.

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Following a series of chi-square comparisons and content analyses, 39 items remained to represent the APS scale. Test-retest reliabilities by Weed et al. (1992) are acceptable at .77 for females and .69 for males. The APS was cross-validated by Greene et al. (1992) in the same manner as the AAS. The discrimination in standard deviation units between the valid psychiatric sample and the substance abuse sample was .90 for males and .70 for females.

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The AAS and APS raw scores are converted to a linear t-score. The recommended t-score cut-off for both males and females is at or above 65. Scores at or above 65 indicate the individual has a significant problem with the substance(s).
Design

The study was a non-experimental design utilizing multivariate correlational methods. The design focused on empirically evaluating the alcohol assessment instruments used by the student counseling center (i.e., Modified Michigan Alcoholism Screening Test, Addiction Acknowledgment Scale, Addiction Potential Scale, Adolescent SASSI, Adult SASSI, and Adult SASSI-2).

An inter-rater reliability procedure was implemented to control for variation in clinician judgment. The inter-rater reliability procedure was completed prior to the data collection process. A reliability coefficient of .98 was the outcome of the inter-rater procedure. Each of the diagnoses was evaluated independently by three Level III chemical dependency counselors certified by the South Dakota Chemical Dependency Certification Board. Level III indicates the highest level of professional expertise based on certification standards.

A Level III chemical dependency counselor qualifies for state certification via two tracks, an Academic track or an Experience track. The Academic
track requires: (a) 160 semester hours transcribed or Master of Arts/Master of Science; (b) 22 semester hours specified education courses; (c) three hours in family counseling; (d) three hours of chemical dependency specific electives; and (e) two years or 4,000 hours CD counseling experience or Graduate Degree CD specific or related field. The Experience track requires: (a) 22 semester hours of specialized education courses; (b) three hours in family counseling; (c) three hours of chemical dependency specific electives; and (d) six years or 12,000 hours CD counseling experience (South Dakota Chemical Dependency Counselor Certification Board, 1991).

Data Collection

This section is divided into two phases which describe the process of data collection. Phase one describes the diagnostic assessment procedures utilized by the counseling center. Phase two describes the manner in which the data were received from the counseling center and coded for the purposes of statistical analysis.
Phase One: Diagnostic Protocol

The data was collected in two distinct phases. Phase one involved a four-step process described below.

Step One.
The first step involved the client completing several free-standing assessment instruments during a scheduled appointment at the university's student counseling center. The client completed at least one form of the SASSI (i.e., the Adolescent Form, the Adult Form, or the Adult SASSI-2 Form), the Modified-MAST, the AAS Survey, the APS Survey, and a General Intake form. All of the assessment instruments were completed in approximately one hour. Due to the replacement of the Adult SASSI with the Adult SASSI-2 form, the agency changed its assessment instruments to the SASSI Adolescent form and the Adult SASSI-2.

After completing the self-report instruments the client was scheduled for a second appointment which typically occurred within two weeks after the first appointment.

Step Two.
The second step of phase one required the agency staff to score the instruments completed during the
initial appointment following the standard scoring procedures. The scoring was done by a member of the counseling staff or by an administrative assistant trained in the testing and scoring procedures of each instrument.

Step Three.

The third step in phase one of the data collection process consisted of a two-hour individual appointment with a trained chemical dependency counselor. A clinical interview was conducted to gather additional information about all areas of the client’s life. A psychosocial history was documented along with a three-generation family map or genogram, which helps reveal any family history of substance abuse. The goal of this session was to assess the complete life of the client, especially the impact of chemicals on the client’s life.

Step Four.

The fourth step in the assessment process was a decision to assign a DSM-III-R diagnosis based on the information gathered in the previous three steps. A diagnosis was made based on the following conditions: (a) if the client met a certain number of the DSM-III-R
criteria related to substance abuse or substance dependence (APA, 1987); (b) if the scores on the assessment instruments exceeded or fell below the recommended cut-off score indicating no abuse, abuse, or dependence; and (c) after two Level III chemical dependency counselors reviewed the client’s file and a consensus was reached regarding the appropriate diagnosis for each client.

Phase Two: Data Coding Procedures

Phase two of the data collection process involved the manner in which the researcher received the client data from the student counseling center.

Step One.

Approval from the university’s Office of Research was requested before the research methods were initiated (see Appendix A). A letter was also forwarded to the Director of the student counseling center describing the purpose and nature of the study and seeking permission to research and analyze the existing data (see Appendix A). The Director has full access to the client files according to the guidelines of federal law 42 C.F.R Part 2, Subpart D, Section 2.52 (see
Appendix B), which allows for full disclosure of client file information for the purposes of researching drug and alcohol programs, provided certain safeguards are met to fully protect client confidentiality (Legal Action Center, 1991).

**Step Two.**

The results of the four assessment instruments and the clinical interview were entered by hand onto a computer coding sheet. The coding process included a one-hour training session. Each person participating in the coding procedures signed a confidentiality form. The confidentiality of the clients was fully protected throughout the course of the research project. The coding sheets were entered into the university’s mainframe system by the Computing Services Office staff. The data set was downloaded to an individual library where the SPSS-X statistical analyses were performed.

**Data Analysis**

The data were analyzed to determine the relationship between scores on the assessment instruments and the resulting DSM-III-R diagnosis.
Another primary analysis focused on determining which assessment instrument was the best predictor for diagnosing alcohol abuse or alcohol dependence in a college student population. The primary methods of data analysis were multiple analysis of variance and discriminant function analysis (Borg & Gall, 1989; Freed, Ryan & Hess, 1991). The criterion variable was the diagnosis culminating from the assessment procedures described in the data collection section. The predictor variables were the Modified-MAST scores, the SASSI scores, the AAS and APS scores, and the Clinical Interview information. The data was coded using the SPSS-X software package which allowed for maximum flexibility in analyzing the data (SPSS Inc., 1988).

Descriptive statistics were used to document the demographic characteristics of the client sample. Means, standard deviations, and frequency distributions are a few examples of how the demographic data were presented (Howell, 1992).
Research Questions

1. What are the total scores on each assessment instrument (M-MAST, AAS, & APS) as they compare to the client's DSM-III-R diagnosis?

2. What are the subscale scores on the three forms of the Substance Abuse Subtle Screening Inventory instrument as they compare to the client's DSM-III-R diagnosis?

3. Which instrument (M-MAST, AAS, APS, Adolescent SASSI, Adult SASSI, or Adult SASSI-2) best predicts the diagnosis of alcohol abuse or alcohol dependence?

4. Which combination of instruments best predicts the diagnosis of alcohol abuse or alcohol dependence?
CHAPTER IV

Results

Chapter four presents the results and a detailed discussion of the research findings. The chapter is divided into three sections: (a) discussion of demographic data; (b) discussion of descriptive data; and (c) results and discussion of research questions.

Demographic Data

Research data derived from a sample consisting of 186 counseling center clients were analyzed. The clients were university students who had completed an assessment protocol (i.e. A clinical interview, the Modified-Michigan Alcoholism Screening Test, a version of the Substance Abuse Subtle Screening Inventory, the Addiction Acknowledgment Scale, and the Addiction Potential Scale). Those files containing insufficient or incomplete assessment information (n = 179) were excluded from the sample.
Table 1

Biographic Characteristics of Study Sample (N = 186)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>122</td>
<td>65.6</td>
</tr>
<tr>
<td>Female</td>
<td>64</td>
<td>34.4</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 years or younger</td>
<td>55</td>
<td>29.6</td>
</tr>
<tr>
<td>20-21</td>
<td>46</td>
<td>24.7</td>
</tr>
<tr>
<td>22-23</td>
<td>30</td>
<td>16.1</td>
</tr>
<tr>
<td>24-25</td>
<td>24</td>
<td>12.9</td>
</tr>
<tr>
<td>26 years or older</td>
<td>31</td>
<td>16.7</td>
</tr>
</tbody>
</table>

The 186 clients ranged in age from 18 to 49 (M = 22.68) and included 122 males (65.8%, mean age of 22.3) and 64 females (34.2%, mean age of 23.5). Fifty-five (29.6%) of the participants were 19 years old or younger, whereas 46 (24.7%) fell between the ages of 20-21, 30 (16.1%) were between the ages of 22-23, 24 (12.9%) were between the ages of 24-25, and 31 (16.7%) were 26 years or older (see Table 1).
Table 2

School Classification of Participants (N = 186)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Frequency</th>
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</tr>
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<tr>
<td>Freshman</td>
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<td>28.0</td>
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<tr>
<td>Sophomore</td>
<td>43</td>
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</tr>
<tr>
<td>Junior</td>
<td>37</td>
<td>19.9</td>
</tr>
<tr>
<td>Senior</td>
<td>30</td>
<td>16.1</td>
</tr>
<tr>
<td>Graduate</td>
<td>20</td>
<td>10.8</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>2.2</td>
</tr>
</tbody>
</table>

The educational classification of the sample included 52 Freshmen (28.0%), 43 Sophomores (23.1%), 37 Juniors (19.9%), 30 Seniors (16.1%), 20 Graduate students (10.8%), and 4 Others (2.2%) (see Table 2).

Table 3

Ethnic Origin of Participants (N = 186)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>168</td>
<td>90.3</td>
</tr>
<tr>
<td>Native American</td>
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<td>6.5</td>
</tr>
<tr>
<td>African American</td>
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<td>1.6</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Asian/Oriental</td>
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<td>0.5</td>
</tr>
</tbody>
</table>
The ethnic representation of the sample included 168 White students, 12 Native American students, three African American students, two Hispanic students, and one Asian student (see Table 3).

Table 4

<table>
<thead>
<tr>
<th>Classification</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
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<td>81.5</td>
</tr>
<tr>
<td>Married</td>
<td>12</td>
<td>6.5</td>
</tr>
<tr>
<td>Divorced</td>
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<td>5.4</td>
</tr>
<tr>
<td>Cohabitating</td>
<td>9</td>
<td>4.9</td>
</tr>
<tr>
<td>Separated</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Widowed</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

The majority of the study sample consisted of individuals who were single 150 (81.5%), 12 (6.5%) were married, 10 (5.4%) were divorced, 9 (4.9%) were unmarried and cohabitating, one (0.5%) was widowed, and one (0.5%) was married and separated (see Table 4).
<table>
<thead>
<tr>
<th>Classification</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence Hall Staff</td>
<td>42</td>
<td>24.1</td>
</tr>
<tr>
<td>Attorney</td>
<td>38</td>
<td>21.8</td>
</tr>
<tr>
<td>Self</td>
<td>29</td>
<td>16.7</td>
</tr>
<tr>
<td>Family/Friend</td>
<td>18</td>
<td>10.3</td>
</tr>
<tr>
<td>Courts</td>
<td>13</td>
<td>7.5</td>
</tr>
<tr>
<td>Judicial Board Hearing</td>
<td>6</td>
<td>3.4</td>
</tr>
<tr>
<td>Instructor/Faculty</td>
<td>5</td>
<td>2.9</td>
</tr>
<tr>
<td>Printed Ads</td>
<td>5</td>
<td>2.9</td>
</tr>
<tr>
<td>Probation Officer</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Other</td>
<td>16</td>
<td>9.2</td>
</tr>
</tbody>
</table>

The most frequent referrals to the Student Counseling Center were made by residence hall staff (24.1%), attorneys (21.8%), self (16.7%), and family/friends (10.3%). Courts made referrals for less than ten percent (7.5%) of the clients. The remaining referrals were made by the judicial board (3.4%), instructors (2.9%), printed advertisements (2.9%), and probation officers (1.1%) (see Table 5).
Table 6

**Employment Status of Participants (N = 152)**

<table>
<thead>
<tr>
<th>Employment</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time</td>
<td>18</td>
<td>11.8</td>
</tr>
<tr>
<td>Part-Time</td>
<td>87</td>
<td>57.2</td>
</tr>
<tr>
<td>Unemployed</td>
<td>47</td>
<td>30.9</td>
</tr>
</tbody>
</table>

Each client was asked to indicate his/her employment status. Table 6 indicates the results with over half (57.2%) were working part-time, 47 (30.9%) were currently unemployed, and 18 (11.8%) were currently employed full-time.

Table 7

**Current Living Arrangements of Participants (N = 184)**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence Hall</td>
<td>57</td>
<td>31.0</td>
</tr>
<tr>
<td>With Unrelated Person(s)</td>
<td>51</td>
<td>27.7</td>
</tr>
<tr>
<td>With Family</td>
<td>27</td>
<td>14.7</td>
</tr>
<tr>
<td>Alone</td>
<td>22</td>
<td>12.0</td>
</tr>
<tr>
<td>Fraternity/Sorority</td>
<td>11</td>
<td>6.0</td>
</tr>
<tr>
<td>Spouse Only</td>
<td>7</td>
<td>3.8</td>
</tr>
<tr>
<td>Parent/Sibling</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Information was obtained as to the client's current place of residence. Thirty-one percent lived in a university residence hall, 27.7% lived with an unrelated person, and 14.7% lived with family (see Table 7). In addition, 12% lived alone, 6% lived in a fraternity or sorority house, 3.8% lived with their spouse, 1.6% lived with a parent or sibling, and 3.3% lived in a residence not listed on the intake form (see Table 7).

Descriptive Data

An important piece of information obtained on the intake form was whether the client had received alcohol or other drug treatment prior to the current assessment procedures. Of the 186 respondents, 30 (16.1%) of the clients indicated a prior experience of alcohol or other drug treatment (see Table 8). Nearly 84% of the clients had not previously received any type of alcohol or other drug treatment (see Table 8).
A genogram was collected from most of the clients during the clinical interview. A genogram is a "format for drawing a family tree that records information about family members and their relationships over at least three generations" (McGoldrick & Gerson, 1985, p. 1). One aspect of the genogram is determining the birth order of the client within his/her family of origin. The classifications are oldest, middle,
youngest, or only child. Thirty-four percent of the clients were the oldest child, 31.8 percent were the middle child, 29.4 percent were the youngest, and 4.7 percent were the only child in their family of origin (see Table 9).

Table 10

Participants Current Contact with Health Care Professionals (N = 55)

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>27</td>
<td>49.0</td>
</tr>
<tr>
<td>Counselor</td>
<td>18</td>
<td>32.7</td>
</tr>
<tr>
<td>Psychiatrist</td>
<td>7</td>
<td>12.7</td>
</tr>
<tr>
<td>Social Worker</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Psychologist</td>
<td>1</td>
<td>1.8</td>
</tr>
</tbody>
</table>

A small number of the clients provided information concerning their current contact with various health care professionals (see Table 10). The highest percentage (49.0) were currently under the care of a physician, with 32.7% were in therapy with a counselor (see Table 10). Seven (12.7%) of the respondents had current contact with a psychiatrist, two (3.6) were
under the care of a social worker, and one client indicated current contact with a psychologist.

Table 11

Disabilities of the Participants (N = 74)

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>19</td>
<td>25.7</td>
</tr>
<tr>
<td>Physical</td>
<td>7</td>
<td>9.5</td>
</tr>
<tr>
<td>Learning/Physical</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>No Disabilities</td>
<td>47</td>
<td>63.5</td>
</tr>
</tbody>
</table>

The clients' self-report of disabilities revealed 19 (25.7%) who had a learning disability, seven (9.5%) with only a physical disability, and one (1.4%) with both a learning and physical disability (see Table 11). Forty-seven (63.8%) reported having no disabilities.

Table 12

Participants Currently on Medication (N = 184)

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>52</td>
<td>28.3</td>
</tr>
<tr>
<td>No</td>
<td>132</td>
<td>71.7</td>
</tr>
</tbody>
</table>
The clients were asked to indicate whether they were currently using prescribed medication. Fifty-two (28.3%) responded positively and 132 (71.7%) of the clients responded negatively (see Table 12). The type of medication being used was not recorded during the data collection phase of the study.

Table 13

Participants Current Use of Nicotine (N = 170)

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>76</td>
<td>44.7</td>
</tr>
<tr>
<td>No</td>
<td>94</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Nearly half (44.7%) of the clients indicated they were currently using nicotine on a regular basis, whereas 55.3% were not (see Table 13).
Table 14

Number of Arrests for Driving Under the Influence of Alcohol (N = 169)

<table>
<thead>
<tr>
<th>Arrests</th>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>M</td>
<td>61</td>
<td>36.1</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>40</td>
<td>23.7</td>
</tr>
<tr>
<td>1</td>
<td>M</td>
<td>40</td>
<td>23.7</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>19</td>
<td>11.2</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

A significant number of the assessment clients (40%) had been arrested for driving under the influence of alcohol (see Table 14). Fifty-nine individuals (34.9%) had been arrested once, while six clients (3.6%) had two arrests. Three male clients had been arrested three, five, and eleven times for driving under the influence of alcohol (see Table 14). A frequency comparison between males and females
showed a total of 48 male clients having prior arrests compared to 20 female clients.

Table 15

<table>
<thead>
<tr>
<th>Income</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Income</td>
<td>8</td>
<td>7.0</td>
</tr>
<tr>
<td>500-999</td>
<td>3</td>
<td>2.6</td>
</tr>
<tr>
<td>1,000-1,999</td>
<td>7</td>
<td>6.1</td>
</tr>
<tr>
<td>2,000-2,999</td>
<td>13</td>
<td>11.3</td>
</tr>
<tr>
<td>3,000-3,999</td>
<td>9</td>
<td>7.8</td>
</tr>
<tr>
<td>4,000-4,999</td>
<td>14</td>
<td>12.2</td>
</tr>
<tr>
<td>5,000-9,999</td>
<td>40</td>
<td>34.8</td>
</tr>
<tr>
<td>10,000-14,999</td>
<td>13</td>
<td>11.3</td>
</tr>
<tr>
<td>15,000 or &gt;</td>
<td>8</td>
<td>7.0</td>
</tr>
</tbody>
</table>

The assessment clients were asked to indicate their gross annual income, ranging from no income to $15,000 or more per year. Thirty-one clients (27.0%) earned between zero and $2,999 per year, 63 (54.8%) earned between $3,000 and $9,999 per year, while 21 clients (18.3%) had an annual income greater than $10,000 (see Table 15).
Table 16

Gross Income of Participants Family (N = 80)

<table>
<thead>
<tr>
<th>Income</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Income</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>1 - 9,999</td>
<td>9</td>
<td>11.3</td>
</tr>
<tr>
<td>10,000-19,999</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>20,000-29,999</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>30,000-39,999</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>40,000-49,999</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>50,000-59,999</td>
<td>3</td>
<td>3.8</td>
</tr>
<tr>
<td>60,000-69,999</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>70,000-79,999</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>80,000 or &gt;</td>
<td>10</td>
<td>12.5</td>
</tr>
</tbody>
</table>

In addition, the clients estimated their gross annual family income. Fifteen families (18.8%) earned between zero and $19,999, 26 (32.6%) families had an annual income between $20,000 and $39,999, 29 (36.4%) families earned between $40,000 and $79,999, and 10 (12.5%) families exceeded an annual income of $80,000 (see Table 16).
Table 17

Number of Alcohol or Drug Convictions (N = 155)

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>77</td>
<td>49.7</td>
</tr>
<tr>
<td>Juvenile</td>
<td>52</td>
<td>33.5</td>
</tr>
<tr>
<td>Adult</td>
<td>18</td>
<td>11.6</td>
</tr>
<tr>
<td>Juvenile &amp; Adult</td>
<td>8</td>
<td>5.2</td>
</tr>
</tbody>
</table>

One-half (50.3%) of the assessment clients had a prior alcohol or other drug conviction. Fifty-two clients (33.5%) received only a juvenile conviction, 18 clients (11.6%) had been convicted only as an adult, and eight (5.2%) had received both a juvenile and an adult conviction (see Table 17).
Table 18

Prior Medical Problems Reported by Participants (N=171)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td>84</td>
<td>49.1</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>61</td>
<td>35.7</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>12</td>
<td>7.0</td>
</tr>
<tr>
<td>Seizures</td>
<td>4</td>
<td>2.3</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>1</td>
<td>0.6</td>
</tr>
</tbody>
</table>

One hundred and seventy-one of the clients completed a checklist of prior medical problems (see Table 18). Eighty-four (49.1%) of the respondents had experienced headaches, 61 (35.7%) had experienced withdrawal as a consequence of their chemical use, and 12 (7.0%) indicated malnutrition as a prior medical problem. Other medical problems experienced by the study sample included seizures (2.3%), hypoglycemia (1.8%), diabetes (1.2%), cirrhosis (0.6%), and hepatitis (0.6%) (see Table 18).
Each assessment client was given the opportunity to document a variety of personal experiences resulting from their alcohol or drug use. Table 19 represents a comparative analysis of the experiences of those clients eventually diagnosed with alcohol abuse and the clients with an alcohol dependence diagnosis. Passouts were the highest frequency experience for...
both the alcohol abuse sample (28, 20.0%) and the alcohol dependence sample (57, 40.7%). Blackouts were experienced by 17 (12.1%) of the alcohol abuse sample and by 54 (38.6%) of the alcohol dependence sample. Sixteen (11.4%) alcohol abuse clients experienced a loss of control, while 45 (32.1%) of the alcohol dependence sample experienced a loss of control resulting from their chemical use. Sixteen (11.4%) clients with an alcohol abuse diagnosis experienced an increase in their tolerance compared to 53 (37.9%) of the alcohol dependence sample.

Another experience reported by the alcohol abuse sample was the shakes (5, 3.6%). Thirty-two (22.9%) of the alcohol dependence sample experienced the shakes. None of the remaining experiences were indicated by the alcohol abuse sample (e.g., alcohol or drug treatment, delirium tremens, overdose, and medical detoxification). Fifteen (10.7%) of the alcohol dependence sample experienced an alcohol or other drug treatment program, eight (5.7%) with delirium tremens, seven (5.0%) experienced an overdose, and six (4.3%) experienced a medical detoxification (see Table 19).
A ten-point Likert scale (ranging from 0 indicating "No Risk" to 9 indicating "Very High Risk") was utilized to assess the current suicide or homicide risk of each assessment client (see Table 20). The vast majority (85.5%) of the respondents self-reported "No Risk" or "Very Low Risk" of suicide or homicide. Twenty-one (11.7%) clients self-reported a "Low-Medium" to "High-Medium" risk of harming themselves or someone else. Only 5 (2.8%) of the respondents assessed themselves within the "High" to "Very High" risk of suicide or homicide (see Table 20). The mean risk level of the study sample was 1.6 which falls in the low risk category.
Table 21

Number of Alcohol-Related Offenses (N = 181)

<table>
<thead>
<tr>
<th>Offenses</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>110</td>
<td>60.8</td>
</tr>
<tr>
<td>1</td>
<td>58</td>
<td>32.0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>5.5</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>0.6</td>
</tr>
</tbody>
</table>

A section of the intake form inquired about past alcohol-related offenses. The offense could have been a drinking and driving violation, a minor in possession of alcohol violation, or a contributing to the delinquency of a minor violation. Table 21 represents the frequency of these offenses. One-hundred ten clients (60.8%) had no alcohol-related offenses, 58 (32%) had one offense, and 10 (5.5%) had two offenses. One client was represented in each of the three, four, and five offense categories (see Table 21).
The assessment clients were asked several questions regarding their religious and cultural beliefs and activities. Table 22 indicates the clients' connection to a particular church affiliation, active involvement in a church, belief in a higher power, and participation in cultural activities. Of the 163 respondents, 136 (83.4%) said they were
affiliated with church, while only 57 (38.8%) indicated they were actively involved (see Table 22). A very high percentage of the clients (90.1%) said they believed in a higher power. Only 31.8% of the 85 respondents checked "Yes" to whether they participated in cultural activities (see Table 22).

Table 23

Parents Use of Chemicals

<table>
<thead>
<tr>
<th>Parent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father (n = 105)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuser/Chemical Dependent</td>
<td>33</td>
<td>31.4</td>
</tr>
<tr>
<td>Non-User</td>
<td>13</td>
<td>12.4</td>
</tr>
<tr>
<td>Recovery/Past User</td>
<td>10</td>
<td>9.5</td>
</tr>
<tr>
<td>Social Drinker</td>
<td>48</td>
<td>45.7</td>
</tr>
<tr>
<td>Mother (n = 92)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuser/Chemical Dependent</td>
<td>9</td>
<td>9.6</td>
</tr>
<tr>
<td>Non-User</td>
<td>30</td>
<td>31.9</td>
</tr>
<tr>
<td>Recovery/Past User</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>Social Drinker</td>
<td>50</td>
<td>53.2</td>
</tr>
</tbody>
</table>

Information was gathered in the clinical interview regarding the client's extended family and their use of alcohol and/or other drugs. The chemical use classifications were: abuser/chemical dependent, non-user, recovery/past user, or social drinker. Table 23 indicates the chemical use of the client's father.
and mother. Thirty-three (31.4%) clients identified their father as being dependent on alcohol, while only nine (9.6%) clients identified their mother as being dependent on alcohol. Thirteen fathers and 30 mothers were viewed as non-users or abstainers of alcohol (see Table 24). Ten (9.5%) clients identified their father as a past user of alcohol or recovering from alcoholism, while only three clients (3.2%) identified their mother in the same category. Nearly half (45.7%) of the clients viewed their father as being a social drinker and over half (53.2%) of the clients identified their mother as a social drinker (see Table 23).

The same chemical use classifications were used to document the client's grandparents' use of alcohol. Table 24 indicates the client's report of 15 (30.0%) paternal grandfathers being dependent on alcohol, 19 (38.0%) as being non-users, six (12.0%) in recovery or a past user, and eight (16.0%) as being a social drinker. Forty-four clients reported three (6.4%) paternal grandmothers as alcohol dependent, 32 (68.1%) were non-users, zero (0.0%) were past users or in recovery, and nine (19.1%) as social drinkers.
Table 24 also describes the chemical use patterns of the client's maternal grandparents. Fourteen (26.4%) clients identified their maternal grandfather as being alcohol dependent, 13 (24.5%) as non-users, only five (9.4%) past users or in recovery, and 18 (34.0%) as social drinkers (see Table 24). Four clients (7.7%) reported their maternal grandmother as being alcohol dependent, 31 (59.6%) were non-users, four (7.7%) as past users or in recovery, and 10 clients (19.2%) identified their maternal grandmothers as social drinkers (see Table 24).
Table 24

Grandparents Use of Chemicals

<table>
<thead>
<tr>
<th>Grandparent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paternal Grandfather (n = 48)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuser/Chemical Dependent</td>
<td>15</td>
<td>30.0</td>
</tr>
<tr>
<td>Non-User</td>
<td>19</td>
<td>38.0</td>
</tr>
<tr>
<td>Recovery/Past User</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>Social Drinker</td>
<td>8</td>
<td>16.0</td>
</tr>
<tr>
<td><strong>Paternal Grandmother (n = 44)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuser/Chemical Dependent</td>
<td>3</td>
<td>6.4</td>
</tr>
<tr>
<td>Non-User</td>
<td>32</td>
<td>68.1</td>
</tr>
<tr>
<td>Recovery/Past User</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Social Drinker</td>
<td>9</td>
<td>19.1</td>
</tr>
<tr>
<td><strong>Maternal Grandfather (n = 50)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuser/Chemical Dependent</td>
<td>14</td>
<td>26.4</td>
</tr>
<tr>
<td>Non-User</td>
<td>13</td>
<td>24.5</td>
</tr>
<tr>
<td>Recovery/Past User</td>
<td>5</td>
<td>9.4</td>
</tr>
<tr>
<td>Social Drinker</td>
<td>18</td>
<td>34.0</td>
</tr>
<tr>
<td><strong>Maternal Grandmother (n = 49)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuser/Chemical Dependent</td>
<td>4</td>
<td>7.7</td>
</tr>
<tr>
<td>Non-User</td>
<td>31</td>
<td>59.6</td>
</tr>
<tr>
<td>Recovery/Past User</td>
<td>4</td>
<td>7.7</td>
</tr>
<tr>
<td>Social Drinker</td>
<td>10</td>
<td>19.2</td>
</tr>
</tbody>
</table>
Results and Discussion of Research Questions

The following is a presentation of the research questions and the statistical results of the discriminant function analysis used to compare the six standardized assessment instruments and the resulting substance use disorder diagnoses:

Question 1

What are the total scores on each assessment instrument (i.e., Modified-Michigan Alcoholism Screening Test, Addiction Acknowledgment Scale, and Addiction Potential Scale) as they compare to the client’s DSM-III-R diagnosis?

The 186 study participants were diagnosed with nine primary substance use disorders by the counseling center’s chemical dependency counselors. The most frequent diagnosis was alcohol dependence (N = 78). The second most frequent diagnosis was alcohol abuse (N = 76). The 32 remaining clients in the study sample were diagnosed with other substance use disorders, including cannabis dependence, psychoactive substance dependence, cannabis abuse, hallucinogen abuse, psychoactive substance abuse, deferred diagnosis, and no diagnosis. The statistical analyses will focus
on the alcohol abuse and alcohol dependence diagnoses and their relationship to the instrument scores.

Table 25

Means, Standard Deviations for Modified-Michigan Alcoholism Screening Test, Addiction Acknowledgment Scale, Addiction Potential Scale for Alcohol Abuse (N = 76) and Alcohol Dependence (N = 78) Diagnoses

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Alcohol Abuse M</th>
<th>SD</th>
<th>Alcohol Dependence M</th>
<th>SD</th>
<th>F (1, 152)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-MAST</td>
<td>5.66</td>
<td>3.77</td>
<td>20.10</td>
<td>13.99</td>
<td>75.68 **</td>
</tr>
<tr>
<td>AAS</td>
<td>47.97</td>
<td>9.10</td>
<td>64.26</td>
<td>14.09</td>
<td>72.19 **</td>
</tr>
<tr>
<td>APS</td>
<td>52.92</td>
<td>10.11</td>
<td>58.06</td>
<td>11.04</td>
<td>9.07 *</td>
</tr>
</tbody>
</table>

Note. Significant at the .017 level, as required by the Bonferroni adjustment.

M-MAST reported in raw scores; AAS and APS reported in t-scores.

* p < .017. ** p < .001.

The means and standard deviations for the M-MAST by diagnosis are presented in Table 25. The mean M-MAST score for the alcohol abuse clients was 5.66 (N = 76). The alcohol dependence clients had a mean score of 20.10 (N = 78). A significant MANOVA was
obtained between the M-MAST scores and the alcohol abuse and dependence diagnoses, $F(1, 152) = 75.68$, $p < .001$ (see Table 26).

The mean AAS t-score for clients with an alcohol abuse diagnosis was 47.97 ($N = 76$). The alcohol dependence clients had a t-score mean of 64.26 ($N = 78$). Tables 25 and 26 present the MANOVA results indicating a significant difference between mean scores for alcohol abuse clients and alcohol dependence clients, $F(1, 152) = 72.19$, $p < .001$.

Table 25 indicates the mean APS t-scores for the alcohol abuse and alcohol dependence clients. The alcohol abuse clients had a mean t-score of 52.92 and a mean t-score of 58.06 for alcohol dependence clients. The alcohol abuse sample and alcohol dependence sample did differ on their APS scores, $F(1, 152) = 9.07$, $p < .017$ (see Table 26).
<table>
<thead>
<tr>
<th>Instrument</th>
<th>M-MAST Raw Score</th>
<th>AAS T-Score</th>
<th>APS T-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyp. SS</td>
<td>8031.61</td>
<td>10205.67</td>
<td>1018.19</td>
</tr>
<tr>
<td>Error SS</td>
<td>16130.28</td>
<td>21488.81</td>
<td>17050.20</td>
</tr>
<tr>
<td>Hyp. MS</td>
<td>106.12</td>
<td>141.37</td>
<td>112.17</td>
</tr>
<tr>
<td>Error MS</td>
<td>75.68</td>
<td>72.19</td>
<td>9.08</td>
</tr>
</tbody>
</table>

Note: Significant at .017 level, as required by Bonferroni adjustment.

* $P < .017$  ** $P < .001$
Question 2

What are the subscale scores on the three forms of the SASSI as they compare to the client’s DSM-III-R diagnosis?

A breakdown of Adolescent SASSI subscale scores by diagnosis is presented in Table 27. The alcohol abuse sample (N = 70) had a mean score of 4.7 for the Alcohol scale, 0.84 for the Drug scale, 6.5 for the Obvious Attributes scale, 1.4 for the Subtle Attributes scale, 7.6 for the Defensiveness scale, 3.1 for the Defensive Dependent vs. Defensive Non Dependent scale, 4.5 for the Correctional scale, and 0.14 for the Random Answering Pattern scale (see Table 27).

The alcohol dependence sample (N = 47) had the following mean scores: Alcohol (M = 11.8), Drug (M = 4.1), Obvious Attributes (M = 10.1), Subtle Attributes (M = 3.2), Defensiveness (M = 5.4), Defensive Dependent vs. Defensive Non Dependent (M = 4.8), Correctional (M = 6.3), and Random Answering Pattern (M = 0.2).
Table 27  
Means, Standard Deviations for Adolescent SASSI for Alcohol Abuse (N = 70) and Alcohol Dependence (N = 47) Diagnoses

<table>
<thead>
<tr>
<th>Adolescent SASSI Subscales</th>
<th>Alcohol Abuse</th>
<th>Alcohol Dependence</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>F (1, 115)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVA</td>
<td>4.7</td>
<td>2.6</td>
<td>11.8</td>
<td>6.6</td>
<td>65.36</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>FVOD</td>
<td>0.8</td>
<td>3.5</td>
<td>4.1</td>
<td>6.9</td>
<td>11.32</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>OAT</td>
<td>6.5</td>
<td>3.3</td>
<td>10.1</td>
<td>3.7</td>
<td>29.36</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>SAT</td>
<td>1.4</td>
<td>4.0</td>
<td>3.2</td>
<td>2.1</td>
<td>8.52</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>DEF</td>
<td>7.6</td>
<td>4.3</td>
<td>5.4</td>
<td>2.8</td>
<td>9.41</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>DEF2</td>
<td>3.1</td>
<td>4.0</td>
<td>4.8</td>
<td>2.3</td>
<td>6.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COR</td>
<td>4.5</td>
<td>2.0</td>
<td>6.3</td>
<td>2.4</td>
<td>18.68</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>RAP</td>
<td>0.1</td>
<td>0.4</td>
<td>0.2</td>
<td>0.4</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Significant at the .006 level, as required by the Bonferroni adjustment.

* p < .006. ** p < .001.

Adolescent SASSI Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs Defensive Non Dependent (DEF2)
- Correctional (COR).
- Random Answering Pattern (RAP).
The MANOVA results are presented in Tables 27 and 28. The most significant differences between the mean scores of alcohol abuse and alcohol dependence clients were found in the Alcohol scale, $F(1, 115) = 65.36, p < .001$, the Obvious Attributes scale, $F(1, 115) = 29.36, p < .001$, and the Correctional scale, $F(1, 115) = 18.68, p < .001$. Significant differences were also found in the Drug scale, $F(1, 115) = 11.32, p < .006$, the Subtle Attributes scale $F(1, 115) = 8.52, p < .006$, and the Defensiveness scale, $F(1, 115) = 9.41, p < .006$. There were no significant differences between the mean scores by diagnoses on the Defensive Dependent vs. Defensive Non Dependent scale, $F(1, 115) = 6.57$, and the Random Answering Pattern scale, $F(1, 115) = 0.14$ (see Table 28).
### Table 28

**MANOVA Results of Adolescent SASSI**

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Hyp. SS</th>
<th>Error SS</th>
<th>Hyp. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVA</td>
<td>1421.03</td>
<td>2500.20</td>
<td>1421.03</td>
<td>21.74</td>
<td>65.36</td>
<td>.000 **</td>
</tr>
<tr>
<td>FVOD</td>
<td>299.49</td>
<td>3041.74</td>
<td>299.49</td>
<td>26.45</td>
<td>11.32</td>
<td>.001 **</td>
</tr>
<tr>
<td>OAT</td>
<td>355.68</td>
<td>1393.10</td>
<td>355.68</td>
<td>12.11</td>
<td>29.36</td>
<td>.000 **</td>
</tr>
<tr>
<td>SAT</td>
<td>99.06</td>
<td>1336.50</td>
<td>99.06</td>
<td>11.62</td>
<td>8.52</td>
<td>.004 *</td>
</tr>
<tr>
<td>DEF</td>
<td>133.85</td>
<td>1635.96</td>
<td>133.85</td>
<td>14.23</td>
<td>9.41</td>
<td>.003 *</td>
</tr>
<tr>
<td>DEF2</td>
<td>77.36</td>
<td>1353.71</td>
<td>77.36</td>
<td>11.77</td>
<td>6.57</td>
<td>.012</td>
</tr>
<tr>
<td>COR</td>
<td>85.92</td>
<td>528.85</td>
<td>85.92</td>
<td>4.60</td>
<td>18.68</td>
<td>.000 **</td>
</tr>
<tr>
<td>RAP</td>
<td>0.02</td>
<td>17.20</td>
<td>0.20</td>
<td>0.15</td>
<td>0.14</td>
<td>.708</td>
</tr>
</tbody>
</table>

**Note.** Significant at .006 level, as required by Bonferroni adjustment.

* p < .006. ** p < .001.

**Adolescent SASSI Subscales:**

- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs Defensive Non Dependent (DEF2).
- Correctional (COR).
- Random Answering Pattern (RAP).
The SASSI-2 subscale scores were cross-tabulated with the alcohol abuse and alcohol dependence diagnoses (see Table 29). The subscale scores for the alcohol abuse sample (N = 9) were as follows: Alcohol (M = 2.8), Drug (M = 0.11), Obvious Attributes (M = 2.9), Subtle Attributes (M = 2.8), Defensiveness (M = 9.1), Supplemental Addiction Measure (M = 4.8), Family vs. Controls (M = 9.1), and Correctional (M = 2.0).

The alcohol dependence sample (N = 9) for the SASSI-2 had a mean score of 8.9 on the Alcohol scale, 3.0 on the Drug scale, 8.1 on the Obvious Attributes scale, 4.1 on the Subtle Attributes scale, 5.8 on the Defensiveness scale, 7.1 on the Supplemental Addiction Measure, 7.7 on the Family vs. Controls scale, and 6.2 on the Correctional scale (see Table 29).
Table 29

Means, Standard Deviations for SASSI-2 for Alcohol Abuse (N = 9) and Alcohol Dependence Diagnoses (N = 9)

<table>
<thead>
<tr>
<th>SASSI-2 Subscales</th>
<th>Alcohol Abuse</th>
<th>Alcohol Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>FVA</td>
<td>2.8</td>
<td>1.9</td>
</tr>
<tr>
<td>FVOD</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>OAT</td>
<td>2.9</td>
<td>2.0</td>
</tr>
<tr>
<td>SAT</td>
<td>2.8</td>
<td>1.1</td>
</tr>
<tr>
<td>DEF</td>
<td>9.1</td>
<td>2.1</td>
</tr>
<tr>
<td>SAM</td>
<td>4.8</td>
<td>1.3</td>
</tr>
<tr>
<td>FAM</td>
<td>9.1</td>
<td>2.7</td>
</tr>
<tr>
<td>COR</td>
<td>2.0</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Note. Significant at the .006 level, as required by the Bonferroni adjustment.

* $P < .006$.

Adult SASSI-2 Subscales:

- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Supplemental Addiction Measure (SAM).
- Family vs. Controls (FAM).
- Correctional (COR).
A MANOVA was performed to examine the differences between mean scores of alcohol abuse clients and alcohol dependence clients. The MANOVA results are presented in Tables 29 and 30. Significant differences were found on the Obvious Attributes scale, $F(1, 16) = 14.25, p < .006$, the Defensiveness scale, $F(1, 16) = 10.20, p < .006$, and the Correctional scale, $F(1, 16) = 12.16, p < .006$. The mean scores did not differ significantly on the Drug scale, $F(1, 16) = 2.32$, the Subtle Attributes scale, $F(1, 16) = 4.20$, the Supplemental Addiction Measure scale, $F(1, 16) = 5.56$, and the Family vs. Controls scale $F(1, 16) = 1.58$. (see Table 30).
Table 30
MANOVA Results of SASSI-2

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Hyp. SS</th>
<th>Error SS</th>
<th>Hyp. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVA</td>
<td>168.06</td>
<td>322.44</td>
<td>168.06</td>
<td>20.15</td>
<td>8.34</td>
<td>.011</td>
</tr>
<tr>
<td>FVOD</td>
<td>37.56</td>
<td>258.89</td>
<td>37.56</td>
<td>16.18</td>
<td>2.32</td>
<td>.147</td>
</tr>
<tr>
<td>OAT</td>
<td>122.72</td>
<td>137.78</td>
<td>122.72</td>
<td>8.61</td>
<td>14.25</td>
<td>.002 *</td>
</tr>
<tr>
<td>SAT</td>
<td>8.00</td>
<td>30.44</td>
<td>8.00</td>
<td>1.90</td>
<td>4.20</td>
<td>.057</td>
</tr>
<tr>
<td>DEF</td>
<td>50.00</td>
<td>78.44</td>
<td>50.00</td>
<td>4.90</td>
<td>10.20</td>
<td>.006 *</td>
</tr>
<tr>
<td>SAM</td>
<td>24.50</td>
<td>70.44</td>
<td>24.50</td>
<td>4.40</td>
<td>5.56</td>
<td>.031</td>
</tr>
<tr>
<td>FAM</td>
<td>9.39</td>
<td>94.89</td>
<td>9.39</td>
<td>5.93</td>
<td>1.58</td>
<td>.226</td>
</tr>
<tr>
<td>COR</td>
<td>80.22</td>
<td>105.56</td>
<td>80.22</td>
<td>6.60</td>
<td>12.16</td>
<td>.003 *</td>
</tr>
</tbody>
</table>

Note. Significant at .006 level, as required by Bonferroni adjustment.

* P < .006.  ** P <. 001.

SASSI-2 Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Supplemental Addiction Measure (SAM).
- Family vs. Controls (FAM).
- Correctional (COR).
Table 31 indicates the breakdown of the means and standard deviations for the Adult SASSI by diagnosis. The alcohol abuse sample (N = 65) had a mean score of 3.9 on the Alcohol scale, 0.9 on the Drug scale, 5.2 on the Obvious Attributes scale, 3.2 on the Subtle Attributes scale, 6.7 on the Defensiveness scale, 6.6 on the Defensive Dependent vs. Defensive Non Dependent scale, 4.6 on the Alcohol vs. Drugs scale, and 8.7 on the Family vs. Controls scale.

The mean scores for the alcohol dependent sample (N = 66) were higher on six of the eight subscales compared to the alcohol abuse sample (see Table 31). The mean score for the Alcohol scale was 14.2, 7.9 for the Drug scale, 8.9 for the Obvious Attributes scale, 4.5 for the Subtle Attributes scale, 5.0 on the Defensiveness scale, 10.0 on the Defensive Dependent vs. Defensive Non Dependent scale, 4.9 on the Alcohol vs. Drugs scale, and 7.5 on the Family vs. Controls scale (see Table 31).
### Table 31

**Means, Standard Deviations for Adult SASSI for Alcohol Abuse (N = 65) and Alcohol Dependence (N = 66) Diagnoses**

<table>
<thead>
<tr>
<th>Adult SASSI Subscales</th>
<th>Alcohol Abuse</th>
<th>Alcohol Dependence</th>
<th>F (1, 129)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>FVA</td>
<td>3.9</td>
<td>2.8</td>
<td>14.2</td>
</tr>
<tr>
<td>FVOD</td>
<td>0.9</td>
<td>3.7</td>
<td>7.9</td>
</tr>
<tr>
<td>OAT</td>
<td>5.2</td>
<td>2.7</td>
<td>8.9</td>
</tr>
<tr>
<td>SAT</td>
<td>3.2</td>
<td>1.3</td>
<td>4.5</td>
</tr>
<tr>
<td>DEF</td>
<td>6.7</td>
<td>2.6</td>
<td>5.0</td>
</tr>
<tr>
<td>DEF2</td>
<td>6.6</td>
<td>2.9</td>
<td>10.0</td>
</tr>
<tr>
<td>ALD</td>
<td>4.6</td>
<td>1.3</td>
<td>4.9</td>
</tr>
<tr>
<td>FAM</td>
<td>8.7</td>
<td>1.9</td>
<td>7.5</td>
</tr>
</tbody>
</table>

**Note.** Significant at the .006 level, as required by the Bonferroni adjustment.

* p < .006. ** p < .001.

Adult SASSI Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs Defensive Non Dependent (DEF2).
- Alcohol vs. Drugs (ALD).
- Family vs. Controls (FAM).
The MANOVA results are presented in Tables 31 and 32. Highly significant differences were found in the mean scores on the Alcohol scale, $F(1, 129) = 81.72$, $p < .001$, the Drug scale, $F(1, 129) = 25.50$, $p < .001$, the Obvious Attributes scale, $F(1, 129) = 45.98$, $p < .001$, the Subtle Attributes scale, $F(1, 129) = 29.83$, $p < .001$, the Defensiveness scale, $F(1, 129) = 12.91$, $p < .001$, and the Defensive Dependent vs. Defensive Non Dependent scale, $F(1, 129) = 42.23$, $p < .001$. The mean scores on the Family vs. Controls scale also differed significantly, $F(1, 129) = 10.39$, $p < .006$. No significant differences were found in the Alcohol vs. Drugs scale, $F(1, 129) = 2.22$ (see Table 32).
Table 32

MANOVA Results of Adult SASSI

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Hyp. SS</th>
<th>Error MS</th>
<th>Hyp. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVA</td>
<td>3396.06</td>
<td>5360.87</td>
<td>3396.06</td>
<td>41.56</td>
<td>81.72</td>
<td>.000 **</td>
</tr>
<tr>
<td>FVOD</td>
<td>1619.22</td>
<td>8887.20</td>
<td>1619.12</td>
<td>68.89</td>
<td>23.50</td>
<td>.000 **</td>
</tr>
<tr>
<td>OAT</td>
<td>443.25</td>
<td>1243.56</td>
<td>443.25</td>
<td>9.64</td>
<td>45.98</td>
<td>.000 **</td>
</tr>
<tr>
<td>SAT</td>
<td>56.64</td>
<td>244.88</td>
<td>56.64</td>
<td>1.90</td>
<td>29.84</td>
<td>.000 **</td>
</tr>
<tr>
<td>DEF</td>
<td>87.17</td>
<td>871.08</td>
<td>87.17</td>
<td>6.75</td>
<td>12.91</td>
<td>.000 **</td>
</tr>
<tr>
<td>DEF2</td>
<td>382.05</td>
<td>1166.92</td>
<td>382.05</td>
<td>9.05</td>
<td>42.23</td>
<td>.000 **</td>
</tr>
<tr>
<td>ALD</td>
<td>4.12</td>
<td>239.54</td>
<td>4.12</td>
<td>1.87</td>
<td>2.22</td>
<td>.139</td>
</tr>
<tr>
<td>FAM</td>
<td>41.92</td>
<td>520.58</td>
<td>41.92</td>
<td>4.04</td>
<td>10.39</td>
<td>.002 *</td>
</tr>
</tbody>
</table>

Note. Significant at .006 level, as required by Bonferroni adjustment.

* p < .006. ** p < .001.

Adult SASSI Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs Defensive Non Dependent (DEF2).
- Alcohol vs. Drugs (ALD).
- Family vs. Controls (FAM).
Question 3

Which instrument best predicts the client's diagnosis of alcohol abuse or alcohol dependence on the basis of scores on the Modified-Michigan Alcoholism Screening Test, Addiction Acknowledgment Scale, Addiction Potential Scale, Adolescent SASSI, Adult SASSI, and Adult SASSI-2?

A discriminant function analysis was utilized with each instrument separately as well as a variety of linear combinations of the six instruments (see Tables 33-42).
### Table 33

**Classification Accuracy, Discriminant Function Analysis - Modified-Michigan Alcoholism Screening Test**

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol Abuse</td>
<td>76</td>
<td>71</td>
<td>93.4</td>
<td>5</td>
<td>6.6</td>
</tr>
<tr>
<td>Alcohol Dependence</td>
<td>78</td>
<td>24</td>
<td>30.8</td>
<td>54</td>
<td>69.2</td>
</tr>
</tbody>
</table>

**Note.** 81.2% of "grouped" cases were correctly classified.

The M-MAST correctly classified 93.4% of the alcohol abuse sample and misclassified 6.6% (see Table 33). The M-MAST correctly classified 69.2% of the alcohol dependence sample and misclassified 30.8%. The M-MAST correctly classified 81.2% of the two diagnostic categories.
Table 34
Classification Accuracy, Discriminant Function Analysis - Addiction Acknowledgment Scale

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>Predicted Group Membership</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(1) Alcohol Abuse</td>
<td>(2) Alcohol Dependence</td>
<td></td>
</tr>
<tr>
<td>(1) Alcohol Abuse</td>
<td>76</td>
<td>57</td>
<td>75.0</td>
<td>19</td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>78</td>
<td>19</td>
<td>24.4</td>
<td>59</td>
</tr>
</tbody>
</table>

Note. 75.3% of "grouped" cases were correctly classified.

The AAS correctly classified 75.0% of the alcohol abuse sample (N = 76) and misclassified 25.0% (see Table 34). The AAS correctly classified 75.6% of the alcohol dependence sample (N = 78) and misclassified 24.4%. The percent of grouped cases which were correctly classified was 75.3%. 
Table 35

Classification Accuracy, Discriminant Function Analysis - Addiction Potential Scale

<table>
<thead>
<tr>
<th>Predicted Group Membership</th>
<th>Alcohol Abuse</th>
<th>Alcohol Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>76</td>
<td>42</td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>78</td>
<td>31</td>
</tr>
</tbody>
</table>

Note. 57.8% of "grouped" cases were correctly classified.

The APS correctly classified 55.3% of the alcohol abuse sample and misclassified 44.7% (see Table 35). The APS did slightly better in correctly classifying 60.3% of the alcohol dependence sample, while misclassifying 39.7%. The overall classification rate for both diagnoses was 57.8% for the APS (see Table 35).
Question 4

Which combination of instruments best predicts the diagnosis of alcohol abuse or alcohol dependence on the basis of scores on the Modified-Michigan Alcoholism Screening Test, Addiction Acknowledgment Scale, Addiction Potential Scale, Adolescent SASSI, Adult SASSI, and Adult SASSI-2?

The linear composite of the MAST, AAS, and APS correctly classified 92.2% of the alcohol abuse sample and misclassified 7.9% (see Table 36). The M-MAST, AAS, and APS correctly classified 69.2% of the alcohol dependence clients and misclassified 30.8%. The overall classification rate for both diagnoses was 80.5% (see Table 36).
### Table 36

**Classification Accuracy, Discriminant Function Analysis - M-MAST, AAS, & APS**

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>Alcohol Abuse</th>
<th>Alcohol Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>76</td>
<td>70</td>
<td>92.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>78</td>
<td>24</td>
<td>30.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>54</td>
</tr>
</tbody>
</table>

**Note.** 80.5% of "grouped" cases were correctly classified.

Modified-Michigan Alcoholism Screening Test (M-MAST).

**MMPI-2 Subscales:**

- Addiction Acknowledgment Scale (AAS).
- Addiction Potential Scale (APS).
Table 37

Classification Accuracy, Discriminant Function Analysis - Adolescent SASSI Subscales

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>Alcohol Abuse</th>
<th>Alcohol Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>70</td>
<td>68</td>
<td>97.1</td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>47</td>
<td>17</td>
<td>36.2</td>
</tr>
</tbody>
</table>

Note. 83.8% of "grouped" cases were correctly classified.

Adolescent SASSI Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs Defensive Non Dependent (DEF2).
- Correctional (COR).
- Random Answering Pattern (RAP).
The linear composite of the Adolescent SASSI subscales correctly classified 97.1% of the alcohol abuse sample and misclassified 2.9% (see Table 37). The same linear composite correctly classified 63.8% of the alcohol dependence sample and misclassified 36.2%. The Adolescent SASSI correctly classified 83.8% of the "grouped" cases when combining the alcohol abuse and alcohol dependence diagnoses (see Table 37).
Table 38
Classification Accuracy, Discriminant Function Analysis - SASSI-2 Subscales

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>Alcohol Abuse</th>
<th>Alcohol Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>9</td>
<td>8 88.9</td>
<td>1 11.1</td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>9</td>
<td>1 11.1</td>
<td>8 88.9</td>
</tr>
</tbody>
</table>

Note. 88.9% of "grouped" cases were correctly classified.

SASSI-2 Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Supplemental Addiction Measure (SAM).
- Family vs Controls (FAM).
- Correctional (COR).
The SASSI-2 subscales correctly classified 88.9% of the alcohol abuse clients and misclassified 11.1% (see Table 38). Although 26 clients completed the SASSI-2, only 18 cases were included in the analysis since the remaining eight cases had missing or out-of-range group codes. The SASSI-2 correctly classified 89.9% of the alcohol dependence sample and misclassified 11.1% (see Table 38). The overall classification rate for both diagnoses was 88.9%. These data could be interpreted with caution since there were a small number of cases included in the discriminant function analysis.
Table 39

Classification Accuracy, Discriminant Function

Analysis - Adult SASSI Subscales

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>65</td>
<td>61</td>
<td>93.8</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>66</td>
<td>20</td>
<td>30.3</td>
<td>46</td>
<td>69.7</td>
</tr>
</tbody>
</table>

Note. 81.7% of "grouped" cases were correctly classified.

Adult SASSI Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs Defensive Non Dependent (DEF2).
- Alcohol vs Drug (ALD).
- Family vs Controls (FAM).
The Adult SASSI subscales accurately classified 93.8% of the alcohol abuse clients and misclassified only 6.2% (see Table 39). Almost 70% of the alcohol dependence sample was correctly classified, while 30% was misclassified. When combining the two diagnostic categories, the Adult SASSI correctly classified 81.7% of the "grouped" cases (see Table 39).
Table 40

Classification Accuracy, Discriminant Function Analysis - M-MAST, AAS, APS, & Adolescent SASSI

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>n</th>
<th>%</th>
<th>(1) Alcohol Abuse</th>
<th>n</th>
<th>%</th>
<th>(2) Alcohol Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>70</td>
<td>67</td>
<td>95.7</td>
<td>3</td>
<td>4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>47</td>
<td>15</td>
<td>31.9</td>
<td>32</td>
<td>68.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. 84.6% of "grouped" cases were correctly classified.

Modified-Michigan Alcoholism Screening Test (M-MAST).

MMPI-2 Subscales:
- Addiction Acknowledgment Scale (AAS).
- Addiction Potential Scale (APS).

Adolescent SASSI Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs Defensive Non Dependent (DEF2).
- Correctional (COR).
- Random Answering Pattern (RAP).
A linear composite of the M-MAST, AAS, APS, and the Adolescent SASSI subscales correctly classified 95.7% of the alcohol abuse sample (see Table 40) and misclassified 4.3%. A lower percentage (68.1%) of the alcohol dependence sample was correctly classified, while 31.9% was misclassified. A composite of 84.6% of the "grouped" cases were correctly classified into the group membership of alcohol abuse or alcohol dependence.
Table 41

Classification Accuracy, Discriminant Function

Analysis - M-MAST, AAS, APS, & SASSI-2

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>Alcohol Abuse</th>
<th>%</th>
<th>Alcohol Dependence</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>9</td>
<td>9</td>
<td>100.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>9</td>
<td>0</td>
<td>0.0</td>
<td>9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. 100.0% of "grouped" cases were correctly classified.

Modified-Michigan Alcoholism Screening Test (M-MAST).

MMPI-2 Subscales:
- Addiction Acknowledgment Scale (AAS).
- Addiction Potential Scale (APS).

SASSI-2 Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Supplemental Addiction Measure (SAM).
- Family vs. Controls (FAM).
- Correctional (COR).
The linear composite of the M-MAST, AAS, APS, and the SASSI-2 predicted the group membership of all 18 cases (100.0%) of alcohol abuse and alcohol dependence (see Table 41). Once again, eight cases were excluded from the analysis due to missing or out-of-range group codes. The predictor variables (MAST, AAS, APS, & SASSI-2) correctly classified 100.0% of the "grouped" cases when combining the two diagnostic categories (see note in Table 41). The small number of cases included in this discriminant analysis will diminish the significance of the perfect correct classification rate achieved with this linear combination of instruments.
Table 42
Classification Accuracy, Discriminant Function Analysis - M-MAST, AAS, APS, & Adult SASSI

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Cases</th>
<th>(1) Alcohol Abuse</th>
<th></th>
<th>(2) Alcohol Dependence</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Alcohol Abuse</td>
<td>65</td>
<td>59  90.8</td>
<td>6</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td>(2) Alcohol Dependence</td>
<td>66</td>
<td>16  24.2</td>
<td>50</td>
<td>75.8</td>
<td></td>
</tr>
</tbody>
</table>

Note. 83.2% of "grouped" cases were correctly classified.

Modified-Michigan Alcoholism Screening Test (M-MAST).

MMPI-2 Subscales:
- Addiction Acknowledgment Scale (AAS).
- Addiction Potential Scale (APS).

Adult SASSI Subscales:
- Alcohol (FVA).
- Drug (FVOD).
- Obvious Attributes (OAT).
- Subtle Attributes (SAT).
- Defensiveness (DEF).
- Defensive Dependent vs. Defensive Non Dependent (DEF2).
- Alcohol vs. Drug (ALD).
- Family vs. Controls (FAM).
The predictor variables of the M-MAST, AAS, APS, and the Adult SASSI subscales correctly classified 90.8% of the alcohol abuse clients and misclassified 9.2% (see Table 42). The same linear composite of variables correctly classified 75.8% of the alcohol dependence clients and misclassified 24.2%. The overall classification rate for the two diagnoses was 83.2% (see Table 42).
Chapter V
Summary, Discussion, and Recommendations

The purpose of Chapter V is to: (a) provide a summary of the study; (b) state conclusions and discuss implications which can be drawn from the results; (c) describe the limitations of this study; and (d) present recommendations for further related research based upon the findings.

Summary

The intent of this study was to explore a currently existing diagnostic structure to determine the most effective protocol for diagnosing substance use disorders in a college student population. Specifically, the purposes of the research were to:

1. Compare the scores on Modified-Michigan Alcoholism Screening Test (M-MAST), Addiction Acknowledgment Scale (AAS), and Addiction Potential Scale (APS) to the client’s DSM-III-R diagnosis.

2. Compare the scores on the three forms of the Substance Abuse Subtle Screening Inventory (Adolescent SASSI, Adult SASSI, or Adult SASSI-2) to the client’s DSM-III-R diagnosis.
3. Determine which instrument (M-MAST, AAS, APS, Adolescent SASSI, Adult SASSI, or Adult SASSI-2) was the best predictor for diagnosing alcohol abuse or alcohol dependence in a college student counseling center client population.

4. Determine which combination of instruments was the best predictor for diagnosing alcohol abuse or alcohol dependence in a college student counseling center client population.

To achieve these purposes data were collected from a sample of drug and alcohol clients who had completed an assessment protocol at a student counseling center at a small, comprehensive university located in the midwest. Out of a population of 365 client files, a sample of 186 useable clients files were included in the study. The clients completed several self-report assessment instruments, including the Modified-Michigan Alcoholism Screening Test (Selzer, 1971), two MMPI-2 subscales (Addiction Acknowledgment Scale and Addiction Potential Scale, Weed et al., 1992), and at least one of the three forms of the Substance Abuse Subtle Screening Inventory (Adolescent Form, Adult Form, or Adult SASSI-2, Miller, 1985). A clinical interview was conducted after the assessment instruments were completed and scored. The assessment protocol
culminated in a DSM-III-R diagnosis being assigned to each client after consulting with another Level III chemical dependency counselor on staff.

The researcher's literature review included a computer search of PALS, ERIC, PSYC LIT, SOCIOFILE, MEDLINE, and DISSERTATION ABSTRACTS. The literature review was organized into the following sections: (a) Alcohol use and abuse among college students; (b) institutional efforts in drug prevention; (c) indicators of alcohol abuse and dependence; and (d) alcohol use assessment instruments used in the study.

The literature review found the drinking patterns of persons in the 18-25 year old category to be more frequent than any other age group (U.S. Department of Health and Human Services, 1991). College students have reported a consistent level of alcohol consumption for the past three decades (Pope et al., 1990), while some studies have found a slight decrease in the intensity and frequency of drinking (Eigen, 1991; Gonzalez, 1991; Meilman & Presley, 1992). While the proportion of college students who drink may have declined, there has been a shift to a heavier level of drinking (Prendergast, 1994). Binge drinking, defined as having five or more drinks in one sitting, is becoming a more
frequent activity among college students (Wechsler, 1994).

Although the vast majority of college campuses are implementing drug prevention programs, the effectiveness of these programs has been limited (Bloch & Undergleider, 1988). Gonzalez (1991) suggests that generalized alcohol awareness efforts have not been effective in increasing alcohol knowledge or reducing alcohol-related problems. Despite the discouraging results, campuses are continuing to address the issue of alcohol abuse in a variety of ways.

The literature is diverse on identifying the indicators and correlates of alcohol abuse. The most significant indicator of potential and actual alcohol abuse is gender. Male college students tend to drink alcohol more frequently and in larger quantities than female students (Brennan et al., 1986; Engs & Hanson, 1986b; Wood et al., 1992). Another indicator of alcohol abuse is ethnicity, which has been found to be correlated with increased levels of drinking, with white students consuming more alcohol than black students (Brennan et al., 1986). Academic performance also appears to be an indicator of alcohol-related problems. Students with lower grade point averages appear to be heavier drinkers (Beck & Seay, 1984;
Colleges and universities are using several methods to detect and treat alcohol and drug problems among the student population (Anderson, 1987; Dean et al., 1986; Rathbun, 1993). Gadaletto and Anderson (1986) found the campus counseling center to be the most frequently used form of assistance for students with drinking problems. Along with utilizing trained professionals, it is common for standardized assessment instruments to administered to students (Cronin, 1991; Smith, 1987).

The literature pertaining to the assessment instruments used in this study was heavily weighted toward the Michigan Alcoholism Screening Test (Selzer, 1971). The 25-item MAST questionnaire has been administered to a variety of subject groups, including alcohol dependent persons, drug abusers, psychiatric patients, general medical patients, college students, hospital personnel, and convicted felons (Hedlund & Vieweg, 1984). The MAST has been studied often with college student subjects (Hay, 1988; Lall & Schandler, 1991; Martin et al., 1990; Silber et al., 1985). The results have indicated the utility of the MAST to screen for alcohol-related problems in a college student population.
The Substance Abuse Subtle Screening Inventory (Miller, 1985) can be administered via three separate forms, the Adolescent form, the Adult form, and the SASSI-2. Each form has a combination of direct and indirect items pertaining to alcohol-related problems and is designed to be "insulated to the respondent's level of honesty or faking" (Vacc, 1994, p. 90). Miller (1985) established an accuracy rate of 90% in classifying alcohol and drug abusers with the SASSI. Klikunas (1989) was not able to replicate the accuracy rate of Miller with the SASSI correctly classifying 44.1% of the sample. The validity of the SASSI has been under scrutiny (Kerr, 1994; Vacc, 1994), with particular focus on the lack of representiveness in the population data.

The MMPI-2 subscales, the Addiction Acknowledgment Scale (AAS) and Addiction Potential Scale (APS), are the most recently developed alcohol assessment instruments utilized in this study (Butcher et al., 1991). Both subscales are embedded in the full MMPI-2 with 13 items on the AAS and 39 items on the APS. The AAS inquires directly about alcohol-related experiences, whereas the APS uses ambiguous items to assess the potential for alcohol problems to develop. Reliability and validity data pertaining to the AAS
and APS have shown them both to accurately discriminate between substance abusers and normative counterparts (Weed et al., 1992; Greene et al., 1992; Svanum et al., 1994).

Discussion and Conclusions

The demographic data indicated that of the 186 clients sampled, 66% were males and 34% were females. Over half (55%) were 19 years of age or younger, while almost 40% were between the ages of 20 and 23. Although the mean age for the study sample was 22.7, it appears that more students below the mean age were referred for an alcohol assessment more frequently than students above than the mean age.

An overwhelming percentage (90.3%) of the clients were Caucasian with the next highest percentage (6.5%) being Native American. This is consistent with the ratio of majority and minority students on this particular campus. Over one-fourth (28%) of the sample were college freshmen, while a slightly lower percentage (23%) were classified as sophomores. This supports the findings of Brennan et al. (1986) who linked drinking problems with class rank. The vast majority of the sample were single (82%) and had been referred to the student counseling center by the
residence hall staff (24%), attorneys (22%), self (17%), family/friend (10%), and several other sources. Almost one-third (31%) of the clients were living in a residence hall and over half (57%) were working part-time.

The descriptive data on the sample also indicated that 16% had previously completed an alcohol or drug treatment program. The birth order of the study sample was evenly distributed between oldest, middle, and youngest (34%, 32%, and 29% respectively), with a small percentage (5%) being an only child in their family of origin. These results suggest that birth order may be highly correlated with significant problems with alcohol. Sixty-eight (40%) clients had a prior arrest for driving under the influence of alcohol. Fifty percent of the sample had either a juvenile and/or an adult conviction for alcohol or drugs.

Almost one-third (31%) of the father’s were identified by the client as a substance abuser or chemically dependent, while only 10% of the mother’s were similarly identified. A similar ratio was reported by the clients regarding the chemical use of their grandparents. Approximately 28% of the clients identified their grandfathers as chemically dependent, whereas only approximately 7% of the grandmothers were
identified as chemically dependent. This finding supports the results of Brown (1985) and Wright (1983) who cite family history as a correlate to alcohol abuse.

Question 1: What are the total scores on the Modified-Michigan Alcoholism Screening Test, Addiction Acknowledgment Scale and Addiction Potential Scale as they compare to the client’s DSM-III-R diagnosis?

Modified-Michigan Alcoholism Screening Test (MAST).

The results indicated a statistically significant difference between the M-MAST scores (see Tables 25 & 26) for clients diagnosed with the DSM-III-R as alcohol abuse ($M = 5.66, SD = 3.77$) and those diagnosed as alcohol dependence ($M = 20.10, SD = 13.99$). The clients diagnosed with alcohol dependence had a mean M-MAST score of 20.10, which was approximately four times greater than the mean M-MAST score of the alcohol abuse clients ($M = 5.66$), significant at $p < .001$. It appears there were more positive responses to the items which are indicative of a problem with alcohol. One plausible explanation for this inflated mean score is the number of DUI’s the client had experienced. Each DUI was
scored as a two on the M-MAST and multiple DUI’s raised the raw score total rapidly.

The high degree of variability (SD = 13.99) cannot be ignored. M-MAST scores of clients who were diagnosed as alcohol dependence were highly affected by extreme scores. These extreme scores were mostly the result of the scoring procedures used by the counseling center. Each DUI and alcohol-related arrest scored a two, therefore, persons with a history of multiple offenses scored well above the recommended cut-off score of five and accumulated a M-MAST score of 40 to 70 or even higher. These results appear to raise questions about utilizing the recommended cut-off score of five (Selzer, 1971).

The M-MAST results seem to support the findings of Mischke and Venneri (1987) who found the MAST to be the most highly correlated (r = .85) with counselor decisions regarding significant alcohol problems. On one hand, these results may indicate the M-MAST to be the instrument of choice to distinguish between a DSM-III-R diagnoses of alcohol abuse or alcohol dependence. On the other hand, the M-MAST may diagnose a client as being alcohol dependent with a raw score at or above five, yet only meet the DSM-III-R criteria for alcohol abuse rather than alcohol dependence.
Addiction Acknowledgment Scale (AAS).

The mean t-score for the alcohol abuse clients was 47.97 (N = 76). This mean score is well below the cutoff t-score of 65 as recommended by Weed et al. (1992) for distinguishing between alcohol abusers and alcohol non-abusers. This indicates a less than full agreement between the DSM-III-R criteria checklist used to diagnose alcohol abuse and the characteristics which are screened for with the AAS.

The results of the AAS indicated a mean t-score of 64.26 for those clients diagnosed with alcohol dependence (N = 78), which is less than one point below the recommended cutoff t-score of 65 (Weed et al., 1992). The AAS mean scores for alcohol dependence were significantly different than the alcohol abuse AAS scores. There appears to be greater agreement between the DSM-III-R criteria for alcohol dependence and AAS t-scores than the DSM-III-R criteria for alcohol abuse and AAS t-scores. These findings are in support of Svanum et al. (1994) who suggested the "AAS may be the most useful MMPI-based substance abuse scale" (p. 436).
Addiction Potential Scale (APS).

The mean APS t-score for the alcohol abuse clients was 52.92. The clients diagnosed with alcohol dependence had a mean t-score of 58.06, which was significantly different than the mean score for alcohol abuse. Although the MANOVA identified a significant difference, the APS does not appear to be as capable of identifying clients who are either abusing substances or are dependent on substances. A t-score of 65 or above on the APS indicates a significant problem with a chemical and most of the alcohol dependence clients scored considerably below the cut-off.

The mean score results appear to indicate the APS to not effectively detect those persons who were diagnosed as alcohol abuse using the DSM-III-R criteria. As Svanum et al. (1994) stated, "our results with the APS, continue to suggest at least uneven if not poor ability to identify substance-dependent persons" (p. 436). If the APS is intended to detect the potential to develop an addiction, then the results should be fairly equivalent to the AAS. The APS did not achieve equivalent results to the AAS, which seems to raise questions about the usefulness of the APS as a MMPI-2 alcohol subscale instrument.
Question 2: What are the scores on the three forms of the SASSI as they compare to the client's DSM-III-R diagnosis?

Adolescent SASSI Form.

One subscale, Defensiveness, had a higher mean score (M = 7.6) for alcohol abuse than alcohol dependence (M = 5.4). It appears that the alcohol abuse clients made a stronger attempt to disguise their alcohol-related problems, which only raised their scores on the Defensiveness scale. The three direct scales (Alcohol, Drug, and Obvious Attributes) indicated significant differences between the alcohol abuse and alcohol dependence diagnoses.

These data support the use of items which ask directly about alcohol and drug-related experiences. The results of the Adolescent SASSI indicated higher mean scores on all but one of the eight subscales for the alcohol dependence sample (N = 47) as compared to the mean scores of the alcohol abuse sample. Many of the alcohol abuse clients would have been classified as non-dependent utilizing the decision rules of the Adolescent SASSI (Miller, 1990), which may increase the prevalence of false negatives.
SASSI-2 Form.

Of the 26 clients who completed the SASSI-2 form, nine had a diagnosis of alcohol abuse. Following the decision rules for the SASSI-2, a client would need subscale scores which were greater than a t-score of 60 (or 85th percentile) to be classified as chemically dependent. The two subscales which approached that mark, at approximately the 85th percentile, were the Defensiveness and Family vs. Controls scales (see results in Table 33). It appears that these results may indicate a high correlation between alcohol use and college student denial and/or a desire to "fake good" to disguise the substance problem.

The small sample size (n = 18) would be a likely factor in helping to explain the reduced number of significant MANOVA's between the alcohol abuse and alcohol dependence samples. The three direct scales (i.e., Alcohol, Drug, and Obvious Attributes) indicated the most distinct separation between alcohol abuse and alcohol dependence. The direct scale results were similar to those found in the Adolescent form.
Adult SASSI Form.

The relatively low mean scores on the Adult form subscales indicate that, although 65 clients were diagnosed with alcohol abuse using the DSM-III-R, very few of these same clients would have been classified as chemically dependent with the Adult SASSI. All but one of the eight subscales resulted in significant MANOVA comparisons, with the Alcohol and Obvious Attributes scales achieving the highest F values.

Four of the eight subscale mean scores (i.e., Alcohol, Drug, Obvious Attributes, and Defensive Dependent vs. Defensive Non Dependent) were above the 85th percentile level for clients diagnosed with alcohol dependence. The Alcohol scale had a mean score of 14.2, which is two points above the minimum cutoff score needed to classify the individual as chemically dependent. It would appear that the Adult SASSI more strongly contributed to the clinical interview diagnosis of alcohol dependence, as compared to the diagnosis of alcohol abuse.
Question 3: Which instrument best predicts the client’s substance use disorder based on scores on the M-MAST, AAS, APS, Adolescent SASSI, Adult SASSI, and Adult SASSI-2?

The Modified-Michigan Alcoholism Screening Test (M-MAST).

Using discriminant function analysis to predict the participants’ group membership, the M-MAST correctly classified 71 of the 76 cases of alcohol abuse (93.4%). In contrast, the M-MAST correctly classified 69.2% of the alcohol dependence sample (N = 78). The M-MAST achieved an overall classification rate of 81.2% which was higher than the AAS (75.3%) and APS (57.8%). These findings indicate that the M-MAST may be the instrument of choice if agency resources would limit the assessment protocol to the administration of a single instrument.

The classification results of the M-MAST (81.2%) were higher than the findings of Klikunas (1989) who used the regular MAST and achieved a correct classification rate of 62% when administered to a group of alcohol dependent subjects. One possible explanation for these divergent results would be the sample population.
The Addiction Acknowledgment Scale (AAS).

The AAS correctly classified almost an identical ratio of alcohol abuse clients and alcohol dependence clients, with 75.0% of the alcohol abuse sample (N = 76) being correctly identified and 75.6% of the alcohol dependence clients (N = 78). The AAS had an overall correct classification rate of 75.3%. These results support the findings of Weed et al. (1992) who found the AAS to discriminate well between substance abusing and nonsubstance abusing samples. The comparative results of this study also support the findings of Svanum et al. (1994) who concluded that the AAS might serve as a weak substitute for the MAST.

The Addiction Potential Scale (APS).

The APS had the lowest overall correct classification rate (57.8%) of the six instruments researched in the study. The APS did slightly better at classifying the alcohol dependence sample (60.3%) as compared to the alcohol abuse sample (55.3%). The findings of this study appear to support the recommendation by Weed et al. (1992) to utilize the APS conjointly with the AAS to increase its ability to detect substance abuse problems. On the other hand,
these results seem to contraindicate the findings of Greene et al. (1992) who found the APS performed better than the AAS in discriminating between a psychiatric sample and a substance abuse sample. One possible explanation for the discrepancy between Greene's 1992 findings and this study is the makeup of the study samples. Traditional-aged college students constituted the majority of the participants in this study and no normative data has been developed for the APS which is descriptive of the college student population.

Adolescent SASSI Form.

The linear combination of the Adolescent SASSI subscales achieved a correct classification rate of 97.1% with the alcohol abuse sample (N = 70). The Adolescent SASSI correctly classified 63.8% of the alcohol dependence clients and 83.8% of the grouped diagnoses. Although the Adolescent SASSI is intended for persons between the ages of 12 and 18 (Miller, 1985), and most of the clients were older than 18, the Adolescent SASSI performed above average in distinguishing between the alcohol abuse and alcohol dependence samples. These results suggest that the Adolescent SASSI also be recommended for persons over the age of 18. A recommendation would be to investigate
the utility of the Adolescent form with adult populations.

**SASSI-2 Form.**

The SASSI-2 achieved an identical ratio of correct classifications between the alcohol abuse (N = 9) and alcohol dependence samples (N = 9), with 88.9% being correctly classified. The SASSI-2 subscales attained the highest overall classification rate for the "grouped" diagnoses at 88.9%. These results should be interpreted with caution due to the small number of cases included in the discriminant function analysis.

**Adult SASSI Form.**

The Adult SASSI subscales correctly classified 93.8% of the alcohol abuse sample (N = 65). A lower percentage of the alcohol dependence clients (69.7%) were correctly classified. Of the three SASSI forms, the Adult Form achieved the lowest overall classification rate (81.7%) when predicting the group membership of the participants. These results indicate the conservative nature of the SASSI in diagnosing a person as chemically dependent. This supports to some degree the contention of Miller (1990)
who praised the SASSI for having the lowest false alarm rate of any instrument he was aware of.

Question 4: Which combination of instruments best predicts the client's substance use disorder based on scores on the M-MAST, AAS, APS, Adolescent SASSI, Adult SASSI, and Adult SASSI-2?

The M-MAST, AAS, and APS.

The linear composite of the M-MAST, AAS, and APS correctly classified 92.1% of the alcohol abuse sample ($N = 76$). The M-MAST, AAS, and APS correctly classified a lower percentage (69.2%) of the alcohol dependence sample. The linear composite of these three instruments correctly classified 80.5% of both diagnoses. The linear composite was slightly lower than the M-MAST (81.2%) and a higher classification rate than both the AAS and APS (75.3% and 57.8% respectively). These results would suggest that the M-MAST alone may provide as good and even better results than the AAS and APS in discriminating between alcohol abuse and alcohol dependence.

The M-MAST, AAS, APS, and Adolescent SASSI.

The linear composite of the M-MAST, AAS, APS, and Adolescent SASSI correctly classified 95.7% of
the alcohol abuse sample (N = 70). The same four instruments correctly classified 68.1% of the alcohol dependence clients (N = 47). The overall classification rate for the M-MAST, AAS, APS, and Adolescent SASSI was 84.6%. This composite, therefore, more accurately classified cases than did the previous composite. In addition, this composite was more accurate than any of the individual assessment instruments. Based on the poor classification results of the APS, agencies may wish to consider using the linear combination of M-MAST, AAS, and Adolescent SASSI without including the APS.

The M-MAST, AAS, APS, and SASSI-2.

The linear combination of the M-MAST, AAS, APS, and SASSI-2 correctly classified 100.0% of the alcohol abuse clients (N = 9) and 100.0% of the alcohol dependence clients (N = 9). These results need to be interpreted with some caution since the size of the SASSI-2 sample was relatively small and may have affected the outcome of the discriminant function analysis.
The M-MAST, AAS, APS, and Adult SASSI.

The linear combination of the M-MAST, AAS, APS, and Adult SASSI correctly classified 90.8% of the alcohol abuse clients \( (N = 65) \) and 75.8% of the alcohol dependence clients \( (N = 66) \). The overall classification rate was the lowest \( (83.2\%) \) of the three linear combinations.

In conclusion, the results indicated there were two linear combinations which classified the highest percentage of clients. Therefore, agencies considering modifying their assessment protocols may want to consider these results.

Limitations

Possible limitations of this study include limited generalizability to counseling center clients who are enrolled at universities in the midwest. Another potential limitation is the client's propensity toward positive dissimulation (or faking good) on the self-report instruments (Otto & Hall, 1988), which could result in invalid scores. A third limitation is the small sample of completed SASSI-2 forms which decreased the strength of the SASSI-2 results in comparison with the other assessment instruments utilized in this study. A fourth limitation is the
absence of a control group being incorporated into the study design. A fifth limitation is the lack of comparative research results with the SASSI, the AAS and the APS as they apply to college student populations. A final limitation is the underrepresentation of racial and ethnic minorities in the study sample compared to the national norms.

Recommendations

The results of this study help to clarify the ability of the M-MAST, AAS, APS, and SASSI forms, both individually and collectively, to accurately detect substance use disorders within a population of counseling center clients. Although some questions were answered, there are several areas which require further research.

First, the same assessment instruments should be administered to a control group of college students. This would allow more specific comparisons to be made between a client sample and a general college student sample.

Second, future research is needed to determine the appropriateness of using the MAST with the recommended cutoff score of five with a college student population. With a mean MAST score of 12.0 for the study sample,
it would appear to benefit college counseling centers to consider using a higher cutoff score for the MAST to decrease the number of false positives. This recommendation is similar to that of Ross, Gavin, and Skinner (1990), who recommend using a MAST cutoff score of 12/13 with a sample of substance abusers.

Third, further empirical investigation is needed to explore the relationship between various demographic variables (e.g., age, gender, class rank, birth order, family history) and substance use disorders. Although these variables were not the statistical focus of this study, the results indicated, for example, birth order and parents use of chemicals to be potential indicators of alcohol-related problems. This type of research would have possible implications for alcohol and drug treatment programs, counseling agencies who screen for alcohol problems, and school personnel who work in the area of alcohol and drug prevention.

Fourth, agencies using the APS alcohol assessment instrument may wish to reconsider its use. The results indicate that the APS weakly predicted alcohol abuse and alcohol dependence within the study sample. Further empirical research is needed to measure the usefulness of the APS in screening for alcohol-related problems within a college student population.
Fifth, future research could evaluate how each of the assessment instruments perform differently from the clinical interview alone. A clinical interview form is not standardized like an alcohol assessment instrument. Counseling agencies would benefit from research which would support and recommend a clinical interview form which may be as clinically useful as a standardized assessment instrument.

In summary, diagnosing substance use disorders among a counseling center client population is an arduous task which requires a combination of advanced clinical skills and valid assessment instruments. The results of the current research project suggest that the diagnostic process cannot rest solely on the shoulders of a single paper-and-pencil self-report questionnaire. The challenge is to gather enough accurate information from the client to have a high degree of confidence in the diagnosis which is being ascribed to the individual. Often the burden rests on the client, who may have varying degrees of motivation in answering the questions honestly. With limited resources, a counseling center may choose to only use the M-MAST to assess drug and alcohol problems within their client population. If an agency is not hindered by financial restraints,
then it would seem plausible to incorporate the AAS and Adolescent SASSI with the M-MAST as the primary assessment instruments.

It is hoped that this study can be helpful to counseling centers and others who work in the alcohol and drug field to better understand the assessment capabilities and limitations of the M-MAST, SASSI, AAS, and APS, as well as encouraging further studies involving these instruments.
References


Kerr, B. (1994). Review of the Substance Abuse Subtle Screening Inventory (SASSI). In J.C. Conoley & J.C. Impara (Eds.), *The supplement to the eleventh mental measurements yearbook* (pp. 249-251). Lincoln, NE: The Buros Institute of Mental Measurements.


Vacc, N.A. (1994). Review of the Substance Abuse Subtle Screening Inventory (SASSI). In J.C. Conoley & J.C. Impara (Eds.), The supplement to the eleventh mental measurements yearbook (pp. 251-253). Lincoln, NE: The Buros Institute of Mental Measurements.


Appendix A

Human Subjects and Site Approval Letters
CERTIFICATION OF REVIEW / APPROVAL

PROJECT TITLE: A Comparison of Several Substance Use Assessment Instruments and the Clinical Interview in the Diagnosis of Substance Use Disorders

PROJECT DIRECTOR: Mark Christians, Counseling & Psychology

DATE SUBMITTED: May 23, 1995

PROJECT PERIOD: May 24, 1995 to May 23, 1996

TYPE OF REVIEW: Exempt

RISK INVOLVED: Minimal

APPROVAL/COMMENTS: This protocol was reviewed and approved as a study involving the use of existing data. Permission to access information has been given by the agency.

FOLLOWUP REVIEW OF THIS PROPOSAL IS SCHEDULED FOR:

IF ANY CHANGES IN PROCEDURES ARE CONTEMPLATED OR PROBLEMS ARISE THAT WOULD INCREASE THE RISKS INVOLVED OR THAT WOULD NECESSITATE A CHANGE IN CLASSIFICATION, PLEASE DISCONTINUE THE STUDY AND NOTIFY THE HUMAN SUBJECTS COMMITTEE FOR FURTHER APPROVAL.

THIS REVIEW WAS CONDUCTED IN ACCORDANCE WITH THE PROCEDURES STIPULATED BY THE UNIVERSITY OF SOUTH DAKOTA'S ASSURANCE OF COMPLIANCE WITH US DHHS REGULATIONS FOR THE PROTECTION OF HUMAN RESEARCH SUBJECTS. (45 CFR 46)

CERTIFICATION OF USD HUMAN SUBJECTS COMMITTEE AND/OR EXPEDITED REVIEW ACTION:

Chairperson, USD Human Subjects Committee

Date

CERTIFICATION OF 'EXEMPT' REVIEW ACTION:

USD Office of Research

Date
May 24, 1995

Mark Christians
c/o Spencer Davis
Counseling & Psychology
School of Education
University of South Dakota
Vermillion, SD 57069

PROPOSAL TITLE: A Comparison of Several Substance Use Assessment Instruments and the Clinical Interview in the Diagnosis of Substance Use Disorders

Dear Mr. Christians:

Your proposal referenced above has been reviewed and approved via the procedures of the USD Human Subjects Committee. A copy of the approval form is enclosed. You may proceed with your study.

When this study is completed please notify the Office of Research. If the study is to last longer than one year, a progress report is to be submitted to the Office of Research prior to the end of the year along with a request for approval of an extension of the project period. A form to assist you in filing your completion and/or progress report is enclosed.

If you have any questions, please contact me.

Sincerely,

Donna Hahn, Coordinator
USD Human Subjects Committee
Office of Research
107 Slagle
677-5370

Enc. 2
May 9, 1996

Mark Christians
Counseling & Psychology
School of Education
University of South Dakota
Vermillion, SD 57069

REF: A Comparison of Several Substance Use Assessment Instruments and the Clinical Interview in the Diagnosis of Substance Use Disorders

Dear Mr. Christians:

Thank you for the progress report on your project.

Approval of the extension of this project is granted until **August 1, 1996**. If you wish to continue past that date, it is necessary for you to submit an additional progress report prior to that date requesting the additional time extension.

A progress report form is enclosed for your future use.

If you have any questions, please call.

Sincerely,

Donna Hahn, Coordinator
USD Human Subjects Committee
Office of Research
677-5370

Enc.
May 8, 1995

Mark Christians  
452 3rd Ave. N.E.  
Sioux Center, IA 51250

Mr. Christians:

Thank you for your request to conduct research as part of your dissertation on the Student Counseling Center data base/alcohol and drug files. Your request is approved.

The purpose of your study seems clear and comprehensive. In accordance with CFR 42, no client IDs in the forms of names-SSNs- or other identifying data will be made available to you. A unique file number is given to each data set within the base. You may access our client files for your study for those available up to the date of 5-31-95.

The Student Advisory Board, composed of students-staff-faculty, have approved the use of our data files for appropriate research. Accordingly, the SCC staff will cooperate with you in data collection/coding/etc. for those methods as posed in your research proposal.

I would anticipate that publication of your findings would need to be discussed further for issues related to proper identification, acknowledgements, and - if appropriate - co-authorship.

Please provide me with a list of your committee members and the telephone number of your chairperson.

As your project unfolds, I would be willing to discuss with you any additional issues that might arise and how this center can assist in the project. I look forward to hearing further from you.

Sincerely,

Mathias E. Stricherz, EdD  
Psychologist  
CCDC III

cc: Dr. Davis  
Office of Research
Appendix B

Federal Law 42 C.F.R., Part 2, Subpart D, Section 2.52
Federal Law 42 C.F.R.


Part 2: Confidentiality of Alcohol and Drug Abuse

Patient Records

Subpart D: Disclosures Without Patient Consent

Section 2.52: Research Activities

(a) Patient identifying information may be disclosed for the purpose of conducting scientific research if the program director makes a determination that the recipient of the patient identifying information:

(1) Is qualified to conduct the research;
(2) Has the research protocol under which the patient identifying information:
   (i) Will be maintained in accordance with the security requirements of 2.16 of these regulations (or more stringent requirements); and
   (ii) Will not be redisclosed except as permitted under paragraph (b) of this section; and
(3) Has provided a satisfactory written statement that a group of three or more individuals who are independent of the research protocol has reviewed the protocol and determined that:

(i) The rights and welfare of patients will be adequately protected; and

(ii) The risks in disclosing patient identifying information are out-weighed by the potential benefits of the research.

(b) A person conducting research may disclose patient identifying information obtained under paragraph (a) of this section only back to the program from which that information was obtained and may not identify any individual patient in any report of that research.