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Factors Associated With Alcohol Use And Its Consequences

by

Marshall D. Alameida

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

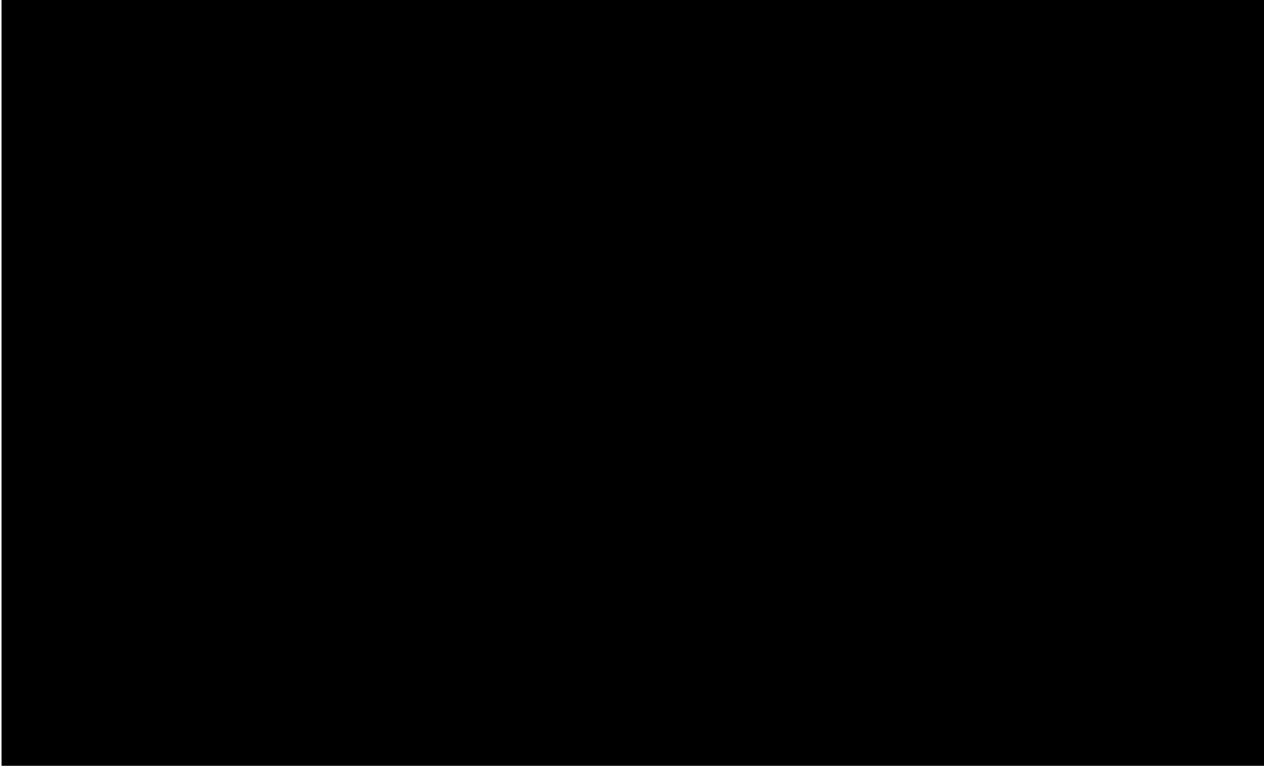
School of Nursing: Social & Behavioral Sciences and the John A. Hartford Center

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO



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By
Marshall D. Alameida, RN, PhD

Factors Associated With Alcohol Use And Its Consequences

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Marshall D. Alameida

Abstract

Design and Methods: This study examined secondary data from a national probability survey – the National Survey on Drug Use and Health in 2003 which was weighted to represent 212,686,651 community-dwelling adults 18 and older. Multivariate analyses were used to examine selected factors associated with alcohol use. The first aim was to examine a subset of variables to understand trait (socio-demographic) factors and drug use in relation to alcohol use frequency and quantity. The second aim was to examine the relationship of trait factors and alcohol use on alcohol disablement, alcohol risk behavior, alcohol abuse/dependence, and treatment.

Findings: The data showed that 146 million individuals (69%) used alcohol in the past year. There were 35 million (17 %) reported binge drinkers, 16 million (7 %) reported heavy drinkers and 16 with a need for alcohol treatment that was not met. Regression analyses showed that alcohol use follows a bell-shaped curve related to age, with risk alcohol use present in all age categories. Male gender and drug use were the strongest predictors of the quantity of alcohol consumption, which was a strong predictor for disablement, risk behavior and alcohol abuse/dependence. Education and income decreased alcohol consumption but increased the risk of drinking and driving. All race categories, compared to White, decreased alcohol consumption yet Hispanic and Other race were at risk for disablement and treatment. Disablement and risk behaviors predicted alcohol treatment; however, alcohol treatment occurs after individuals have very high alcohol consumption levels. A large treatment gap exists that underscores current problem drinkers are not receiving treatment. Alcohol problems occur at low levels of consumption, and may occur at even lower levels when mental health symptoms are present.

Discussion: When the numbers of individuals who use alcohol and have disablement problems, and engage in risky behavior are considered, with the numbers of individuals that experienced treatment gap, the scope of the national problem becomes apparent. Future studies should continue examine the relationship of alcohol use and disability and the consequences of alcohol use.

Committee Chairperson:
Charlene Harrington, RN, PhD, FAAN

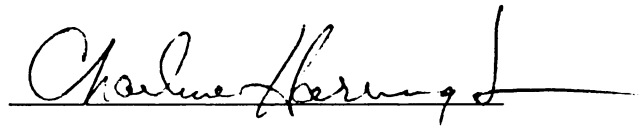


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Factors Associated with Alcohol Use and its Consequences

CHAPTER I: INTRODUCTION

The primary purpose of this study is to examine factors associated with alcohol use and the consequences of alcohol use in an adult population living in the community. This study used a social model that attempts to integrate the fields of alcohol and disability research, examining secondary data from the National Survey on Drug Use and Health (NSDUH, 2003) based on a probability sample weighted to represent 212,686,651 adults in the U.S.

This study has two specific aims:

Specific Aim 1: To investigate the relationships of trait characteristics and alcohol use in terms of frequency and quantity and an evaluated need for treatment.

Specific Aim 2: To investigate the relationship of trait characteristics and alcohol use (frequency and quantity) to its consequences (disablement, risk behavior, alcohol abuse/dependence) and alcohol treatment, as well as the relationship of selected disablement and risk behavior factors to treatment.

Under Aim 1, alcohol use was examined in terms of frequency (ever having used alcohol, use in the past year and use in the past month). For those that used alcohol, the quantity of alcohol use was examined in terms of binge use (defined as five or more drinks on one occasion in the past month) or heavy use (defined as five or more drinks on five or more occasions in the past month). The individuals who were at risk based on age and gender characteristics (defined as all females and males 65 years of age and older who consume more than 30 drinks in a month and males less than 65 years old who consume more than 60 drinks in a month) were also examined. The average number of drinks in the past month was also examined along with those individuals evaluated as

needing alcohol treatment in the past 12 months based on how respondents answered DSM-IV questions in the NSDUH and based on this information, were classified as either abusing alcohol, being dependent on alcohol or of having received alcohol treatment in the past 12 months.

The study used multivariate analyses to examine selected factors associated with alcohol use. Two types of trait characteristics were examined: (1) predisposing factors which were age, gender and race; and (2) enabling factors which were education, employment status, income and health insurance. Two other factors were examined: mental health symptoms and drug use in the past year. It was expected that these factors would have an important association with alcohol use and a need for alcohol treatment.

The second aim examined factors associated with the consequences of alcohol use. In this aim, the dependent variables include: (1) disablement symptoms; (2) risk behavior; (3) alcohol abuse or dependence; and (4) alcohol treatment. Disablement symptoms included problems with emotions or physical functions and problems with work, social interaction, or activity functions. Risk behavior included dangerous activities and/or driving under the influence of alcohol. Alcohol abuse or dependence was defined as actions that meet the DSM-IV criteria. Finally, factors associated with alcohol treatment, and a treatment gap, were examined.

To examine the consequences of alcohol use in Aim 2, alcohol use frequency (ever having used alcohol, use in the past year and use in the past month) and the quantity of alcohol use were examined in terms of binge or heavy use as predictor variables. The individuals at risk based on age and gender characteristics and the average number of drinks in the past month were also used as independent variables. Two types of trait

characteristics were included in the model: (1) predisposing factors which were age, gender and race; and (2) enabling factors which were education, employment status, income and health insurance. Two other factors were examined: mental health symptoms and drug use in the past year. It was expected that these factors would have an important association with alcohol disablement, alcohol risk behaviors, abuse/dependence and alcohol treatment and the treatment gap. Numerous studies have utilized differing quantity and frequency measures. For instance, the volume of alcohol consumption and the frequency of heavy drinking, in relation to alcohol problems, was examined (Dawson, Grant, & Hartford, 1995; Midanik, Tam, Greenfield, Caetano 1996). In addition, Archer, Dawson and Grant (1995) investigated whether the reduction in alcohol consumption would have a potential affect on alcohol abuse and dependence. In other research, drinking patterns, along with age and gender, have been examined in relation to driving under the influence of alcohol [Gruenwald, Mitchell, & Treno, (1996)].

Recently, Russell, Light and Gruenwald (2004) utilized the National Health Interview Survey of 1988 to examine levels of alcohol consumption (drinks/drinking day, drinking days/year, heavy drinking rates) and their relationship to 41 alcohol outcome measures within five cohorts based on gender and age. Their findings showed a linear relationship between increased quantity/frequency of alcohol consumption and the number of self reported problem outcomes.

This study extends the prior research on quantity and frequency of alcohol consumption and disablement in important ways. First, it uses data from the most recent national survey on alcohol use for those living in the community in the U.S. Second, it uses a theoretical framework where the degree of disablement and risk are examined in

relation to alcohol use. Third, this study provides an opportunity to investigate numerous factors that may influence alcohol use patterns along with alcohol abuse/dependence and treatment services.

The National Survey on Drug Use and Health (NSDUH) 2003 was selected as the most recent, appropriate data set for this study. It was selected because it was a national survey and as a result of the extensive detail on alcohol use (including frequency and quantity of use) it captured. The survey includes important predictor variables such as illicit drug use and mental health symptoms and uses the classification of alcohol abuse and dependence in accordance with the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) (American Psychiatric Association, 1994).

Alcohol use is one of the most important social and health problems in the U.S. and worldwide. This study will contribute findings about alcohol use, disablement, risk outcomes, alcohol abuse/dependence and treatment. The literature review in Chapter II presents data on the problems related to alcohol use. Chapter III presents three theoretical frameworks and an effort to synthesize these into a modified framework considering alcohol use and disablement. Chapter IV presents the methods and Chapter V presents the findings. Chapter VI discusses these findings and considers the implications for future research.

CHAPTER II: THEORETICAL FRAMEWORK

The purpose of this chapter is to introduce a theoretical model that has been developed as a result of reviewing the literature on alcohol use and disability. This model, the Substance Use Disablement and Recovery Model (SUDARM), was developed to integrate three well known models. These foundational models are Edward & Gross's (1976) Alcohol Dependency Syndrome (a model that describes alcohol consumption in relation to its progression towards a state of dependency), Andersen's (1968) Behavioral Model (a model that describes access to health care and the relationship among predictor and outcome variables), and Verbrugge & Jette's (1994) Disablement Process (a model of disability that describes the course of disablement from its pathologic origin to a state of disability). This chapter presents these three models and the effort to integrate the models into a framework for this study.

The Disease Concept of Alcohol

Benjamin Rush, in 1784, described an uncontrollable desire to consume alcohol, with delirium tremens (alcohol induced psychosis and tremors) as a withdrawal outcome. In the 19th century, the temperance movement promoted the concept of alcoholism as including craving and withdrawal symptoms. In this regard, it was believed that all who consumed alcohol would incur the negative effects associated with alcoholism (Heather, 1992). In addition, the theory of degeneration led to a focus on the individual, postulating that biological, environmental and moral vices unleashed social and medical issues that increased with subsequent generations, until such time as the alcoholic family becomes extinct (Mann, Hermann & Heinz, 2000).

The failure of prohibition initiated more current concepts associated with alcoholism. The formation of Alcoholics Anonymous (AA) in the late 1930's continued the temperance view of sympathy for addicts, but only individual alcoholics could join AA, and the prevalence of alcohol in the general public was not one of AA's interests (Mann et al., 2000). The view that alcohol consumption led to problematic drinking was no longer accepted, and knowledge regarding current concepts of alcohol dependence such as tolerance (increased levels of alcohol to achieve the same effect) and withdrawal (physical symptoms such as tremors with the cessation of alcohol intake) were neglected through the early 1940's (Mann et al., 2000).

In 1942, Jellinek and the Yale School on Alcoholic Studies stated their agreement with AA that alcoholism is a disease that is progressive in nature and is not a component of moral character (Mann et al., 2000). In 1954, the World Health Organization (WHO) issued a report that focused on the "personal make-up" of the individual alcoholic as a determining factor, while reinforcing the pharmacologic actions of alcohol as a significant factor in alcoholism (Mann et al., 2000). In 1955, the WHO acknowledged that withdrawal symptoms of a serious nature could follow the cessation of alcohol intake after prolonged use. Subsequently, Jellinek (1960) published his seminal work on the disease concept of alcohol, and referring to the WHO report, reiterated the concepts of adaptation of cell metabolic activity, tolerance and withdrawal as central tenets of alcoholism and the predisposing factors that lead to cravings, loss of control and relapse (Mann et al., 2000).

The 1960s brought forth research on alcohol behavior in twin studies and initiated the current focus on genetic predisposition as opposed to the previous concept of

degeneration. In addition, knowledge regarding the neurobiological underpinnings of alcohol dependence received acknowledgement. Edwards & Gross (1976) focused on the concept of alcohol dependence and its associated withdrawal syndrome, with the cessation of prolonged alcohol intake. The World Health Organization incorporated their work in the development of the International Classification of Diseases, subsequently operationalizing their concept in the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R) as well as the DSM-IV (Mann et al., 2000).

The disease concept of alcoholism has been revisited and is subject to controversy. In fact, replacing this concept with a social learning perspective has been suggested (Heather, 1992). It has been argued that nicotine also causes neuroadaptation and dependence, and yet it is not considered a disease. Furthermore, there are concerns that patients might be labeled with the disease of alcohol, thereby promoting a sense of apathy related to the “sick role” concept having been voiced (Heather, 1992). Respondents, however, have argued that the sick role does not stigmatize patients, but in fact provides a socially accepted reprieve from expected role performance (Garner, 1967). In addition, it has been argued that a state may be referred to as a disease without anatomic abnormalities (hypertension), and that alcohol’s induced behaviors are present as a disablement, thereby constituting a disease process (Keller 1976).

Alcohol Dependency Syndrome

The diagnosis of Alcohol Use Disorders in U.S. research studies is based on criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) of the American Psychiatric Association. The diagnostic criteria for alcohol

dependence reflected the conceptual framework of the Alcohol Dependency Syndrome (Edwards & Gross, 1976) in the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R) of the American Psychiatric Association, a precursor to the DSM-IV (Hasin: NIAAA Publication). Conceptualization of the Alcohol Dependency Syndrome (ADS) was based on an integration of physiological and psychological processes that can lead to increased alcohol consumption and progressive unresponsiveness to negative consequences (Edwards & Gross, 1976).

The essential postulates of the ADS are fourfold. First, the syndrome may be recognized by a clustering of criteria, that may differ in degree and need not all be present. However, increased intensity of the syndrome is typical of increased coherence of multiple criteria. Second, the syndrome is not a dichotomous all-or-none phenomenon, but occurs over time with gradually increased alcohol consumption and symptom intensity. Third, the presence of ADS is formed by issues such as personality and culture. Finally, a biaxial process was utilized to differentiate the concepts of alcohol dependence syndrome (ADS) and alcohol abuse in the DSM-III-R and the subsequent DSM-IV (Hasin: NIAAA Publication).

In regard to the biaxial process, the ADS applied its concepts to describing the physiological and psychological underpinnings of alcohol dependence. On the other hand, alcohol abuse was associated with the consequences of heavy drinking, such as social and legal issues, without the presence of physical dependence, defined as tolerance (increase levels of alcohol to maintain the same effect) or withdrawal (physiological signs such as tremors with alcohol cessation) (Edwards, 1986).

The Alcohol Dependency Syndrome (Edwards & Gross, 1976) is a conceptual framework delineated by a process of alcohol seeking behavior, based on concepts initially presented in the Disease Concept of Alcoholism (Jellinek, 1960). The essential concepts of ADS are: “(1) narrowed repertoire of drinking behavior; (2) salience of drink seeking behavior; (3) tolerance; (4) withdrawal syndrome; (5) drinking to alleviate withdrawal symptoms; (6) subjective awareness of a compulsion to drink; and (7) relapse” (Edwards & Gross, 1976).

The narrowing of the drinking repertoire relates to an individual’s shifting pattern of consumption, motivated by internal cues and external circumstances. The initial consumption of alcohol may be socially acceptable and may vary in quantity from day to day. As alcohol consumption increases, the individual’s focus is on the alleviation of withdrawal symptoms and the repertoire of drinking is narrowed. Drinking behavior becomes more consistent, regardless of social cues (Edwards & Gross, 1976).

Continued alcohol consumption leads to salience of drink seeking behavior in order to maintain blood alcohol levels, with further disregard for interpersonal relationships, financial management, family obligations or other social obligations. The degree of alcohol dependence can be partially assessed in accordance with the degree to which the individual’s compulsivity for alcohol consumption negates these other cues. Thereafter, increased tolerance to alcohol occurs with increased consumption. This change in the dose-response curve is typically recognized by the individual, and cross tolerance to other addictive substances also occurs.

In the next phase of ADS, withdrawal symptoms begin to manifest with a decrease in blood alcohol levels, or abrupt cessation of alcohol intake. At this point,

alcohol is consumed to alleviate withdrawal symptoms, an awareness of compulsivity toward alcohol manifests, and post abstinence reinstatement of prior dependency may also occur (Edwards & Gross, 1976).

The essential postulates of the ADS are its recognition by a clustering of specific criteria, though not all criteria are necessary. Therefore, the ADS “is not all or none, it occurs with graded intensity” (Edwards, 1986). In addition, personality and culture lend to shaping its presentation. Importantly, the authors did not assume the ADS to be “progressive or irreversible” nor did they make assumptions as “to the nature of pathology” (Edwards, 1986).

The initial decision to use alcohol is determined by genetic, environmental and psychosocial stimuli. Upon entering the brain, however, alcohol initiates a process which can promote continued alcohol seeking behavior and alcohol dependency. In the context of redefining alcohol abuse and dependence for the DSM-III-R, alcohol abuse and dependence became understood as “continuous rather than dichotomous phenomena” (Miller, 1995). Similarly, Edwards (1986) stated alcohol dependence occurred gradually, over time, with increased consumption. Caetano and Cunradi (2002) have reported that the risk of alcohol dependence begins at low levels of consumption, with a linear increase related to an increase in consumption level. Importantly, research has documented self reports of disablement in relation to alcohol consumption (Russell et al., 2004), though efforts are required in expanding the research to evaluate the degree of disablement.

The Alcohol Dependency Syndrome (Edwards & Gross, 1976) is redefined in this study as the Alcohol Disablement and Recovery Continuum by acknowledging that the potential for recovery from alcohol abuse/dependence and progressive disablement exists.

The ADRC is integral to the SUDARM as a framework for investigating the interaction of trait, use and response characteristics related to alcohol consumption, with frequency and quantity alcohol consumption variables defined as those use characteristics that act as a predisposing and a direct response exacerbation for alcohol abuse/dependence, disabling symptoms, risk behaviors and the measurement of specific levels of disablement along the main pathway of the Disablement Process (Verbrugge & Jette, 1994). The ADRC is depicted in Table 1 and incorporates the actual definitions of substance abuse and dependence that are incorporated in the DSM-IV-TR (2000), with the addition of alcohol use as the starting point for risk related outcomes, as well as at risk alcohol consumption levels defined in the literature.

Table 1: Alcohol Disablement & Recovery Continuum (ADARC): Modified July 12, 2004 Substance Abuse/Dependence: DSM-IV-TR (APA 2000)

			
Alcohol Use	At Risk Alcohol	Alcohol Abuse (DSM-IV)	Alcohol Dependence (DSM-IV)
Any alcohol consumption in the past year or past month	< 65 age Binge, Heavy. Men: > 14 drinks/week Women: > 7 drinks/week Both: 5 drinks/1 occasion	Substance Abuse: A. A maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12 month period. (1) recurrent substance use resulting in a failure to fulfill major role obligations at work, school or home (e.g., repeated absences or poor work performance related to substance use; substance-related absences, suspensions, or expulsions from school; neglect of children or household) (2) recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use) (3) recurrent substance-related legal problems (e.g., arrests for substance-related disorderly conduct) (4) continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (e.g., arguments with spouse about consequences of intoxication, physical fights) B. The symptoms have never met the criteria for Substance Dependence for this class of substance.	Substance Dependence A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12 month period: (1) tolerance, as defined by either of the following: (a) a need for markedly increased amounts of the substance to achieve intoxication or desired effects (b) markedly diminished effect with continued use of the same amount of the substance (2) withdrawal, as manifested by either of the following: (a) the characteristic withdrawal syndrome for the substance (b) the same (or closely related) substance is taken to relieve or avoid withdrawal symptoms (3) the substance is often taken in larger amounts or over a longer period than was originally intended (4) there is a persistent desire or unsuccessful efforts to cut down or control substance use
	> 65 age Binge, Heavy. Men & Women: > 7 drinks/week 5 drinks/1 occasion		

(5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain smoking), or recover from its effects

(6) important social, occupational, or recreational activities are given up or reduced because of substance use

(7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

Specify:

Physical Dependence: (1) or (2) present

Alcohol Dependence: Narrative version

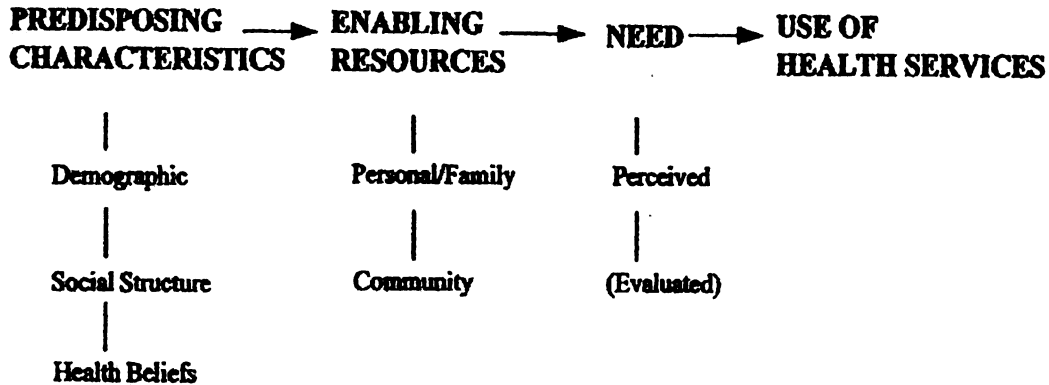
The Andersen Behavioral Model

The Andersen Behavioral Model is one of the most frequently used frameworks that researchers apply to evaluating utilization of healthcare services. This model incorporates a systems perspective that integrates variables associated with individuals, the environment and providers that are related to care seeking decisions (Phillips, Morrison, Andersen & Aday, 1998). Initially developed by Ronald M. Andersen (1968), the model's purpose was the knowledge development of health services utilization.

The initial unit of analysis was the family and shifted to the individual due to measurement challenges in accounting for the heterogeneity of family members, such as an attempt to define a summary measure for family health status (Andersen, 1995). In addition, the concept of formal health services was designed to explain the use of services rather than the interactions taking place between service providers and care recipients.

Importantly, increased service utilization, as an indicator of improved outcomes, was considered to be influenced by national policy (Andersen, 1995).

Phase I of the Anderson Model (1960s)



The initial Andersen Behavioral Model (Andersen, 1968), suggested that health service utilization was a function of a persons' predisposition to use services, as well as those factors that enable or impede service use and the need for care (Andersen, 1995). In this regard, the model has linear relationships between the concepts that are defined as predisposing. The model (Andersen, 1968) also suggested that health service utilization was a function of a persons' predisposition to use services, as well as factors that enable or impede service use and the need for care. The model has linear relationships between the concepts defined as predisposing characteristics, enabling resources, need and use of health services.

Predisposing characteristics are comprised of demographic variables, social structure variables and health variables. The demographic variables include age, and gender, which Andersen (1995) stated are biological imperatives that suggest a likelihood of service needs. Social structure is comprised of traditional variables such as education, occupation and ethnicity, which reflect a broad array of measures that suggests an

individual's status in the community. Health belief variables include attitudes, values and knowledge that people possess regarding their health and health services, which influence an individual's perception of need and subsequent use of health services (Andersen, 1995).

Andersen (1995) stated that enabling resources are those personal and community resources that must be present for use of health services to take place. Enabling resource variables are inclusive of health personnel and facilities where a person might live and work, an individual's means and knowledge in terms of how to access resources, and other variables such as insurance and income. Need was described by Andersen (1995) as either perceived or evaluated. Perceived need, he stated, is largely a social phenomenon, primarily explained by social structure and health beliefs. Because there is also a biological imperative that accounts for a person's health seeking behavior, this is best assessed by the evaluated component of need, as provided by professional staff (Andersen, 1995).

In terms of the model's linear relationships, Andersen (1995) states that an individual's education, ethnicity and occupation contribute to their health belief system. Their health belief system provides a means of explaining the influence of social structure (predisposing characteristics) on perceived need (enabling resources) and service utilization (use of health services). Andersen (1995) conceded that enabling and need variables are more of an explanation of the variations in service utilization than is health belief.

Numerous observations and critiques of the initial Andersen model were published and even presented by Andersen (1995). Other predisposing variables were

suggested, such as genetic predisposition, mental dysfunction and cognitive impairment (Andersen, 1995). In addition, though health beliefs (predisposing) may be a possible explanation of how social structure (predisposing) variables might influence enabling and need variables, as well as service utilization, its conceptualization and measurement have been questioned. Concerns were raised that organizational factors were not addressed, which could explain the importance of medical care (enabling) and its influence on how service utilization is predicted. Specifically, provider types (enabling) were not addressed (Andersen, 1995).

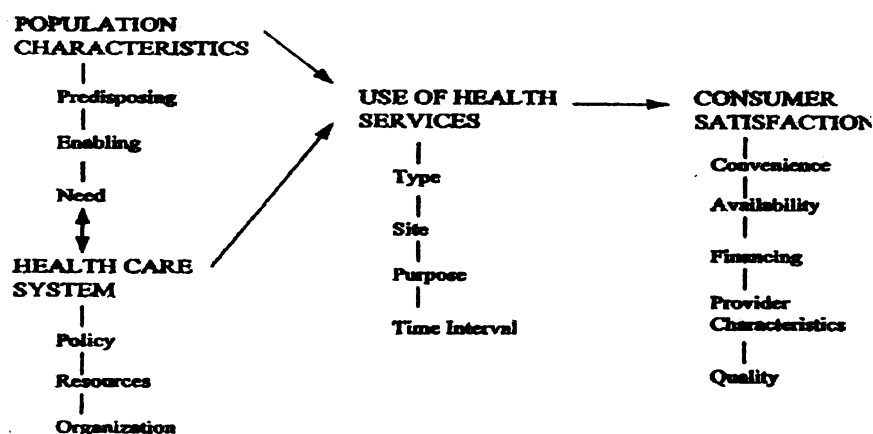
The initial Andersen model measured health services use as an outcome, such as physician ambulatory care, hospital and physician inpatient services, and dental care (Andersen, 1995). The expectations of the model were that perceived need helped to explain service utilization. Demographic, social structure and health belief variables predicted perceived need and service utilization. Furthermore, evaluated need related more specifically to the type of treatment and the amount of care an individual received following their presentation to a medical provider. The original model hypothesis was that predisposing, enabling and need variables differ in their ability to explain service utilization. In this regard, serious hospitalization was expected to be explained by demographic (predisposing) and need variables, while discretionary services such as dental care are explained by the predisposing variable of social structure (Andersen, 1995).

The model underwent its first major revision in the 1970's, with Phase 2 (Aday & Andersen, 1974) developed by Aday and other collaborators at the University of Chicago, Center for Health Administration Studies. The model captured predisposing, enabling

and need variables within the category of population characteristics, and added the categories of health care system and customer satisfaction, while more specifically defining the use of health care services. The health care system included policy, resources and organization variables. Population characteristics and the health care system were bi-directionally linked to each other, and linearly linked as predictors of the use of health services, which included the variables type, site, purpose, and time interval. Use of health services is subsequently linked in a linearly predictive relationship with customer satisfaction, which included convenience, availability, financing, provider characteristics and quality variables (Andersen, 1995).

The addition of the health care system acknowledged the importance of national health policy and the organization of resources within the health care system as important determinants for population service utilization. The expansion of health services provided more specificity for research. Furthermore, customer satisfaction, as an outcome of service utilization, recognized that service utilization, as policy, resulted in researchable health outcomes (Andersen, 1995).

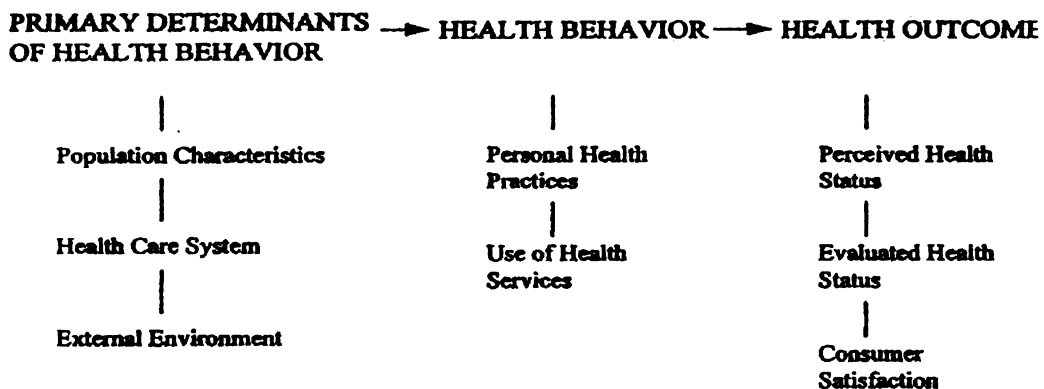
Phase 2 of the Andersen Behavioral Model (1970s)



Andersen and Aday (1978) continued to posit that service utilization is predicated on an individual's predisposition to use services, based on predisposing variables (demographic, social, health beliefs). Thereafter, utilization of services is based on enabling variables (resources) and the degree to which need variables (perception of illness) are a motivating factor. Furthermore, the concept of equitable access was defined as utilization based on need, as opposed to social variables such as demographics, education or income.

In the 1980's, the Andersen Behavioral Model was again revised (Andersen, Davidson & Ganz, 1994). This development took place in recognition of the fact that health services should serve the function of maintaining and improving the health of the population, whether health concerns are perceived by the population or evaluated by professionals. A new category, primary determinants of health behavior, incorporated population characteristics, the health care system and the newly added sub-category of external environment. In this regard, the external environment was recognized as an important input for evaluating health services utilization within the context of physical, political and economic variables (Andersen, 1995).

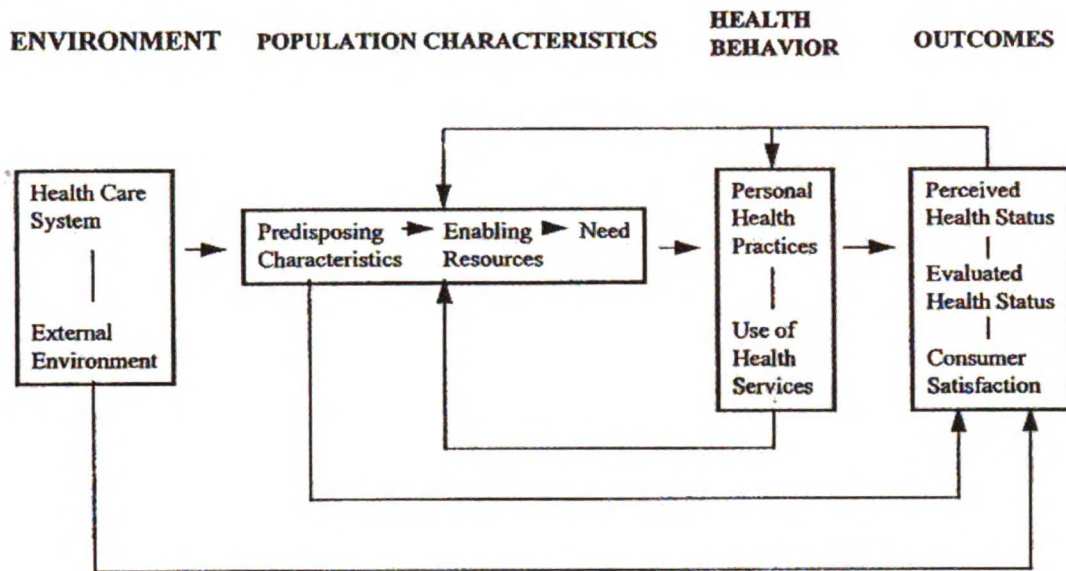
Phase 3 of the Andersen Behavioral Model (1980s to 1990s)



The primary determinants of health behavior are linear predictors of health behavior, which includes the use of health services and a new category for personal health practices. Personal health practices included diet, exercise and self care, which interact with health services utilization to linearly influence health outcomes (Andersen, 1995). In this version of the model, health outcomes include perceived health status, evaluated health status and customer satisfaction variables. These outcomes extend access measures by including additional areas for health policy and reform. In this regard, perceived and evaluated need shift from need variables to health outcome variables, with customer satisfaction added as a health outcome variable.

The premise of this version of the model was that utilization plus improved health status were equated with effective access to care (Andersen, 1995). In addition, the model differentiated (Aday & Andersen, 1978; Andersen, McCutcheon, Aday, Chiu & Bell, 1983) between potential access that increased the likelihood of utilization and realized access. Potential access is influenced by the structural aspects of the delivery system, as well as the presence of individual enabling resources and need. Realized access is the actual utilization rate of services and subjective evaluation of care (Andersen et al., 1983). Aday and Andersen (1981) further equated access to care with the concept of equity, defined as the distribution of services that are based on people's needs. Conversely, inequity was defined as a system of distribution that is based on demographic variables such as race, income, or insurance.

Phase 4: The Andersen Behavioral Model



The Andersen Behavioral Model continued to evolve with a Phase 4 revision that continued the linear relationship of the model, and added feedback loops (Andersen, 1995). These feedback loops provided added explanations for the interaction of variables within the model. In this regard, the linear relationship of the health care system and the external environment are maintained with population characteristics, which affect health behavior, and subsequently affect outcomes. Additionally, the health care system and external environment, as well as population characteristics, directly affect outcomes (Andersen, 1995).

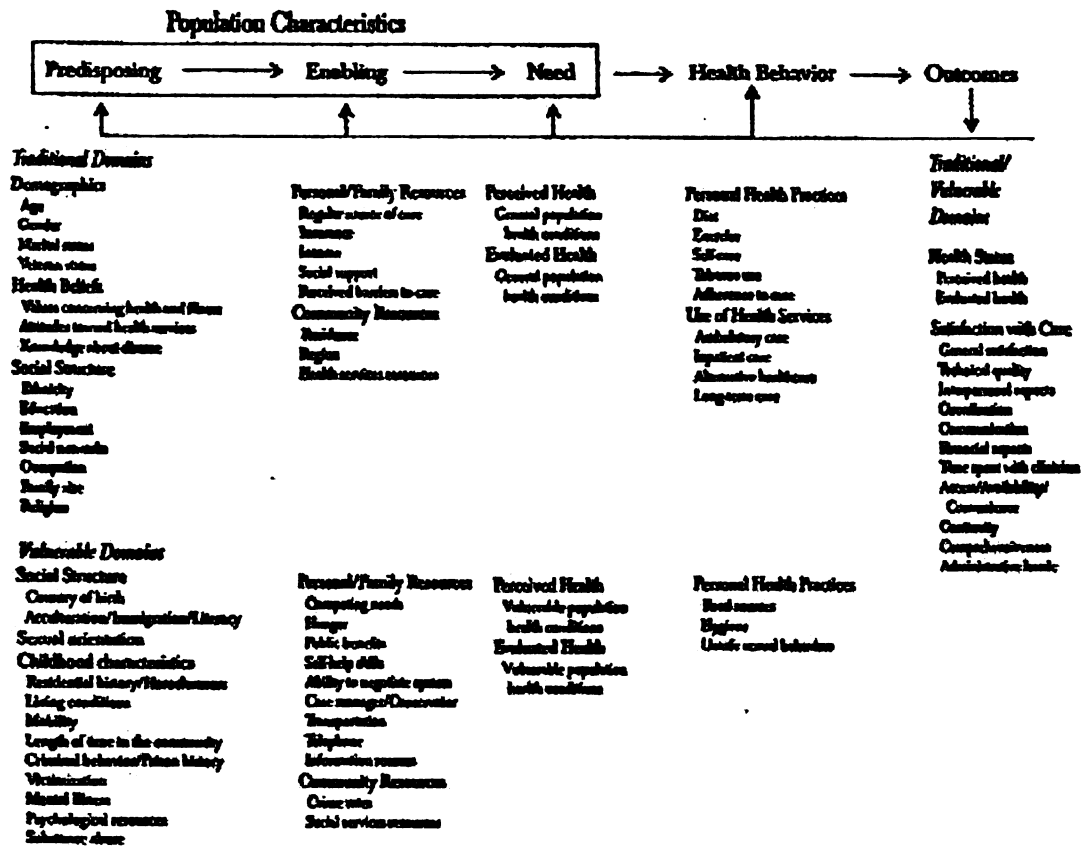
This version of the Andersen Behavioral Model established a feedback loop from outcomes to population characteristics and health behavior, as well as from health behavior to population characteristics. Importantly, a cyclical feedback process was established between population characteristics, health behavior and outcomes. This cycle explained the manner in which population characteristics can influence health behavior

choices (personal health practices and use of health services) and foster a cycle of decline or improvement amongst the relevant variables that are reflected in the outcome variables (Andersen, 1995).

In addition, the model expanded on the definition and purpose of environmental variables (Phillips et al., 1998). In this regard, environmental variables included the healthcare system characteristics (policies, resources, finances and organizations) that affect access, as well as external environmental factors (wealth, politics and social norms) and community level variables (availability of specific service provisions) that enable the individual to access services.

The Andersen Behavioral Model has also been modified to facilitate research of health care utilization and outcomes for vulnerable populations, defined as “minorities; undocumented immigrants; children and adolescents; mentally ill; chronically ill; disabled, the elderly; and impoverished and homeless persons” (Geldberg, Andersen & Leake, 2000). This version of the Andersen Behavioral Model provided important added variables such as mental illness and substance abuse, and was designed to better understand health and health seeking behaviors in these populations. They did, however, concede that the model would need to be tailored to specific vulnerable populations (Gelberg, et al., 2000). In fact, the model is viewed as a framework for analysis that does not dictate the specific study variables or research methodology (Phillips et al., 1998).

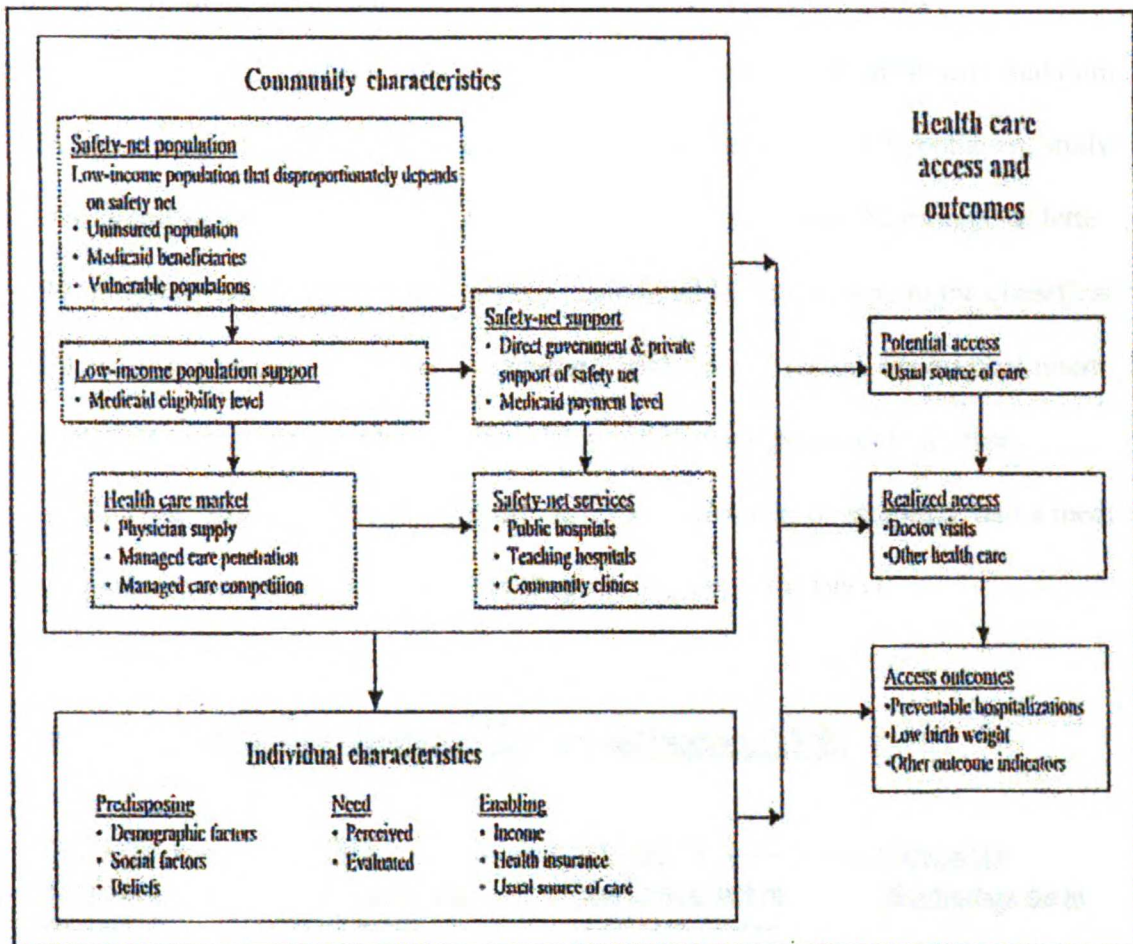
Behavioral Model for Vulnerable Populations: Gelberg, Andersen & Leake, 2000



The Andersen Behavioral Model was also extended to examine population characteristics that lead to reliance on safety net services, as well as the supporting policies and services within the health care market (Davidson, Andersen, Wyn & Brown, 2004). The three primary domains are community characteristics, individual characteristics and health care access and outcomes. The safety net population is identified as those who are uninsured, rely on Medicaid and are members of vulnerable populations. Prior research has validated that individual characteristics explain 20-25 percent of the variance in access, leaving much unexplained. Therefore, the purpose of this model was to apply a comprehensive conceptual framework to explain variables at

the community level (Davidson et al., 2004), and efficiency of access when an individual enters the system (Davidson et al., 2004).

Framework to Evaluate Community Safety Net Access & Outcomes



The Disablement Process

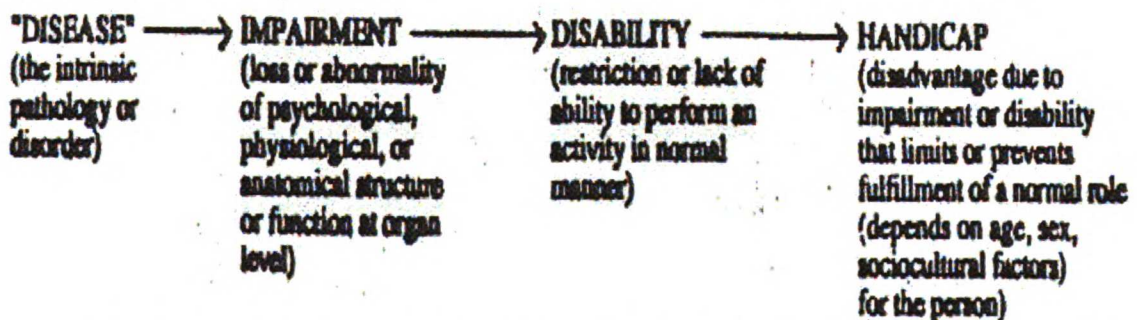
The Disablement Process (Verbrugge & Jette, 1994) is a hybrid model of disability, comprised of concepts from the International Classification of Impairments, Disabilities and Handicaps (ICIDH) and the Nagi scheme, the major conceptual frameworks in disability. The ICIDH is a disease taxonomy that was developed by the World Health Organization to provide a disability parallel to the International

Classification of Disease (World Health Organization, 1980). The ICD serves as a standardized taxonomy of diseases within the medical field and in health statistics, and relies on the central concepts of impairment, disability and handicap, and has promoted discussion and research on an international basis (Verbrugge & Jette, 1994).

The ICIDH has been used extensively in international administrative and clinical settings, though difficulties with issues such as the development of hypotheses, study designs and survey measurements have been cited as limitations (Verbrugge & Jette 1994). Additionally, the ICIDH has been challenged for not lending to the classification of persons and its inapplicability as a research tool. In this regard, the original intent of the ICIDH to provide a method of organizing information pursuant to disease consequences has been labeled by critics as a medicalization of disability, and a medical intrusion into the social aspects of life (Pope & Tarlov, p.76, 1991).

ICIDH Model

International Classification of Impairments, Disabilities, and Handicaps (ICIDH)

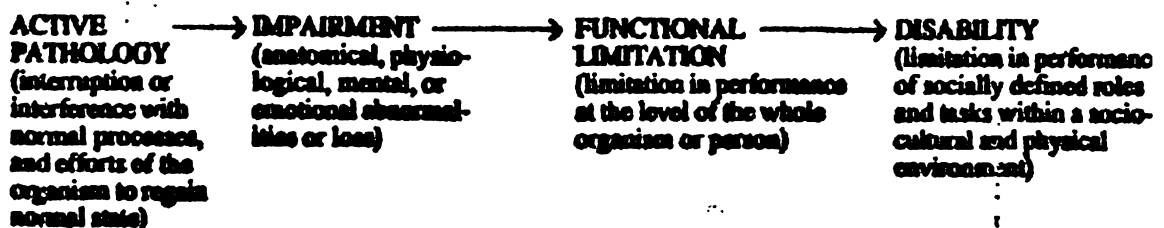


The Nagi scheme was developed in 1976 by sociologist Saad Nagi and focuses on functional limitations rather than the classification of disease. It incorporates the four concepts of active pathology, impairment, functional limitations and disability (Nagi, 1976). The concept of active pathology is similar to the ICIDH concept of disease, and

the concept of functional limitations (activities of daily living) relates to the ICIDH concept of disability. In addition, the ICIDH concept of handicap is a corresponding concept to Nagi's disability (Pope & Tarlov, p. 76, 1991). There is not a corresponding match, however, in the Nagi scheme for the ICIDH concept of handicap (Verbrugge & Jette 1994).

Nagi Scheme

Nagi Scheme

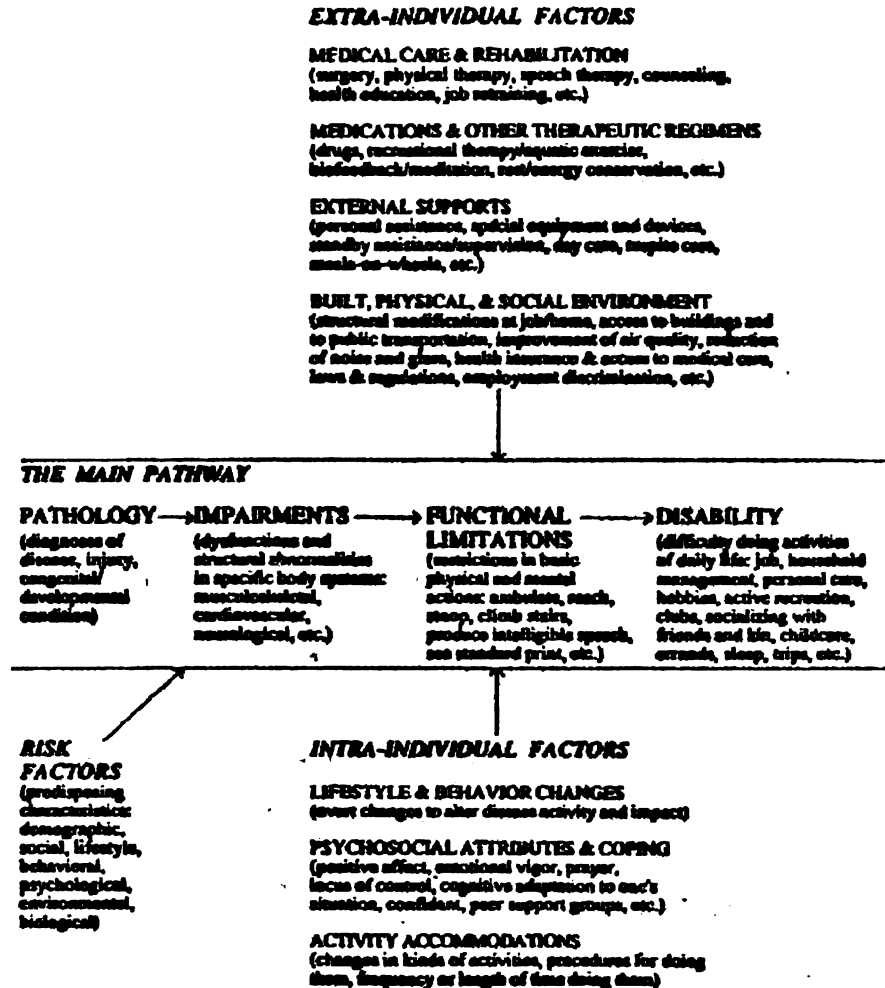


The underpinning theory for the Nagi scheme is sociological rather than taxonomic. This model, relatively unknown in the 1980s, has received wide acceptance in disability research. The basic framework was adopted by the Institute of Medicine (IOM) panel on disability policy and prevention. The basic framework of the Nagi scheme has also served as the foundation for the development of the Disablement Process (Verbrugge & Jette 1994).

The Disablement Process (Verbrugge & Jette, 1994) is a conceptual model of disability with application to medicine, social science and public health. As a conceptual scheme, the intent is to provide a model by which research based terminology, measurement and hypotheses can be developed and tested. Specifically, the Disablement Process describes the affect to body system functioning, mental and physical activities, and daily life activities caused by chronic and acute conditions. In addition, the model provides a description of how personal and environmental factors might act as

exacerbations (accelerate), or interventions (slow) that affect the process of becoming disabled (Verbrugge & Jette, 1994).

The Disablement Process Model



The model draws its main foundational concepts from the Nagi scheme and provides an expanded scope through use of concepts from the ICIDH (Verbrugge & Jette, 1994). The term “disablement” is a reference to the capabilities of individuals to perform the expected and desired roles within society. Used generally, this term applies to all pathological consequences on human functioning. The term “process” signifies a trajectory toward increased limitations in functioning ending in disability. In this regard,

“Process” applies to a disablement trajectory “of functional consequences over time, and the factors that affect their direction, pace, and patterns of change” (Verbrugge & Jette, 1994). The main pathway concepts of the Disablement Process are pathology, impairments, functional limitations and disability.

Pathology is associated with “biochemical and physiological abnormalities that are detected and medically labeled as disease, injury or congenital/developmental conditions” (Verbrugge & Jette, 1994). Chronic pathology is defined as lasting more than three months, with acute pathology lasting less than three months. Diagnosis of pathology relies on signs and symptoms that may only manifest through impairments. Other diagnostic data that can formulate a diagnosis are also relevant, such as patient self assessment surveys (Verbrugge & Jette, 1994).

Impairments are defined as “dysfunctional and significant structural abnormalities in specific body systems” (Verbrugge & Jette, 1994). The term significant refers to abnormalities with “physical, mental or social functioning” (Verbrugge & Jette, 1994). Impairments may occur in both the primary (diabetes effect on metabolic system) and secondary locales (diabetes effect on renal and cardiovascular systems) of a disease process. Pathology may not present as an impairment in body systems or functions, such as pathology in remission. Pathology that meets clinical threshold criteria and has been diagnosed, however, is presented as an impairment. Importantly, clinical evaluation procedures for impairments can be integrated into home surveys for epidemiological research (Verbrugge & Jette, 1994).

Functional limitations are defined as “restrictions in performing fundamental physical and mental actions used in daily life by one’s age/sex group” (Verbrugge &

Jette, 1994). The implication is the ability of body and mind to do purposeful work. In this regard, body actions include “overall mobility, discrete motions and strengths, trouble seeing, trouble hearing and communicating” (Verbrugge & Jette, 1994). Examples of functional limitations of the body can be observed in “walking, lifting objects, climbing stairs, reading standard size print, and hearing other people speak in a room” (Verbrugge & Jette, 1994). Mental actions include cognitive and emotional functions such as short-term memory, speech, alertness, time and space orientation and affect. Mind and body functions are viewed as the “basic interface between a person and the social and physical milieu of daily activities.” The identification of functional limitations in mental actions can be achieved through formats that include self reports, proxy reports, or interviewer observations (Verbrugge & Jette, 1994).

Disability is defined as “experienced difficulty doing activities in any domain of life, due to a health or physical problem” (Verbrugge & Jette, 1994). Disability includes personal care activities of daily living (ADLs), household management instrumental activities of daily living (IADLs), paid employment, sleep, care for children and others, hobbies and other leisure activities, active sports and other physical recreation, entertainment away from home, religious services or activities, public service/clubs/adult education, socializing with friends and relatives and local transportation and travel (Verbrugge & Jette, 1994).

The main pathway of the Disablement Process reflects a socio-medical model of disability. Other key social concepts of the model are risk factors, exacerbations and interventions. Risk factors are epidemiologically defined as “demographic, social, lifestyle, behavioral, psychological, environmental and biological characteristics of an

individual that affect impairment, functional limitations and disability” (Verbrugge & Jette, 1994). In this regard, risk factors are considered predisposing variables that exist before or at the outset of the disablement process. Typically, these predisposing variables are long-term or even permanent features of the individual and are prompts for chronic conditions and their impacts (Verbrugge & Jette, 1994).

Exacerbations are instrumental in initiating and maintaining impairments, functional limitations and disability. There are three pathways by which an exacerbation can manifest itself. First, an intervention such as a medication regimen can cause side effects, or a surgical intervention might cause greater dysfunction. Second, an individual might adopt behaviors such as alcohol use, or perceptions that increase their disability. Third, social impediments can restrict an individual’s freedoms, such as prejudices, stigma and architectural barriers. In regard to these pathways, Verbrugge & Jette (1994) state that the first and second examples of exacerbations are direct responses to the disablement process, while the third example is considered a predisposing factor for the disablement process.

Interventions are actions taken by individuals or others such as medical professionals to reduce the effects of the disablement process. Interventions are defined as extra-individual (acted on or inserted from outside the individual) or intra-individual (initiated by or within the individual). Extra-individual interventions include medical care, rehabilitation services, medication regimens, therapeutic regimens, external supports (personal assistance services and assistive technologies) and the built, physical and social environment. Intra-individual interventions consist of lifestyle and behavior changes, psychosocial attributes and coping and activity accommodations. These

interventions are not predisposing factors, but intervene in the disablement process in an attempt to avert, delay or reverse outcomes associated with the disablement process (Verbrugge & Jette, 1994).

It is important to remember that the disablement process contains feedback loops for frail or longtime disabled individuals. As an example, Verbrugge & Jette (1994) cite the example of a female with arthritis who restricts her physical activity thereby compromising her cardiopulmonary status, inducing muscle weakness and exacerbating disability. Likewise, an individual who chooses to initiate alcohol intake to levels that are considered a risk exacerbate predisposing factors such as psychological risks (mental illness) as well as the main pathway concepts of impairments, functional limitations and disability, along the disablement process.

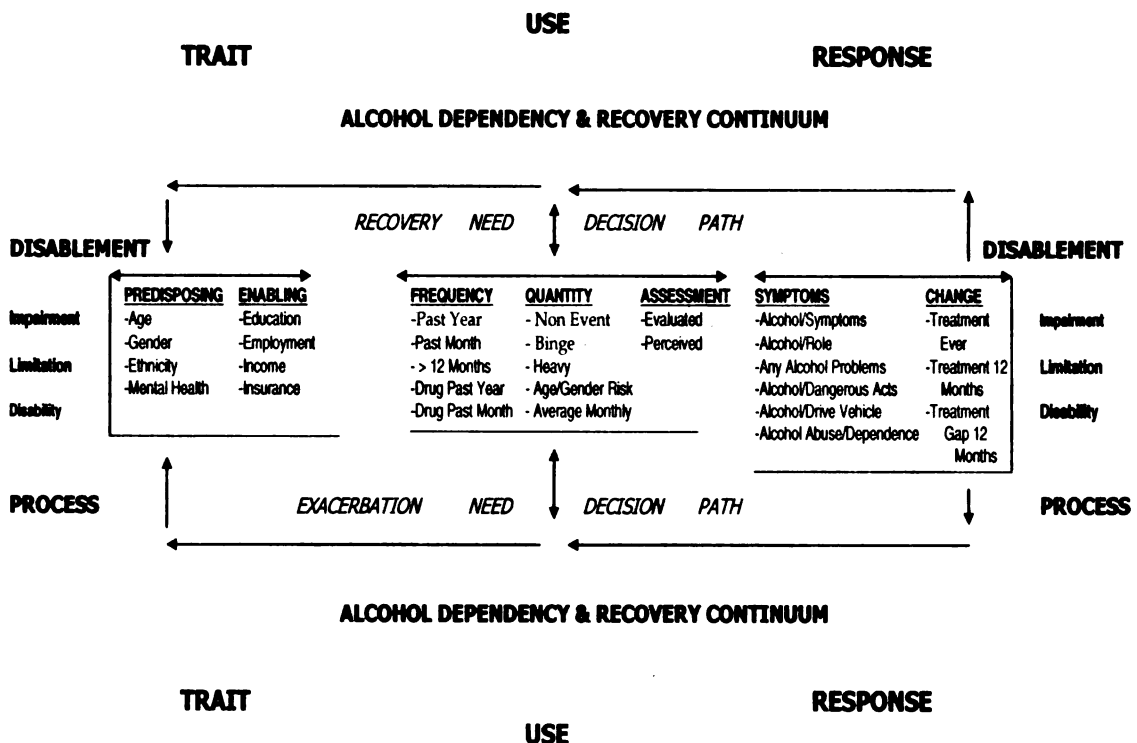
Substance Use Disablement and Recovery Model

The Andersen Behavioral Model was modified to integrate it with the Alcohol Dependency Syndrome and the Disablement Process (DP) to develop a framework for this study called the Substance Use Disablement and Recovery Model. In this framework, trait characteristics (predisposing characteristics and enabling resources) are viewed as influencing use characteristics and health behaviors (alcohol use), which are defined by quantity and frequency of substance use. Subsequently, alcohol use affects response characteristics (e.g. difficulty with activities in any social domain of life, due to a health or physical problem) and then causes disablement along the main pathway (including pathology, impairment, functional limitation, disability) in the Disablement Process (Verbrugge & Jette, 1994).

Alcohol use can lead to changes in behavior that are also classified as response characteristics in the SUDARM. These changes in behavior are treatment seeking or a treatment gap for services and they resonate with the Andersen Behavioral Model's concept of alcohol as a personal health practice that may influence service utilization decisions. Medical care and rehabilitation (includes counseling, etc.) are interventions in the Disablement Process which potentially alleviate disability, and are related to the Andersen Behavioral Model's concept of service utilization.

The Substance Use Disablement & Recovery Model provides a theoretical framework that describes the trait characteristics (predisposing, enabling), alcohol use (frequency, quantity and assessed need for treatment) and alcohol response characteristics (symptoms, change behavior). The model can be used as a framework for this study to investigate the relationships among the traits, use and responses.

SUBSTANCE USE DISABLEMENT AND RECOVERY MODEL (SUDARM)



The Alcohol Dependency Syndrome (Edwards & Gross, 1976) is used as a conceptual framework where alcohol use begins with alcohol intake, with the potential progression to alcohol abuse and dependency and to varying levels of disablement, and risk behaviors. Alcohol use facilitates a cycle of response characteristics (symptoms: disablement, risk behavior, abuse/dependence; change behavior: treatment, treatment gap). The Andersen Behavioral Model (Andersen, 1995) is modified to describe the relationship of trait characteristics (inherent or predisposing: e.g., age), and (acquired or enabling: e.g., education) to health behaviors (frequency: e.g., alcohol and illicit drugs past year and past month; quantity: e.g., binge, heavy; and assessment: e.g., evaluated). Trait characteristics and use patterns predict response characteristics, defined as disablement, risk behaviors and alcohol abuse/dependence, as well as decisions to seek treatment and experience treatment gap. Alcohol use is considered a pathway for the exacerbation or remission of alcohol related disablement, defined by the Disablement Process (Verbrugges & Jette 1994), a socio-medical model of disability. The main pathway concepts of the Disablement Process (pathology, impairments, functional limitations, disability) describe the progressive mental, emotional and physical decline, or improvement, of individuals in relation to exacerbations (e.g., alcohol) and interventions (e.g., treatment). The Disablement Process measures the degree of disablement along the main pathway of the model, from pathology to disability (Verbrugge & Jette, 1994).

A disease can be referred to as a syndrome, defined as a pattern of signs and symptoms that can be observed. A syndrome is classifiable as a disease if there is a significant deviation from a normal standard of health, and can be classified as a serious threat to health with life-threatening consequences. There is not a prerequisite that

etiology is identified prior to consideration of a syndrome as a disease. In fact, malaria and tuberculosis were classified as a disease prior to understanding their etiology.

Relative to alcohol abuse and alcohol dependence (mental disorders in DSM-IV), the American Psychiatric Association definition of a mental disorder is a “clinically significant behavioral or psychological syndrome or pattern that occurs in an individual and is associated with present distress (e.g. a painful symptom) or disability (i.e., impairment in one or more important areas of functioning) or with a significantly increased risk of suffering death, pain, disability or an important loss of freedom (American Psychiatric Association, 1994).”

In this manner, the disease concept of alcoholism is engrained in the ADS and the current DSM-IV. As such, the concept of alcohol dependence also links with the main pathway concept of pathology in the Disablement Process Model of disability. Pathology is associated with “biochemical and physiological abnormalities that are detected and medically labeled as disease, injury or congenital/developmental conditions” (Verbrugge & Jette, 1994). Therefore, alcohol use can be considered a predisposing exacerbation as well as a direct response exacerbation for disability, making it a more comprehensive exacerbation than Verbrugge & Jette (1994) envisioned in their development of the Disablement Process Model.

In Chapter III, a review of the empirical literature was developed and presented. The literature review is presented in accordance with the factors identified in the Substance Use Disablement and Recovery Model.

CHAPTER III: A Review of the Empirical Literature

The purpose of this chapter is to present a review of the empirical literature as it applies to alcohol use and selected predictors and outcomes associated with different patterns of alcohol use. The chapter presents an overview of alcohol use and focuses on the literature related to specific factors identified in the theoretical framework that are associated with alcohol use and its consequences in terms of disablement, risk behavior, alcohol abuse or dependence and alcohol treatment.

Alcohol Use Overview

The World Health Report concluded that five percent to 10 percent of the earth's population is affected by an alcohol related disease, contributing to 3.2 percent of global deaths, net of its benefits and responsibility for 4.0 percent of the global Disability-Adjusted Life Years (Rehm, Room, Monteiro, Gmel, Graham, Rehn, Sempas & Jernigan, 2003). Alcohol abuse is a major health problem that costs the U.S. economy billions of dollars each year (Rice, 1991; Harwood, 1998), and causes activity limitation in mental health disability (LaPlante, 2002), leading to increased disability rates (LaForge, Williams, Parker & Hartford 1990; Bilder & Mechanic, 2003).

The relationship between medical diagnosis and disability is complex. At the same level of functionality related to a medical diagnosis, some individuals will be considered disabled and others not (Verbrugge & Patrick, 1995). Disability is dependent on numerous issues, such as policy, perception, evaluation, genetics, environment and disease co-morbidities. The literature contains support for an array of theories on alcohol (West, 2001) as well, providing evidence that the reason individuals consume alcohol and

progress to problematic levels of alcohol consumption is also complex and not completely understood.

The initial decision by individuals to use alcohol is determined by genetic, social, environmental and psychosocial stimuli. Upon entering the brain, however, alcohol initiates a process which can promote continued alcohol seeking behavior and alcohol dependency (Edwards & Gross, 1976). This process can be hypothesized as acting in conjunction with the initial genetic, environmental and psychosocial stimuli that initiated the alcohol seeking behavior. This study does not seek to understand the determinants of alcohol seeking behavior, but rather focuses on selected predictor and outcome variables and their relationship to alcohol consumption.

Notwithstanding this objective, it is important to provide evidence of alcohol's relationship to disablement. Approximately two percent of the American population (5.3 million) is currently disabled as a result of a brain injury, with an annual cost to the economy of \$48.3 billion each year. Motor vehicle collisions account for 50 percent of these injuries; with falls, gunshot wounds, assaults and intentional injury resulting from drug and alcohol consumption (Wagner, Sasser, Hammond, Wiercisiewski & Alexander 2000) also contributing to disability.

Alcohol is reportedly involved in approximately 50 percent of head injuries prior to the actual time of accident, with 29 percent to 58 percent of individuals having a positive blood alcohol level (BAL) at the time of injury. In a survey of 142 recent traumatic brain injury clients, consecutively admitted to inpatient rehabilitation, 42.3 percent had a positive BAL and 32.3 percent were intoxicated ($\geq 100\text{mg/dl}$). Of the sample, 109 reported consuming alcohol in the month prior to injury, at a level of 11.2

average drinks per week, and 47.5 percent reporting binge drinking with 20 percent stating they have driven an automobile after ≥ 2 drinks prior to injury (Bombadier, Rimmele & Zintel, 2002). Spinal cord injury studies have also reported alcohol consumption or intoxication ranging from 17 percent to 79 percent. In addition, readmission rates for trauma injury patients at a level I trauma center have been more than two times higher for those that had been intoxicated at the time of the initial injury (Hubbard, Everett & Khan, 1996).

In terms of coronary artery disease (CAD), a leading cause of disability in developed countries, research on sibling pairs has reported a sibling pair concordance to CAD with regular alcohol consumption (Hauser, Mooser, Crossman, Haines, Jones, Winkelman, Schmidt, Scott, Roses, Pericak-Vance, Granger & Krause, 2002). In a study comparing matched controls (Mertens, Lu, Parthasarathy, Moore, & Weisner, 2003), the prevalence of congestive heart failure was higher in the alcohol dependence population than in the control group. These studies hypothesize that alcohol is a direct or covariate determinant of cardiac related etiology, or an antecedent consequence of a debilitating, chronic disorder.

Research also cites a relationship between substance abuse or dependence and Post Traumatic Stress Disorder (PTSD) in adolescents that had been physically or sexually assaulted, witnessed violence, or had family members with alcohol or drug abuse and dependence (Kilpatrick, Acierno, Saunders, Resnick, Best & Schurr, 2000). Another study of PTSD, alcohol and recurrent trauma at level I trauma centers found in excess of 50 percent of randomly selected patients admitted for surgery exhibiting high

levels of PTSD or an alcohol diagnosis (Zatzick, Jurkovich, Russo, Roy-Byrne, Katon, Wagner, Dunn, Uehara, Wisner & Rivara, 2004).

Affective disorders (major depression, mood disorders), another leading cause of mental health disability, are associated with co-morbid alcohol dependence (LaPlante, 2002) with approximately 30 percent of bipolar I and 20 percent of bipolar II patients considered alcohol dependent (Reiger, et al., 1990). Grant and Harford (1995) also report that 13.3 percent of those individuals 65 years of age and older with a major depressive disorder had an alcohol use disorder compared to 4.5 percent without major depressive disorder. Mostly, alcohol issues occur after the occurrence of affective disorders (Reiger et al., 1990), hypothesizing depression as an alcohol use pathway.

It has also been found that schizophrenia, a leading cause of mental health disability (LaPlante, 2002), has a co-morbid prevalence for substance abuse or dependence (Reiger et al., 1990) at a higher level than in the general population (47% vs. 16%), with alcohol the most frequently abused or dependent drug. A neurobiological hypothesis suggests a reward deficiency syndrome associated with dopamine as the cause (Green, Zimmet, Strous, Schildkraut, 1999).

Brain and spinal cord injuries, coronary artery disease, congestive heart failure, post-traumatic stress disorder, affective disorders and schizophrenia may present some pathways to alcohol abuse and dependence. The predisposing and enabling factors that lend to these disorders, as well as alcohol abuse and dependence, include genetic, environmental, psychosocial and situational variables. In this regard, it is acknowledged that the variables of this study are not all-inclusive of the universe of variables that would allow for the most complete investigation of alcohol and disablement. For instance,

genetic predisposition, community factors, access to care issues, family dynamics, physical and sexual abuse, spirituality, legal and judicial ramifications, health status, perceived need, cultural context, language, health care and substance abuse policy, political and economic issues, and globalization are examples of only a few additional variables that bear investigation. The selected variables for this study, however, comprise a core set of variables that are both important to the field of alcohol research as well as providing a basis for expanded, future research. Furthermore, this study focuses on the important linkage of alcohol quantity and frequency as a basis for investigating and presenting the odds ratios of progressively increased alcohol consumption and related outcomes of disablement symptoms, risk and abuse/dependence.

Literature Review Process

It is noteworthy that major studies on alcohol use across the lifespan have typically focused on risk behaviors and alcohol abuse or dependence as a key outcome variable. This research is valuable in understanding alcohol usage and its related risks. The identification of risk levels of alcohol consumption, however, must also be investigated as it relates to disablement. As a result, the objective of the literature review is to gain an understanding of alcohol use and self reported disablement symptoms that can lead to disability in community dwelling adults. Databases that were searched included PubMed, CINAHL, Sociological Abstracts and PsychINFO. Search terms (singularly and in combination with alcohol) included alcohol, adults, older adults, older age, aged, very old, elderly, geriatrics, gerontology, personal assistance services, activities of daily living (ADL's), instrumental activities of daily living (IADL's), unmet need, adverse consequences, health status, effects and drinking. Finally, an additional

literature review of 409 articles in PubMed, with the search string 'alcohol risk quantity,' was conducted.

The criteria for selection of the major articles was: (1) 1990-Present, (2) in the U.S., (3) in the community, (4) included adults, (5) alcohol related if possible, (6) defined setting, selection criteria, independent, dependent variables (7) reported results in statistical terms, (8) related to the study variables. Titles, abstracts and articles were reviewed and articles selected that met the selection criteria of the literature search in the opinion of this author. This process was extensive, although not exhaustive in terms of the field of literature on alcohol research.

Alcohol Use

As noted above, the World Health Report concluded that five percent to 10 percent of the earth's population is affected by an alcohol related disease and cites alcohol assessment as a key clinical initiative. Additionally, 34 percent of the global burden of disease (GBD) was attributed to behavior-related practices, which included drinking (Eisenberg, 1997). Further research identified alcohol as contributing to 3.2 percent of global deaths, net of the benefits attributable to alcohol. In this regard, the data for the U.S., Canada and Cuba are -1.6 percent mortality for women and 2.0 percent for men (Rehm et al., 2003). Importantly, Fillmore, Kerr, Stockwell, Chikritzhs and Bostrom (2006) have found that the cardiac protection of alcohol may be over estimated and the estimates of mortality associated with heavy alcohol use may be underestimated.

The Epidemiologic Catchment Area study cites the rate for lifetime occurrence of alcohol abuse or dependence as 13.5 percent (Kessler et al., 1994). In addition, Russell, Light, & Gruenewald, (2004) have reported on the linear relationship between alcohol

quantity/frequency and related problem outcomes. Specifically, respondents with minor alcohol related problems drank an average of 2.6 drinks on an average of two days/week with heavy alcohol consumption between 12 and 13 days in a year. Comparatively, individuals with minor and severe alcohol related problems consumed an average of 4.7 drinks on an average of 3.5 days/week with 58 heavy drinking days in the year.

Furthermore, it has also been estimated that older Americans suffer a prevalence of alcohol-related problems at a rate of two to 22 percent (Fink, Morton, Beck, Hays, Spritzer, Oishi and Moore, 2002). Finally, Blow, Walton, Chermack, Mudd and Browser (2000) and Patterson and Jeste (1999) report that the acceptance of alcohol among the “baby boomers” raises concern this group will increase the prevalence of alcohol problems among older adults.

The recommended maximum level of alcohol consumption for those less than 65 years of age is defined by the U.S. government as two drinks each day for men and one drink each day for women (Chermack, Blow, Hill & Mudd, 1996). For individuals aged 65 and above, the National Institute of Alcohol Abuse and Alcoholism (NIAAA) and the Center of Substance Abuse Treatment (CSAT) state the consumption of more than one drink per day constitutes an alcohol consumption risk (Blow & Barry, 2000).

Additionally, the Dietary Guidelines Advisory Committee (2005) recommends a maximum consumption for men and women as two and one standard drinks per day respectively. Importantly, standard drinks are defined as containing 0.6 ounces of alcohol, as compared to the NSDUH 2003 which defines a standard drink as containing one ounce of alcohol.

The Dietary Guidelines for Americans were mandated by the passage of Public Law 101-445 in 1990 and are a joint effort of the Department of Health and Human Services as well as the United States Department of Agriculture (Dietary Guidelines for Americans, 2005). The development of alcohol specific guidelines is based on two questions. The first question investigates the relationship of alcohol consumption (persons that consume four or fewer alcoholic beverages each day [with a sub-search for ages 65 and older]) and total mortality, as well as specific disorders such as cardiovascular disease, cancer and trauma. The second question involves the investigation of the relationship between the same levels of alcohol consumption and “(1) macronutrient profiles, (2) micronutrient profiles, and (3) overall diet quality” (2005 DGAC Report at <http://www.health.gov/dietaryguidelines>).

The consumption of five or more drinks in one day during the past 12 months translates into being six times more likely of being alcohol dependent (Caetano, Tam, Greenfield, Cherpitel & Midanik, 1997). Therefore, initiating the Alcohol Disablement and Recovery Continuum in the SUDARM with any consumption of alcohol, allows for the inclusion of at risk levels as well as abuse and dependence. This also allows for the investigation of any levels of consumption as a potential for adverse outcomes.

TRAIT CHARACTERISTICS (Predisposing)

Age

Caetano and Cunradi (2002) found the prevalence of 12 month alcohol dependence to vary by age: 18-29 (9%), 30-39 (5%), 40-49 (4%), 50-59 (2%), and 60+ (0%). Focusing on older adults in a study using the National Health Interview Survey Health Promotion and Disease Prevention Supplement, those who ever drank reported

drinking everyday in the last two weeks as follows: 55-64 (17.2%), 65-74 (20%), 75-84 (19.1%), >84 (18.1%) (Ruchlin,1997). In yet another study (n = 148) of community dwelling frail and functionally impaired elderly, 24 percent of the sample actively used alcohol at the time of the study (Emlet, Hawks, & Callahan, 2001). Also, a study of primary care clients (n=5065) 75+ still showed 11 percent of men and nine percent of women drinking in excess of the recommended guidelines (Adams, Barry & Fleming, 1996). In addition, Ruchlin (1997) found more persons 65-74 drank everyday and were heavy drinkers than those 55-64.

Gender

The National Co-morbidity Study (18-54) reports lifetime prevalence of alcohol abuse at 12.5 percent for men and 6.4 percent for women; and alcohol dependence at 20.1 percent for men and 8.2 percent for women (Kessler, Crum, Warner, Nelson, Schulenberg & Anthony, 1997). Caetano & Cunradi (2002) report 12 month rates of alcohol dependence, based on DSM-IV criteria, as six percent for men and two percent for women. Heavy drinking (>1 drink/day) in persons 65+ was 10.1 percent in men and 2.2 percent in women in the National Health Interview Survey-2000. With men, moderate drinking remained stable with age and heavy drinking decreased. In women, moderate drinking decreased while heavy drinking was stable (Breslow, Faden & Smothers, 2003).

Problem drinking in a study of older primary care clients found nine percent of men and two percent of women drank more than 21 drinks per week. Additionally, 15 percent of men drank more than 14 drinks per week, and 12 percent of women drank more than 7 drinks per week (Adams, Barry & Fleming, 1996), with male gender a

predictor of alcohol use (Nakamura, Molgaard, Stanford, Peddecord, Morton, Lockery, Zuniga & Gardner, 1990; Ruchlin, 1997; Emlet, Hawks, & Callahan, 2001).

Race

Caetano and Cunradi (1997) report the prevalence of 12 month alcohol dependence for those 18+ as four percent white, five percent black, seven percent Hispanic and three percent other. Ruchlin (1997) found in the NHIS that being white had an increased odds of drinking on all measures of drinking (drank > 5 days in past 2 weeks; drank > 3 drinks on occasion; drank everyday). In a study of drinking behaviors among whites, blacks and Mexican Americans, the authors also found variations in alcohol consumption (Molgaard, Nakamura, Stanford, Peddecord & Morton, 1990). Those respondents who were in the age category of 45-64 reported on their alcohol consumption levels when their ages were less than 40. The reported findings stated that moderate drinking levels occurred as white: 6.3 percent, black: 14.9 percent and Mexican American: 6.9 percent and severe drinking levels occurred as white: 13.4 percent, black: 17.5 percent and Mexican American: 7.8 percent. For drinking levels reported after age 40 by this same group, moderate drinking levels occurred as white: 7.9 percent, black: 12.0 percent and Mexican American: 5.2 percent and severe drinking levels occurred as white: 12.3 percent, black: 14.6 percent and Mexican American: 5.5 percent.

Individuals in the study that were currently in the age category of 65 and older also reported on their alcohol consumption patterns before they were 40 years of age and then after they were 40 years of age. For this group, moderate drinking levels before age 40 occurred as white: 3.3 percent, black: 8.7 percent and Mexican American: 6.5 percent while severe drinking levels occurred as white: 5.8 percent, black: 10.5 percent and

Mexican American: 10.1 percent. Drinking levels after age 40 for moderate drinking occurred as white: 5 percent, black: 7.0 percent and Mexican American: 3.6 percent while severe drinking levels occurred as white: 4.4 percent, black: 9.4 percent and Mexican American: 9.1 percent (Molgaard et al., 1990). Aside from variations related to ethnicity, variations among the age cohorts were also present. In this regard, those in the 45-64 year age group reported higher consumption levels in all categories except that Mexican Americans in the 65+ age group reported a higher percentage of moderate and severe alcohol intake levels after age 40. Overall, this data may sustain concerns that younger cohorts are in fact consuming higher quantities of alcohol, and that these consumption levels may be evident in emergent, aging populations of different ethnicities.

Variations in care, in relation to ethnicity, have been cited in the literature. Differential care has been established in testing for alcohol and drugs with U.S. trauma patients. Research has found that black and Hispanic males were tested for alcohol more frequently than white males in all injury severity categories, with Hispanic males tested more frequently than white males for drugs in the moderate injury group. This discrepancy bodes ill for potential care when alcohol and drug abuse is suspected (Kon, Pretzlaff & Marcin, 2004).

Mental Health Disorders

In research on global burden of disease it has been reported that neuropsychiatric disorders contributed mostly to alcohol-attributable disease burden (Rehm et al., 2003). The Epidemiologic Catchment Area study cites rates for lifetime occurrences of mental disorder, alcohol abuse or dependence, and drug abuse or dependence as 22.5 percent, 13.5 percent and 6.1 percent respectively. Twenty two percent with a lifetime mental

disorder had an alcohol abuse history, and 37 percent with a lifetime alcohol disorder had one or more mental disorders. For those with either an alcohol or drug disorder, the odds of having the other addictive disorder were seven times greater than the rest of the population (Reiger et al., 1990).

The National Co-morbidity Study (NCS) documented lifetime and 12 month prevalence rates of DSM-III-R psychiatric disorders in the non-institutionalized U.S. population aged 18-54 (Kessler, McGonagle, Zhao, Nelson, Hughes, Eshleman, Wittchen & Kendler, 1994). Approximately 50 percent of respondents (n=8098) reported at least one lifetime disorder with 30 percent reporting at least one 12 month disorder. Additionally, it was found that 14 percent of the population, which had a history of three or more co-morbid disorders, accounted for more than 50 percent of all reported lifetime disorders. The most common psychiatric disorders were major depression and alcohol dependence with lifetime and 12 month rates of depression reported as 17 percent and 10 percent of the sample respectively, and alcohol dependence reported at 14 percent and seven percent respectively (Kessler et al., 1994).

Furthermore, the NCS found alcohol abuse or dependence had a high probability of association with at least one other lifetime DSM-III diagnosis. In this regard, it has been reported (Kessler, Crum, Warner, Nelson, Schulenberg & Anthony, 1997) that co-occurring alcohol disorders initiate at a later point in time than at least one other DSM-III-R disorder and that earlier disorders generally more strongly predict alcohol dependence versus alcohol abuse, and are stronger predictors in women. The NCS data also suggest that alcohol disorders typically follow another non-substance abuse, mental

disorder and the rate of most psychiatric disorders in the general population decline with age and higher socioeconomic status (Kessler et al., 1994).

In a Veterans Administration study (N = 12,331) of older adults, co-morbid alcohol and psychiatric disorders (Dual Diagnosis) did decline significantly with age, from 30.4 percent (< 55) to 13.5 percent (55-64), 7.3 percent (65-74) and 4.4 percent (75+), and importantly, 10 percent of the total sample 55+ and 6.9 percent of those individuals 65+ were dual diagnosed (DD) with alcohol and psychiatric disorders. Furthermore, elderly DD had higher rates of complete service connected disability than non DD elderly (18.1% vs. 12.4% respectively). Schizophrenia was the most prevalent psychiatric diagnosis among elderly DD, at 17.1 percent, followed by depression (14.5%). The most frequent substance abuse disorder (81%) was alcohol (Prigerson, Desai, & Rosenheck, 2001).

In a study of older problem drinkers (n = 78) recruited from non-treatment settings, average and maximum consumption during follow-up were significantly related to feeling depressed (Walton, Mudd, Blow, Chermack, & Gomberg, 2000). Furthermore, late onset drinkers with problems (n = 197) at or before 50 more likely had a history of prolonged depressed mood (Schutte, Brennan & Moos, 1998). In addition, Reifman and Welte (2001) found past history of major depression, dysthymia and alcohol dependence independently predicted the presence of a current AXIS I disorder (primary, active mental health disorder except for mental retardation or personality disorder) (n = 2325) in older adults, which mirrors a study (n = 95) of low income mentally and medically ill elderly (Arean & Alvidrez, 2001).

Blow, Walton, Chermack, Mudd and Browser (2000) studied clients admitted to elder specific substance abuse treatment for alcohol dependence and alcohol abuse (n=90). The onset of an alcohol use disorder (AUD) was prior to 50 years in 69.1 percent of clients, with the average age at 35.6, average number of drinks daily 3.54, 29.44 mean years of social drinking, 15.5 mean years heavy drinking and 11.29 mean years abstinence. Of the sample, 31 percent had a psychiatric diagnosis. These were anxiety (26.3%), social phobia (7.8%), generalized anxiety disorder (7.3%), agoraphobia (7.6%), simple phobia (7.8%), PTSD (6.3%), panic disorder (1.3%), major depression (17.5%), anti-personality disorder (3.1%), nicotine (57.8%), sedatives (13.8%) and opiate usage (6.2%).

Thomas and Rockwood (2001) also found (n = 2873) all dementias, except Alzheimer's, were more prevalent with definite and questionable alcohol abuse. In addition, Graham and Schmidt (1999) used a survey to address this question (n = 826) and found that increased quantity and volume of alcohol was related to poorer psychosocial well-being, and high volume drinking clients had lower satisfaction with family, increased depression and a lower sense of coherence.

Furthermore, Reifman and Welte (2001) found a significant relationship between alcohol problems before age 60 and depressive symptoms (n = 5722). Finally, in a study of primary care patients aged 18-70, it was reported that patients with major depressive disorder, bipolar disorder, phobias and substance abuse disorders had significantly increased disability (Olfson, Fireman, Weissman, Leon, Sheehan, Kathol, Hoven & Farber, 1997).

In a study of the National Health Interview Survey, the odds of applying for disability benefits increased with a serious mental illness (Bilder & Mechanic, 2003), with applicants (18-65) more likely having a co-morbid physical and/or substance abuse condition. Another study of the NHIS found that those who recalled drinking two weeks prior to their onset of disability had higher rates of disability than nondrinkers, or those who did not drink for a two week period prior to the survey (Laforge, Williams, Parker, & Hartford, 1990).

In the 1994 and 1995 National Health Interview Survey, disability supplement was used by LaPlante (2002) to measure mental disorders based on self report of seven conditions and eight disorder questions including alcohol abuse disorder, whether a health professional provided a diagnostic name for a specific disorder and the assignment of ICD-9 codes associated with the self-report data. This research reported mental health disability as fourth in prevalence of disability at 18.6 percent, and that a mental disorder was slightly more likely to be mentioned as a principal cause of limitations. LaPlante (2002) found that unipolar depression, adjustment reactions and alcohol abuse had the most chance of being reported as secondary conditions that limited activity.

To examine psychopathology and the initiation of disability payments (Kouzis & Eaton, 2000), data from the ECA were examined. The highest rates for the start of disability payments were schizophrenia (5.4%) and panic disorder (5.1%). Those with more than one disorder constituted more than four percent of the sample. Alcohol abuse or dependence reflected a starting rate of disability payments of 2.6 percent; however, the adjusted relative odds of starting payments was 1.0 with a 95 percent CI of .42-2.25. The authors note that the federal legislation, which eliminates persons from Social Security if

their alcohol or drug impairment is the primary source of disability, may be the underlying reason for this finding. Interestingly, major depressive disorder and phobia constituted the largest co-morbid group, with phobia and alcohol abuse or dependence comprising the second largest group. Co-morbidity was a significant predictor of starting disability payments with an almost three times greater risk (OR = 2.8, 95% CI 1.37-5.58) (Kouzis & Eaton, 2000).

In a nested case-control study within the Epidemiological Catchment Area Follow-up Study in Baltimore, Maryland, 168 new cases of disability (limitations in activities of daily living) in adults were evaluated for antecedent psychopathology, compared to non disabled controls. Age and gender adjusted odds ratios for incident disability in ADL's were found for phobia (OR = 1.9, 95% CI 1.3-2.8), alcohol abuse and dependence (OR = 2.5, 95% CI 1.5-4.2), and major depressive disorder (OR = 4.2, 95% CI 2.2-8.3) (Armenian, Pratt, Gallo, & Eaton, 1998).

Declining prevalence of disability has been cited in studies of the National Long Term Care Survey (NLTCS) 1982-1994 (Manton, Stallard & Corder, 1998) and the NHIS surveys from 1982 to 1996. The authors found gains with the most educated, but not with severe personal disability. The growth of the assisted living population, which was not included in the survey may explain overall declines in disability as more individuals move from institutional care to home and community based care (Schoeni, Freedman and Wallace 2001). In addition, emergent trends with those receiving Medicare benefits may actually increase disability prevalence and cost (Foote & Hogan, 2001). Bilder & Mechanic (2003) report individuals with mental disorders (age <65) were employed at a lower rate than the general population, yet represent the largest group to receive SSI or

SSDI benefits. Furthermore, this age group population (Foote et al., 2001) has increased 18.6 percent (1995-1999: 818,340 persons), with the prevalence of severe mental illness (725,000 persons) costing Medicare \$3.2 billion per year.

In a study of the National Health Interview Survey (NHIS), those who recalled drinking two weeks prior to their onset of disability had higher rates of disability than nondrinkers or those who did not drink for a two week period prior to the survey (Laforge, Williams, Parker, & Hartford, 1990). Another study of the NHIS found that the odds of applying for disability benefits increased with a serious mental illness (Bilder & Mechanic, 2003), with applicants (18-65) more likely having a co-morbid physical and/or substance abuse condition. LaPlante (2002) reported that mental health disability was fourth in prevalence of disability at 18.6 percent, and that a mental disorder was slightly more likely to be mentioned as a principal cause of limitations, and that unipolar depression, adjustment reactions and alcohol abuse had the most chance of being reported as secondary conditions that limited activity.

Trait Characteristics (Enabling)

Education

Ruchlin (1997) found those with at least one year of college education displayed greater odds of at risk drinking. Caetano and Cunradi (2002) report prevalence of 12 month alcohol dependence in those 18+ as five percent (less than high school), four percent (completed high school), four percent (some college) and four percent (college graduate). These studies indicate that increased education may contribute to increased risk of drinking, with a slight reversal for alcohol dependence.

Employment

In researching the 1980-81 Epidemiologic Catchment Area survey, Mullahy and Sindelar (1993) reported that an alcoholism diagnosis negatively effected full time employment. They also noted that problem drinking increased unemployment in males, though results for males were not significant in a study of the 1988 Alcohol Survey of the National Health Interview Survey (Mullahy & Sindelar, 1996). Furthermore, Kenkel and Wang (1998) found that those individuals classified as alcoholics were less likely to have white collar jobs, receive fringe benefits, less apt to be employed full time, and at greater risk of being injured on a job.

Income

Caetano and Cunradi (2002) report prevalence of 12 month alcohol dependence as six percent (<\$10,000), three percent (\$10,000-19,999), five percent (\$20,000-29,999), six percent (\$30,000-39,000), two percent (40,000-59,000) and five percent (\$60,000+). In another study, Ettner (1995) stated that higher income increases the prevalence of alcohol consumption. Conversely, the NCS found that the prevalence of most psychiatric disorders decreased with higher socioeconomic status (Kessler et al., 1994). In researching the 1980-81 Epidemiologic Catchment Area survey, Mullahy and Sindelar (1993) reported that an alcoholism diagnosis negatively effected income. They also reported that a lifetime diagnosis for alcohol corresponded to a decrease in income of 20 percent.

Health Insurance

In a telephone survey, the likelihood of having a diagnosis of alcohol, drugs or mental illness was highest for Medicaid recipients and the greatest perceived unmet need for alcohol, drug and mental health services has been reported by the uninsured (Wells,

Slebourne, Sturm, Young & Burnam, 2002). In another study of those 15+ years old receiving emergency room services, bills of alcohol users were more often paid by Medicaid, compared to Worker's Compensation or commercial insurance (Waller, Skelly & Davis, 1995).

USE CHARACTERISTICS (Frequency of Illicit Drug Use)

Illicit Drugs

The Epidemiologic Catchment Area study cites rates for lifetime occurrences of mental disorder, alcohol abuse or dependence, and drug abuse or dependence as 22.5 percent, 13.5 percent and 6.1 percent respectively. Twenty two percent with a lifetime mental disorder had an alcohol abuse history and 37 percent with a lifetime alcohol disorder had one or more mental disorders (Reiger et al., 1990). For those with either an alcohol or drug disorder, the odds of having the other addictive disorder were seven times greater than the rest of the population (Reiger et al., 1990).

RESPONSE CHARACTERISTICS (Disablement and Risk Behaviors)

Emotional, Mental, Physical and Role Function Disablement

According to the Survey of Income and Program Participation (SIPP), the overall rate of disability for the U.S. civilian, non-institutionalized population is 19.7 percent (52.6 million people), with 12.3 percent (33 million people) reporting a severe disability. The prevalence of any disability and severe disability increased by age group from 10.7 percent and 5.3 percent respectively (age 15-24) to 73.6 percent and 57.6 percent respectively (age 80+). Blacks had the highest rate for likelihood of disability at 15.7 percent, followed by non-Hispanic whites (12.2%), Hispanics (9.7%), and Asian and Pacific Islanders (8.5%) (U.S. Census Bureau, 2001).

In a study (n = 161) of the relationship between excessive drinking and functional impairment in older adults, those with instrumental activities of daily living (IADL) and activities of daily living (ADL) impairments drank more as a group (>14 drinks/week) (Moore, Endo & Carter, 2003). Moore et al. (2003) found that alcohol intake of more than seven drinks each week was associated with impairments in IADL, as did consumption of more than three drinks on any occasion. One study showed that ADL and IADL function is not compromised with current alcohol intake in older, cognitively impaired adults, although former drinkers did exhibit poorer IADL function (Reid, Concato, Towle, Williams & Tinetti, 1999). On the other hand, exercise and moderate alcohol use has shown an association with better functional status and decreased rates of functional decline (Wang, van Belle, Kukull, & Larson, 2002).

Damage to the brain is a potential risk associated with chronic alcohol use with even moderate drinking being linked to deficiencies in mental functions associated with information acquisition, storage, retrieval and processing. These deficiencies can contribute to poorer job and academic performance (NIAAA, 2001). In addition, severe alcoholism can lead to disorders such as Wernicke-Korsakoff syndrome which inhibits the retention of new information for more than a few seconds (NIAAA, 2001).

The most common brain impairments associated with alcohol use are in the domains of higher cognitive functioning and visual-spatial ability. Impairments with higher functioning negatively affect an individual's ability to develop a plan, carry out components of the plan or make changes as warranted. This individual might be able to file documents in an existing system, but might not be able to devise a new system of

filing. The impairment of visual-spatial ability negatively affects an individual's capability to drive a drive or to follow simple instructions (NIAAA, 2001).

In a study of occupational versus non-occupational injuries that led to a presentation for emergency room services, the researchers found that the rate of at-risk drinking was similar between the two groups (McLean, Blow, Walton, Gregor, Barry, Maio, and Knutzen, 2003). Other research has found that actual consumption of alcohol in the work environment is encouraged or inhibited by organizational controls and issues such as low autonomy, boredom, limited control, and lack of respect. Importantly, the loss of productivity attributed to alcohol was \$119 billion in 1985 (Harwood et al., 1992).

Alcohol abuse has been associated with work and family conflicts (Frone and Russell, 1993). It has also been linked to an increase in male-to-female intimate partner violence in relationships where the male is diagnosed with anti-personality disorder. Additionally, an increase in marital dissatisfaction has been reported in relationships with groupings of disorders that included any substance use disorder (Whisman, 1999). Unfortunately, social role conduct is also marred by the fact that approximately 50% of all violent crimes are committed under the influence of alcohol (Collins and Messerschmidt, 1993).

Drinking Alcohol & Doing Dangerous Things or Driving a Car Risk Behaviors

Alcohol use also translates into hazardous behavior patterns which can lend toward disabling consequences. In a study of hazardous drinking behavior, including older adults, 67 percent reported either driving their car or driving with someone after drinking. Harmful drinkers reported this behavior at a rate of 76 percent, with 64 percent

of at risk clients also reporting this risky behavior (Moore, Morgenstern, Harawa, Fielding, Higa & Beck 2001).

The legal limit for a blood alcohol concentration (BAC) is 0.08-0.10 in most states. More complex driving tasks actually increase the likelihood that lower levels of alcohol will adversely affect driving skills. Research has found that a BAC limit between 0.02-0.04 increases the odds of a single vehicle crash to 1.4 times that of nondrinkers. In addition, a BAC of 0.05-0.09 increases the risk to 11.1 times, a BAC of 0.10-0.14 increases the odds to 48 times and a BAC of 0.15 has been found to increase the risk of a single vehicle accident to 380 times that of a non-drinker (NIAAA, 1996). Furthermore, studies with pilots in simulators have found performance impairments at BAC levels as low as 0.04 and an impaired performance state for 14 hours following BAC levels of 0.10-0.12. Frighteningly, a 160 pound man will be at a BAC level of 0.04 one hour after consuming two alcoholic beverages on an empty stomach, with females reaching specific BAC levels with less alcohol consumption than males (NIAAA, 2001).

In a group of elderly emergency room admissions, screened positive for alcohol, motor vehicle accidents were at a level of 36.7 percent for those >65. In addition, falls occurred with 49.5 percent of those >65 and assaults were twice as prevalent in elderly who used alcohol at 8.3 percent versus those not using alcohol at four percent (Zautke, Coker, Morris & Stein-Spencer, 2002). In a randomly selected, retrospective cohort study of persons who did drink alcohol (n = 154,031) and those that did not drink alcohol (n = 770,155), 20,620 reported total hip fractures were investigated. Results found that 6,973 were attributed to the alcohol group, reflecting a 2.6 percent increased risk and a

risk for reducing long-term survival (Yuan, Dawson, Cooper, Einstadter, Cebul & Rimm 2001).

In another study, an association between alcohol consumption and intentional traumatic brain injury was found (Wagner, Sasser, Crawford, Hammond, Wiercisiewski & Alexander, 2000). Alcohol has also been reported as present in the onset of traumatic spinal cord injuries test outcomes for alcohol (McKinley, Kalakowski & Kreutzer, 1999, Garrison, Gleason, Tun, Brown, & Garshick, 2004). In fact, a one year, post traumatic brain injury study by Horner, Ferguson, Selassie, Labatte, Kniele and Corrigan (2005) found that heavy drinking was reported by 15 percent of the respondents with 14.3 percent reporting moderate drinking. Though studies are mixed on alcohol use and suicides in older adult populations, the data suggests there may be a relationship in conjunction with other age related variables such as depression, medical complications, lack of social support and perceived negative health status (Blow, Brockmann & Barry, 2004).

RESPONSE CHARACTERISTICS (Treatment)

Treatment

The National Survey on Drug Use and Health (NSDUH) 2003 (U.S. Dept. of Health and Human Services, 2004) reported that approximately 18.2 million persons 12 years of age and older were in need of alcohol treatment. A study of the 1995 & 1996 National Household Survey on Drug Abuse (NSHDA) identified 18.3 percent who attempted to receive treatment for substance abuse or mental health or both (Green-Hennessy, 2002). In the National Household Survey of 1997 and 1998, 10.9 percent

perceived a need for alcohol, drugs and mental health services (Sturn & Sherbourne, 2001).

Treatment Gap

Of the approximately 18.2 million persons reported by the NSDUH to be in need of alcohol treatment, only 1.3 million actually received this treatment in a specialty facility (U.S. Dept. of Health and Human Services, 2004). Furthermore, of the approximately 16.9 million persons who did not receive alcohol treatment, there were 629,000 persons who felt they did need treatment, with 173,000 making an unsuccessful attempt at receiving treatment and 469,000 making no attempt. Of the 18.3 percent of persons attempting to receive treatment, as reported by the NHSDA 1995-1996, 33 percent of those who did receive services did not receive substance abuse services (Green-Hennessy, 2002). Of the 10.9 percent who perceived a need for treatment, as reported in the National Household Survey of 1997 and 1998, 15 percent did not receive any services (Sturn & Sherbourne, 2001).

Summary

The literature provides evidence of the prevalence of alcohol use across the lifespan, with specificity to predisposing trait characteristics such as age, gender, ethnicity and mental health symptoms. In addition, the research suggests that enabling trait characteristics, such as education, employment, income, health insurance and mental health symptoms may predict variability in alcohol use (frequency, quantity, assessment). It is understood that this dissertation is not able to provide evidence of causality between alcohol and disabling conditions. Certain disablement outcomes, however, can be attributed to alcohol use due to a respondent's self-reports on alcohol consumption levels

and related disablement, risk behaviors, alcohol abuse or dependence and treatment seeking behavior. For other outcome variables, an inference can be made that alcohol is a contributory factor.

The literature would suggest that alcohol dependence is at its highest level in the age category of 18-24, and then declines in each successive age cohort (Caetano & Cunradi, 2000). As a result, those respondents that are 65 years of age and older are expected to be at a lesser risk than any other age in relationship to certain outcome variables of this study. Interestingly, we were not able to fully understand the relationship of age and alcohol consumption to disablement due to the limited and conflicting findings in the literature. The combination of disability increasing with age (U.S. Census Bureau, 2001) and alcohol dependence decreasing with age presented an area of unique interest to the study.

Male gender was presented in the literature as a greater risk than female gender for alcohol abuse and alcohol dependence (Kessler et al., 1997) and was therefore expected to be more predictive of all alcohol consumption categories, as well as the negative consequences associated with alcohol and treatment seeking behavior in this dissertation. The literature also indicated that there are variations in alcohol consumption patterns related to ethnicity/race (Caetano and Cunradi, 1997; Ruchlin, 1997; Molgaard et al., 1990); however additional research on ethnicity is required and this dissertation did not hypothesize a predictive relationship between ethnicity, alcohol consumption and the other study variables.

Importantly, mental health disorders and illicit drug use were strongly linked to alcohol use in the literature and were expected to consistently predict alcohol use and its

consequences (Reiger et al., 1990; Kessler et al., 1994). Also, there is prolific evidence regarding alcohol's relationship to negative outcomes and treatment seeking behavior, and the supposition that certain patterns of alcohol consumption would predict these outcomes was an inherent part of the dissertation hypotheses. The frequency and quantity of alcohol consumption at which point these consequences present themselves is subject to argument, however, due to the need for more research in this area.

The literature also presents evidence of the relationship between education, employment, income and alcohol consumption and its related outcomes (Ruchlin (1997; Caetano & Cunradi, 2002). The outcomes reported in the research that was cited in this literature review; however, involved descriptive data on whether alcohol was consumed, alcohol abuse and alcohol dependence. Finally, treatment seeking and the gap in needed treatment services are identified in the literature (U.S. Dept. of Health and Human Services, 2004; Sturn & Sherbourne, 2001).

The literature provides evidence to support the variables in this study. Importantly, this research places the investigation within a sociological context, as opposed to that of a medical model. The NSDUH 2003 survey uses self-report data on disablement, risk behaviors, alcohol abuse or dependence and treatment seeking behaviors. The aims, hypotheses and methodology are discussed in Chapter IV.

CHAPTER IV: METHODOLOGY

This study was a secondary data analysis of a large, national data set, the National Survey on Drug Use and Health 2003. The purpose of this chapter is to introduce and explain the methodology employed in this study. The first section of this chapter introduces re-introduces the specific aims and hypotheses of this study. The second section introduces the National Survey on Drug Use and Health (NSUDH) 2003. The third section describes the statistical software used in this study, data management techniques, and management of missing data. Subsequently, a table of descriptive statistics for the study variables was developed in terms of frequencies. Thereafter, the analytical methods for each of the two specific aims were described.

Specific Aim 1: To investigate the relationships of trait characteristics and alcohol use in terms of frequency and quantity, as well as an evaluated need for treatment.

HYPOTHESIS 1a: Traits (age, male gender, more education, increased income and select mental health symptoms) and illicit drug use in the past year will positively predict alcohol use (frequency: past year and past month). Hypothesis 1a was designed to test whether traits and drug use predicted the frequency of alcohol use. Table 15 shows the results of the logistic regression.

HYPOTHESIS 1b: Traits (age, male gender, more education, increased income and select mental health symptoms), and illicit drug use past year, will positively predict alcohol risk patterns of consumption (binge or heavy and age/gender).

HYPOTHESIS 1c: Traits (age, male gender, more education, increased income and select mental health symptoms), and illicit drug use in the past year, will positively predict alcohol use (average monthly consumption).

HYPOTHESES 1d: Traits (age, male gender and mental health symptoms), use of illicit drugs in the past year and quantity risk levels of monthly alcohol use [(a) binge, heavy, age/gender risk (b) monthly average] will positively predict an evaluated need for alcohol treatment.

Specific Aim 2: To investigate the relationship of trait characteristics, as well as drug frequency and alcohol need characteristics on alcohol response characteristics.

HYPOTHESES 2a: Trait characteristics (male gender and mental health symptoms) and need characteristics [illicit drugs past year and quantity risk levels of monthly alcohol use (a) binge, heavy, age and gender risk (b) monthly average] will positively predict alcohol disablement, alcohol risk and alcohol abuse/dependence. Ages 18-34 will predict risk and abuse/dependence.

HYPOTHESIS 2b: Traits [age, male gender, education, income and mental health symptoms) and use (illicit drugs past year and quantity risk levels of monthly alcohol use (a) binge, heavy, age and gender risk (b) monthly average] will positively predict treatment (alcohol treatment ever, alcohol, drug or mental health treatment in the past 12 months, and treatment gap for alcohol).

HYPOTHESIS 2c: Traits (age, male gender, education, income and mental health symptoms) and use [illicit drugs past year and quantity risk levels of monthly alcohol use (a) binge, heavy, age and gender risk (b) monthly average] and selected disablement and risk variables (emotional, physical and role problems, alcohol and dangerous activities and driving a car) will positively predict treatment (alcohol treatment ever, alcohol, drug or mental health treatment in the past 12 months).

Data Set

The National Survey on Drug Use and Health (NSDUH) 2003 was selected as the most recent, appropriate data set for the investigation of the relationship of alcohol to selected health outcomes that include measures of disablement. This determination was made after investigating numerous data sets, the results of which can be found in *Appendix B*.

The NSDUH 2003 was developed by the Office of Applied Studies (OAS), within the Substance Abuse and Mental Health Services Administration (SAMHSA), which serves as the public health agency within the United States Department of Health and Human Services (DHHS). This office leads the Federal research efforts on substance abuse and mental health treatment access. The NSDUH, formerly known as the National Household Survey on Drug Abuse, publishes both quarterly and annual data that are primarily related to substance use. The design of the NSDUH is intended to provide incidence and prevalence estimates for alcohol and drugs, and to report on substance use and abuse patterns as well as their related consequences. Additionally, the NSDUH focuses on treatment and the perceived need for treatment. Importantly, the NSDUH includes questions from the Diagnostic and Statistical Manual of Mental Disorders that allow for the investigation of mental health symptoms.

The decision to use the NSDUH, 2003 for this study was based on several reasons. First, the data is from the most recent national survey that can be generalized to the US population living in the community. Second, the survey captures extensive data on alcohol use in terms of its frequency and amount. Third, it identifies individuals that would be classified as having alcohol abuse and dependence in accordance with the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) (American Psychiatric Association, 1994), as presented in Table 1, Chapter II: Theoretical Framework. Fourth, information on the personal use of illicit drugs, substance use treatment, mental health disorders and treatment are also captured in participant's survey responses. Fifth, the NSDUH captures respondent's self report of disabling symptoms that can be attributed to alcohol use.

Population

The study population of the National Survey of Drug Use and Health 2003 is based on a sample of the civilian, non-institutionalized U.S. population who are 12 years of age and older. The sample includes civilian inhabitants of military installations, and those individuals residing in rooming houses, college dormitories, shelters and group homes. The collection methods included computer-assisted personal interviews as well as audio computer-assisted, self interviews. The study sample is a "multi-stage area probability sample for each of the 50 states and the District of Columbia" (U.S. Dept. of Health and Human Services, 2004). For this study, all individuals under the age of 18 were eliminated from the analysis.

Design

The sample design involves a five-year design process (1999-2003) with the objective of providing estimates of drug use at the national and state levels. The first level of stratification was at the state level. For this design timeframe, eight states were designated as large states (California, Florida, Illinois, Michigan, New York, Ohio, Pennsylvania and Texas) and the sample size selected (3,541 to 3,711) allowed for estimates of drug use within these states. The remaining 42 states and the District of Columbia had smaller sample sizes that were selected (856-964) and the ability to estimate drug use in these states was supported with “small area estimation (SAE) techniques” (RTI International, 2004).

The second stratification level in the NSDUH 2003 design was into 900 field interviewer (FI) regions. Each large state had 48 FI regions and each small state had 12 (FI) regions. The third level of stratification was the combining of adjacent census blocks within each FI region as the “first stage sampling units called segments” (RTI International, 2004). These segments constituted the primary sampling units and the dwelling units within these area segments were listed in a standardized order and then selected through systematic sampling. In each of the FI regions there were eight of these sampling units with two of the sampling units in each FI region actively sampled in each quarter of the year for 2003. This strategy allowed for the sample to be active in each FI region at all times during 2003. The NSDUH 2003 sample is weighted so that the sample can be generalized to the U.S. and the individual states (RTI International, 2004).

Each dwelling unit was visited by an FI to determine eligibility and conduct interviews, with each respondent selected by handheld computer from the address roster

and receiving \$30 for the completed interview. In this manner, the targeted age groups were 12-17, 18-25, 26-34, 35-49 and 50 and older. Coordination was conducted between the size measures used to select the area segments, and the dwelling unit and person level selection process to ensure a near self weighting sample for each of the age categories chosen. The result was an approximately equal number of individuals within the age categories of 12-17, 18-25 and 26 and older (U.S. Dept. of Health and Human Services, 2004). The original NSDUH 2003 sample included 67,784 persons which was reduced to 55,230 with the public use data file due to a “subsampling step used in the disclosure protection procedures” (U.S. Department of Health and Human Services, 2004).

Cases were evaluated for meeting minimum response requirements. The final weighted screening response rate is 91 percent with a 77 percent Computer Assisted Interview (CAI) weighted interview response rate (U.S. Dept. of Health and Human Services, 2004). In this study, respondent’s 12-17 years of age were excluded. As a result, the study population was comprised of 37,026 individuals. This is weighted to the population of 212,686,651.

The NSDUH, 2003 public use dataset was accessed through the Substance Abuse and Mental Health Data Archive (SAMHDA) website at <http://www.icpr.umich.edu/SAMHDA/>. The SAMHDA, which is an initiative of the Office of Applied Studies (OAS) is based at the Inter-University Consortium for Political and Social Research (ICPSR).

NSDUH 2003 Weighting Procedures

The regression analyses in this study were conducted on the weighted sample, defined as the “final sampling weight” where the estimated size of the target population is

equal to the sum of the weights for each respondent over all respondents in the NSDUH 2003 (U.S. Department of Health and Human Services, 2003). The results are intended to provide an unbiased estimate for the entire study population due to the fact that the estimated results from the NSDUH 2003 are based on sample survey data rather than complete data for the population the study is intended to represent.

The “basic sampling weights” (U.S. Department of Health and Human Services, 2003) are equivalent to the inverse of the probability that a respondent would be chosen to participate in the NSDUH 2003 survey process. This means that the lesser the chance a respondent has of entering the survey, the greater the weight that is accorded to that respondent. In terms of determining the probability that an individual might have in being selected for the survey, the NSDUH did so by summing the results of “three stagewise sampling probabilities” (U.S. Department of Health and Human Services). The probability of a respondent i entering the survey is:

the product of (a) the probability of selecting respondent i 's segment given the state and FI region in which it is located, (b) the probability of selecting respondent i 's dwelling unit given the selection of his or her segment and (c) the probability of selecting respondent i within that selected dwelling unit.

Additionally, the basic sampling weights went through an adjustment process to account for non-response at the unit and dwelling levels. Another adjustment process was conducted in order for the NSDUH to be consistent with the U.S. Bureau of Census population estimates for the year 2000. The result of these methods was the “final NSDUH weights” (U.S. Department of Health and Human Services). Importantly, the public use data file went through a process of extracting a random subsample of respondents in order to introduce an element of uncertainty that would provide for

confidentiality. As a result, the remaining sample went through an adjustment process and the “weights were then calibrated to known totals from the full analytic file in order to increase precision” (U.S. Department of Health and Human Services).

Committee on Human Research

The study design was submitted to the University of California, San Francisco (UCSF), Committee on Human Research, with a request for approval with a revised exempt certification. The request for revised exempt certification was based on the fact that this secondary data analysis did not involve any contact with human subjects, utilizes a public use data file that did not include any of the 18 Protected Health Identifiers, and does not include identifiers for any of the study respondents. The CHR Exempt Certification Form-Category 4 was approved on May 31, 2005.

Selection of Study Variables

The NSDUH, 2003 contains 2,235 variables. This study selected 26 variables for its analyses. The online code-book for the NSDUH, 2003 was examined in order to fully understand the survey questions and then the variables that were consistent with the theoretical framework of this study were selected.

Data Preparation

The alcohol measures, as well as all study variable measures, were available within the National Survey on Drug Use and Health (NSDUH). NSDUH 2003 replaced some variable missing values by using logical inference and statistical imputation following logical inference. Some demographic variables were imputed using the unweighted, hot-deck technique that has been utilized in prior NSDUH surveys. In addition, numerous variables utilized the predictive mean neighborhoods (PMN) method,

developed for the NSDUH. As a result of these techniques, missing values were eliminated for almost all of the variables.

For those variables where missing data did exist, descriptive statistics were analyzed in order to evaluate their effect. Given the large sample size (37,026: un-weighted and 212,686,651: weighted) missing data of less than one percent was considered inconsequential to the analysis. The variable alcohol use and driving was found to be missing 5,679 responses or 15.3 percent of respondents. This was due to the NSDUH 2003 legitimate skip for all respondents that did not drive a car in 2003, allowing for those that did drive a car under the influence of alcohol to be identified. All other study variables that had missing values were missing values at less than one percent of the study respondents.

Coding of Variables

Frequencies were run on the variables that were selected from the NSDUH 2003 database for this study. A coding scheme was then developed for the recoding of variables into the variables that would be used in the regression equations. Frequencies of the recoded variables were run and compared with the original variable frequencies to ensure accuracy of the recoding process.

Categorical variables were created for the regression models and frequencies and percents for categorical variables were calculated. Recoding of variables was done to dichotomize some variables and/or to reverse the original variable values so that '1' denotes a 'yes' response of the study variables. In addition, some computation was performed in order to either consolidate data (e.g., select mental health symptoms) into a single variable of interest, or to ensure that the response frequency would be equal to or

greater than five percent of the study population (e.g., alcohol emotional/physical problems, alcohol role function problems). The recoded variables in SAS and SUDAAN were reconciled to the original variable frequencies. Tables 2-9 show the definitions and coding of all the study variables from the original categories.

Table 2: TRAITS: Predisposing

NSDUH Variable #	Study Variable Name	NSDUH Variable Name	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
2162	Age R_Age2	Age2	0 = 18-25 1 = 26-34 2 = 35-49 3 = 50-64 4 = 65+	Original-Final Edited Age Categories 0 = 7-12 1 = 13-14 2 = 15 3 = 16 4 = 17
2167	Gender GENDER	Irsex	0 =Female 1=Male	Original 'Imputation Revised Gender' 0 = 1 1 = 2
2178	Race R_NEWRACE2	Newrace2	0 = Non Hispanic White, 1= Non Hispanic Black/African American 2 = Hispanic 3 = Other	Original 'Race/Hispanicity (7 Levels) Categories 0 = 1 1 = 2 2 = 7 3 = 3, 4, 5, 6
1899 1903 1904 1905 1881 1884 1919	Select Mental Health Symptoms MENTAL_HEALTH	a.) phbsocl b.) phbcrwds c.) phbpubpl d.) phbtravl e.) panatak f.) mdedp2wk g.) ptsever	0 = No/Other 1 = Yes: any symptom	Computed variable of "Any Phobias". Computed variable of 4 variables that captures 1=Y responses and missing data remains in '0'. I am creating an assumption that only those respondents who did not answer any of the 4 questions intended to skip this topic area, whereas those respondents who answered any of the questions felt that the answered questions were the applicable questions for them. An analysis identified the respondents in a separate variable that missed all questions and are included in the no response (55 cases, 0.1%) as individuals who we are assuming felt they had none of these problems. Also included in this computed variable are the 3 variables: "Had Sudden Attack of Fear Past 12 Months", Felt Depressed For 2 Weeks in Past 12 Months", and "Ever Had Extremely Stressful Experience". Again, 1=Y responses and missing data remains in '0'. Same logic as #8: an assumption that only those respondents who did not answer any of the 4 questions intended to skip this topic area. An analysis shows that there were no respondents that missed all 4.

Table 3: TRAITS: Enabling

NSDUH Variable #	Variable	NSDUH Variable	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
2170	Education EDUCATION	lreduc2	0 = < High School 1 = High School 2 = Some College 3 = College or Grad School	Original 'Recode-Imputation Revised Education' Categories 0 = 1-7 1 = 8 2 = 9-10 3 = 11
2229	Employment	empstat4	0 = Unemployed and other (including not in labor force) 1 = Employed full or part time	Original 'Imputation Revised Employment Status 18+' Categories 0 = 3, 4 1 = 1, 2
2114	Respondent's Total Income TOTAL_INCOME	lrpinc3	0 = Less than \$10,000 (including loss) 1 = \$10,000 - \$19,999 2 = \$20,000 - \$29,999 3 = \$30,000 - \$39,999 4 = \$40,000 - \$49,999 5 = \$50,000 - \$75,000 6 = \$75,000 and Above	Original 'Imputed Revised Respondent's Total Income' Categories 0 = 1 1 = 2 2 = 3 3 = 4 4 = 5 5 = 6 6 = 7
2142 2144 2146 2150 2148	Health Insurance HEALTH_INS	lrmcdchp lrmedicr lrchmpus lrothhlt lrrprvhl	0 = No Insurance 1 = Public Insurance 2 = Private Insurance 3 = Both	a.) 0 = [No Insurance]: irothhlt '2' and lrmcdchp '2' and lrmedicr '2' and lrrprvhl '2' and lrchmpus '2' b.) 1 = [Private Insurance]: lrmcdchp '1' or lrmedicr '1' or lrothhlt '1' or lrchmpus '1' c.) 2 = [Both]: lrrprvhl '1'

Table 4: ALCOHOL USE AND DRUG USE: Frequency

NSDUH Variable #	Variable Name	NSDUH Variable	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
589	Alcohol Use Past Year ALC_USE_Y	alcyr	0 = No 1 = Yes	Original 'Alcohol - Past Year Use' 0 = 0 1 = 1
590	Alcohol Use Past Month ALC_USE_M	alcmon	0 = No 1 = Yes	Original 'Alcohol - Past Month Use' 0 = 0 1 = 1
637	Illicit Drug Use Past Year DRUG_USE_Y	sumyr	0 = No 1 = Yes	Original 'Any Illicit Drug - Past Year' 0 = 0 1 = 1

Table 5: ALCOHOL USE: Quantity Dependent and Independent Variables

NSDUH Variable #	Variable Name	NSDUH Variable	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
647	Level of Alcohol Use Past Month [Dependent Variable] BINGE_HV	bingehvy	0 = Past Month Use: No Binge or Heavy 1 = Past Month Binge or Heavy	This variable is a dependent variable for the population that used alcohol in the past month. The '0' value are those that used alcohol but did not fit the risk pattern of Binge or Heavy. The '1' value are those that fit the risk pattern
2162 2167 747	Age/Gender Past Month Risk Use [Dependent Variable] RISK_USE	Age2 Irsex alcavgm	0 = Past Month Use: No Risk Pattern 1 = Past Month Risk Pattern	This variable is a dependent variable for the population that used alcohol in the past month. The '0' value are those that used alcohol but did not fit the risk pattern. The '1' value are those that fit the risk pattern
747	Alcohol Average Past Month Use [Dependent Variable] ALC_AVG_1	alcavgm	1-90+ drinks in the past month Continuous variable	Original 'Number of Alcoholic Beverages Drank Per User in Past Month' with the '0' consumption respondents deleted and the number of drinks truncated at 90+ drinks in the past month
NSDUH Variable #	Variable Name	NSDUH Variable	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
647	Level of Alcohol Use Past Month [Independent Variable] ALC_LEV_M	bingehvy	0 = None 1 = Past Month Use 2 = Past Month Binge 3 = Past Month Heavy	Original 'Level of Alcohol Use Past Month' 0 = 4 1 = 3 2 = 2 3 = 1
2162 2167 747	Age/Gender Past Month Risk Use [Independent Variable] RISK_USE	Age2 Irsex alcavgm	0 = No 1 = Yes	0 = No Alcohol Use Past Month or No Age/Gender Risk Use 1 = Age/Gender Risk: All Females, & Males that are 65 years of age or older = 31 and over/month. Males that are < 65 years of age = 61 and over/month
747	Alcohol Average Past Month Use [Independent Variable] ALCOHOL_GRP4	alcavgm	0 = No Use Past Month 1 = Less than 10 2 = >10 to 20 3 = >20 to 30 4 = >30 to 60 5 = >60	Original 'Number of Alcoholic Beverages Drank Per User in Past Month' 0 = Never used alcohol or did not use alcohol in the past month 1 = 1 to 10 drinks past month 2 = >10 to 20 drinks past month 3 = >20 to 30 drinks past month 4 = > 30 to 60 drinks past month 5 = >60 drinks past month Recoded so that respondent's who did not drink in past month are included in the no drink category instead of the system missing category (15,291). System missing then becomes 1262 or 3.4% out of N = 37, 026

Table 6: ALCOHOL USE: Assessed Need for Treatment

NSDUH Variable #	Study Variable Name	NSDUH Variable Name	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
1473	Needed Treatment for Alcohol Use Past Year ND_TRT_LT	TXNEDALC	0 = No 1 = Yes	Original 'Needed Treatment for Alcohol Use Past Year' 0 = 0 1 = 1 Respondent has alcohol abuse, or alcohol dependence or received alcohol treatment in the past 12 months per DSM-IV questions in NSDUH

Table 7: RESPONSES: Disablement

NSDUH Variable #	Study Variable Name	NSDUH Variable Name	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
	Alcohol Caused Problems With Emotions/Nerves or Physical Problems Past 12 Months PRB_1_BY_ALC	982 or 984	0 = No 1 = Yes	Computed variable from recoded variables 982 and 984 where 982 [ALCEMOPB] OR 984 [ALCPHLPB] 1 = Yes
	Alcohol Caused Problems With Emotions/Nerves Past 12 Months	ALCEMOPB 982	0 = No 1 = Yes	Original 'Alcohol Caused Problems with Emotions/Nerves Past 12 Months' 0 = 2: No, 91: Never used alcohol, 93: Did not use alcohol in past 12 months or used <6 dys 1 = 1 Missing Data Codes: 83: Did not use alcohol in past 12 months or used < 6dys log assigned 85:Bad data logically assigned, 94: Don't know, 97: Refused, 99: Blank
	Any Physical Problems Caused/Worsened by Alcohol Past 12 Months:	ALCPHLPB 984	0 = No 1 = Yes	Original 'Any Physical Problems Caused/Worsened by Alcohol Past 12 Months' 0 = 2, 91, 93 1 = 1 Missing Data Codes: 83, 85, 94, 97, 98, 99: Legitimate Skip
	Alcohol Caused Problems With Social Role Functions PRB_2_BY_ALC	987 or 990 or 986	0 = No 1 = Yes	Computed variable from : 987 [Alcserpb] 990 [Alcfmfpb] 986 [Alcsact] 1 = Yes
	Alcohol Caused Serious Problems at Home/Work/School Past 12 Months	Alcserpb 987	0 = No 1 = Yes	Original 'Alcohol Caused Serious Problems at Home/Work/School Past 12 Months' 0 = 2, 91, 93 1 = 1 Missing Data Codes: 83, 85, 94, 97, 98
	Drinking Alcohol Caused Problems With Family/Friends Past 12 Months	Alcfmfpb 990	0 = No 1 = Yes	Original 'Alcohol Caused Problems with Family/Friends Past 12 Months' 0 = 2, 91, 93 1 = 1 Missing Data Codes: 83, 85, 94, 97, 98
	Less Activities Because of Alcohol [C] Use Past 12 Months	Alcsact 986	0 = No 1 = Yes	Original 'Less Activities Because of Alcohol Use Past 12 Months' 0 = 2, 91, 93 1 = 1 Missing Data Codes: 83, 85, 94, 97, 98
	Alcohol Emotional, Mental, Physical, Role PRB_3_BY_ALC	Computed Variable: I or II		982 [ALCEMOPB] OR 984 [ALCPHLPB] 987 [Alcserpb] 990 [Alcfmfpb] 986 [Alcsact]

Table 8: RESPONSES: Risk Behavior and Alcohol Abuse/Dependence

NSDUH Variable #	Study Variable Name	NSDUH Variable Name	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
1283	Drove Vehicle While Under the Influence of Alcohol DROVE_ALC	DRVAONLY	0 = No 1 = Yes	Original 'Drove Under Influence of Alcohol/Alcohol Only Past 12 Months' 0 = 2, 91 1 = 1 Missing data: 81, 85, 94, 97, 98, 99
988	Drink Alcohol and Do Dangerous Things DO_DANGER_ALC	Alcpdang	0 = No 1 = Yes	Original 'Drink Alcohol and Do Dangerous Activities Past 12 Months' 0 = 2, 91, 93 1 = 1 Missing data: 83, 85, 94, 97, 98
1245	Alcohol Abuse or Dependence Past Year ALC_ABUSE	Abodalc	0 = No/Unknown 1 = Yes	Original 'Alcohol Abuse or Dependence' 0 = 0 1 = 1

Table 9: RESPONSES: Treatment

NSDUH Variable #	Study Variable Name	NSDUH Variable Name	Study Variable Code	Study variable code and the corresponding codes of the NSDUH variable
1484	Alcohol or Drug Treatment in Lifetime ALC_TRT_LT	txilalev	0 = No/Unknown 1 = Yes	Original 'Received Treatment for Drug or Alcohol in a Lifetime' 0 = 0 1 = 1
	Received Treatment Any Location Alcohol, Drug, Mental Health Past Year RECEIVE_TRT	1486 1487 1656	0 = No/Unknown 1 = Yes	Computed variable: 1486 [Alctrmt] 1487 [Txillalc] 1656 [Amhtxrc2]
	Received Alcohol Treatment Any Location Past Year	Alctrmt 1486	0 = No/Unknown 1 = Yes	Original 'Received Treatment Any Location Alcohol Past Year' 0 = 0 1 = 1
	Received Treatment Any Location Alcohol/Drugs Past Year	Txillalc 1487	0 = No/Unknown 1 = Yes	Original 'Received Treatment Any Location Alcohol/Drugs Past Year' recorded so '1' = Yes.
	Received Any Mental Health Treatment in the Past Year	Amhtxrc2 1656	0 = No 1 = Yes	Original 'Received Any Mental Health Treatment in Past Year' 0 = 2 1 = 1
1482	Alcohol Treatment Gap ALC_TRT_GAP	txgapalc	0 = No/Unknown 1 = Yes	Original 'Need Alcohol Treatment, Not Received Treatment at a Specialty Facility Past Year' 0 = 0 1 = 1 Respondent met criteria for 'Evaluated Need for Treatment' and did not receive alcohol treatment in the past 12 months.

Alcohol Consumption Dependent Variables

Three frequency measures of alcohol consumption were developed as dependent variables for the study. These measures were: (1) alcohol use ever; (2) alcohol use within the past year, and (3) alcohol use within the past month (Table 10). These are categorical variables that compare respondents who drank alcohol in the designated timeframes to respondents that did not drink alcohol in the designated timeframes.

Table 10: Alcohol Consumption Dependent Variables: Alcohol Frequency

Alcohol Frequency Variable Name	Variable Type	Independent/Dependent	Comparison Group
Alcohol Use Ever	Categorical	Dependent	Non Drinkers
Alcohol Use Past Year	Categorical	Dependent	Non Drinkers
Alcohol Use Past Month	Categorical	Dependent	Non Drinkers

Two measures of alcohol quantity use were also created as categorical dependent variables (Table 11). They were (1) past month alcohol binge or heavy (five drinks on one or more occasions in the past month), (2) past month age/gender limit risk (females of all ages, and males aged 65 and older that consume more than 30 drinks/month [average of 1/day], and males 18-64 years of age who consume more than 60 drinks/month (average of two/day)). These categorical variables compared respondents that exhibit different risk patterns of alcohol consumption to respondents that consume alcohol and do not exhibit the risk consumption patterns. The strategy was to better understand the difference between risk and non risk alcohol consumption patterns.

Table 11: Alcohol Consumption Dependent Variables: Alcohol Quantity

Alcohol Quantity Variable Name	Variable Type	Independent/Dependent	Comparison Group
Past Month Binge or Heavy Alcohol Use	Categorical	Dependent	Drinkers: No Binge or Heavy
Past Month Age/Gender Risk Limit Use	Categorical	Dependent	Drinkers: No Age/Gender Risk

One measure of the quantity of alcohol use was also created as a continuous, dependent variable (Table 12). This strategy was employed to examine actual alcohol consumption and also allowed for utilization of the Ordinary Least Squared (OLS) and Poisson Regression methods in addition to the study logistic regression method. Because the original NSDUH 2003 variable did not have a normal distribution, the quantity of alcohol drinks was truncated at 90+ drinks in the past month.

Table 12: Alcohol Consumption Dependent Variables: Alcohol Quantity

Alcohol Quantity Variable Name	Variable Type	Independent/Dependent	Included
Past Month Average Alcohol Consumption	Continuous 1-90	Dependent	Drinkers

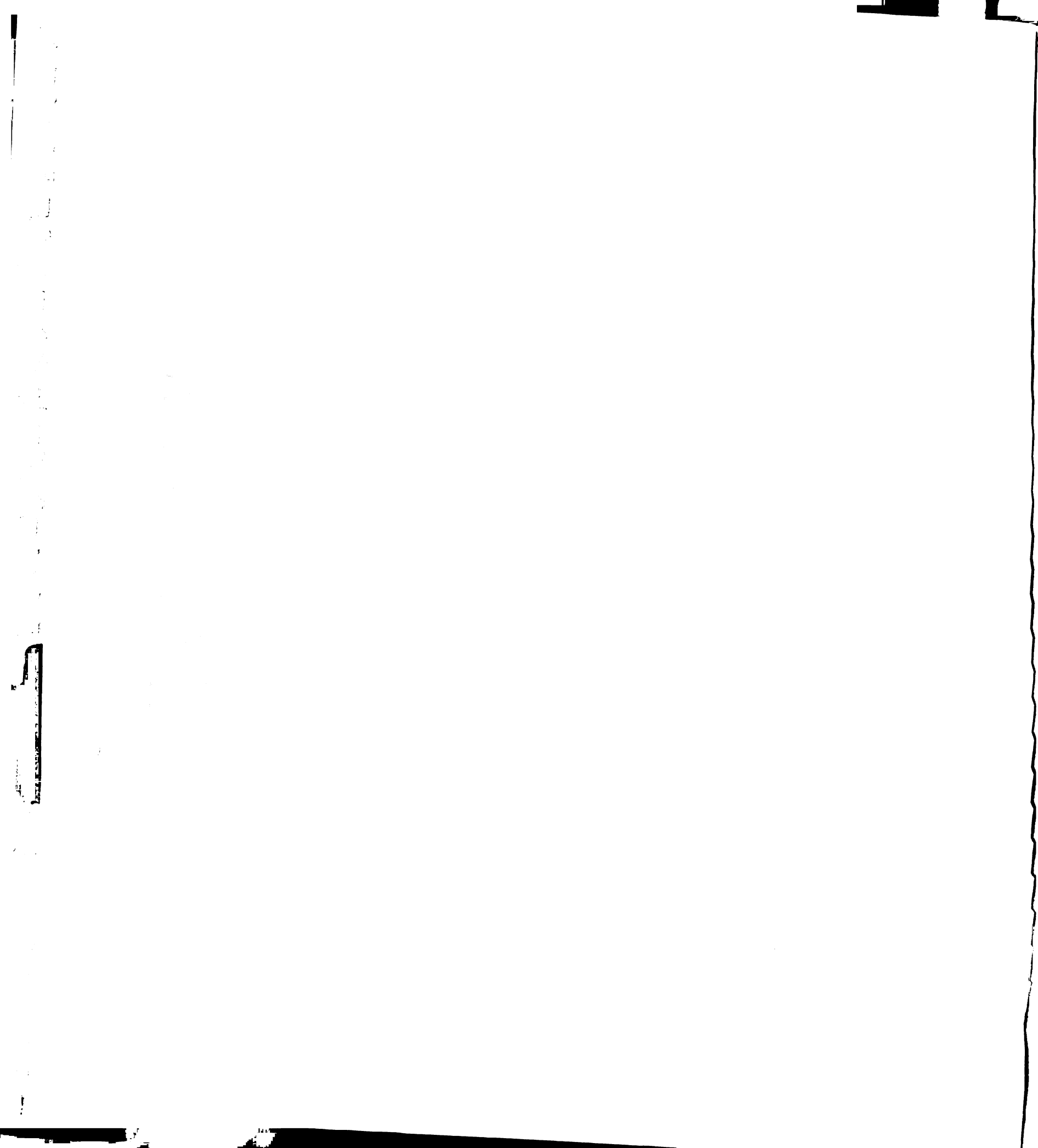
Alcohol Consumption Independent Variables

Three quantity measures of alcohol consumption were developed as independent variables for this study. They were (1) past month alcohol levels; (2) past month age/gender risk, and (3) past month average alcohol consumption. The first measure was the level of alcohol consumption in the past month. In this variable, the comparison group was those respondents that did not drink alcohol. The alcohol consumption categories were past month alcohol use without binge or heavy use, past month binge alcohol use (five or more drinks on at least one occasion in the past month), and past month heavy alcohol use (five or more drinks on at least five or more occasions in the past month). The dummy coding for this variable is stated below. The omitted category

is the zero category, and the comparison group is 'a.' By including variables 'b,' 'c' and 'd', and omitting variable 'a,' the study contrasted each level of past month alcohol use (just alcohol use, just binge use, just heavy use) with no alcohol use in the past month.

- a. 0 = past month alcohol use: use and no binge or heavy; binge use; heavy use]
1=no alcohol use in the past month
- b. 0 = no alcohol use past month, binge use, heavy use
1= alcohol use past month (no binge use or heavy use)
- c. 0 = no alcohol use, past month alcohol use (no binge use or heavy use), heavy alcohol use
1=binge alcohol use in the past month
- d. 0 = no alcohol use past month, past month alcohol use (no binge or heavy), binge alcohol use
1 = heavy alcohol use in the past month

The second alcohol quantity independent variable was based on the alcohol monthly average consumption variable. The coding created categories of alcohol consumption, which were 0, <10, >10 to 20, >20 to 30, >30 to 60 and >60. The comparison group was those respondents that did not drink alcohol in the past month. The inclusion of non-drinkers as the comparison group in these two alcohol measures allowed this study to investigate whether there actually is a difference in the odds risk between non drinkers and progressive increases in this risk pattern of alcohol consumption. The third measure was the age/gender risk variable. This categorical variable compared those respondents that did drink alcohol at the prescribed risk limits in the past month with those that did not drink alcohol in the past month as well as those that drank but did not drink at the prescribed risk levels. It was understood that the results from using this variable would be explained differently than the previous two alcohol measures due to the fact that drinkers and non-drinkers were included in the comparison group.

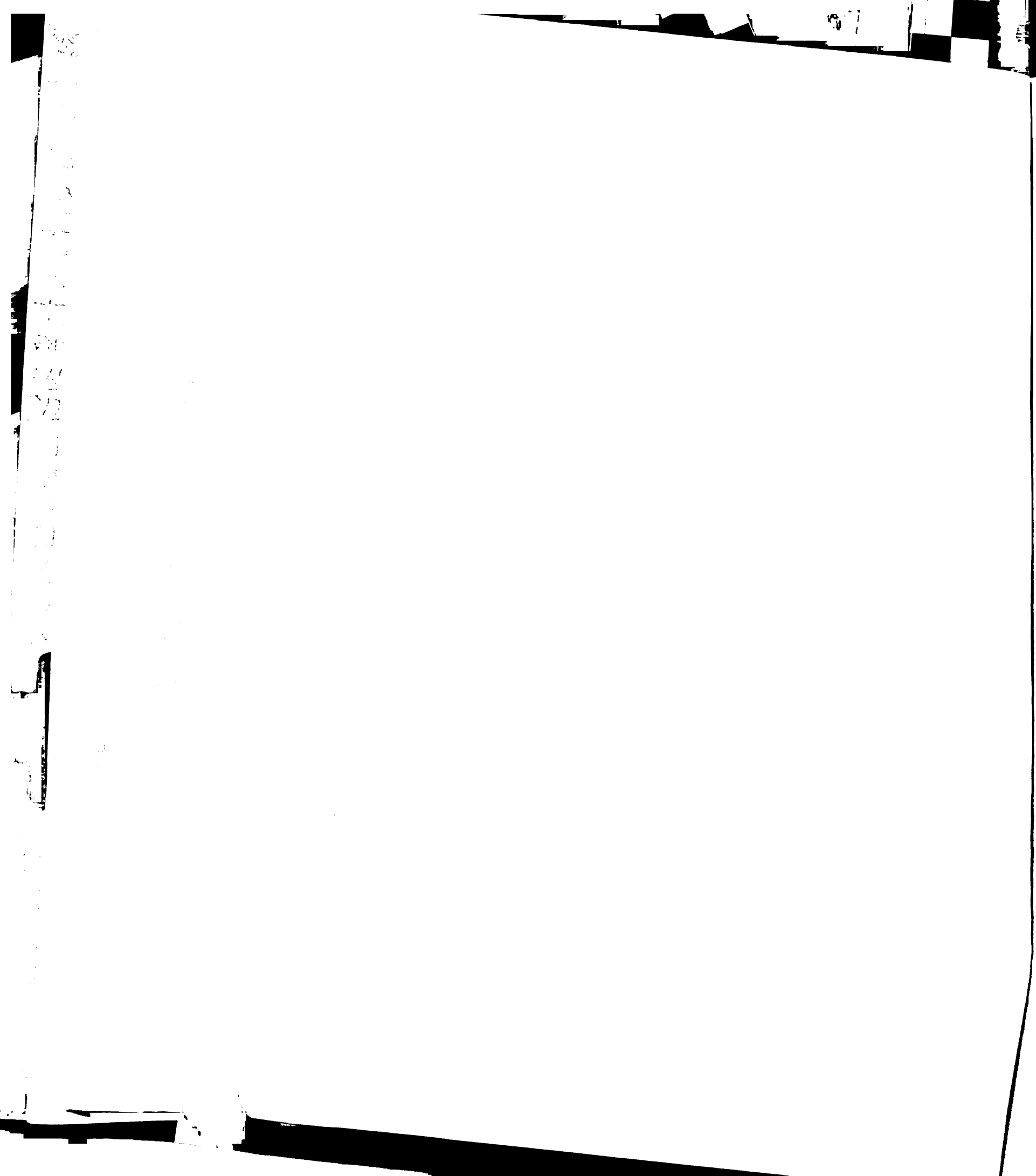


Data Analysis: SUDAAN and SAS

The statistical software used to generate and analyze the study data was SUDAAN. Developed by the Statistical Software Center at the Research Triangle Institute (RTI), SUDAAN is a statistical analysis program that includes numerous procedures that can be used to analyze data. Most importantly, SUDAAN procedures are capable of analyzing data from “complex sample surveys and other observational and experimental studies involving repeated measures and cluster-correlated data” (Shah, Barnwell, & Bieler, 1997). In this regard, complex samples are defined as “multistage, stratified, unequally weighted, or clustered” (Shah, Barnwell, & Bieler, 1997). The strength of SUDAAN is “in its ability to compute standard errors of ratio estimates, means, totals, regression coefficients, and other statistics in accordance with the sample design” (Shah, Barnwell, & Bieler, 1997).

The “final analysis weight for the public use data file is denoted as ANALWT_C, with the C denoting confidentiality. This sample weight represents the total number of target population persons each person on the file represents” (U.S. Department of Health and Human Services). The “sum of ANALWT_C, over all records on the data file, represents an estimate of the total number of people in the target population”, and ANALWT_C is a variable in the NSDUH 2003 dataset (U.S. Department of Health and Human Services).

There are also two additional sample design variables which are “VESTR (variance estimation [pseudo] stratum) and VEREP (variance estimation [pseudo] replicate within each stratum) and must be used to estimate variances and standard errors when using commercially available variance estimation software packages” (U.S.



Department of Health and Human Services). The SAMHDA software terminology of Stratum and Cluster correspond to VESTR and VEREP respectively in the public use file (U.S. Department of Health and Human Services). These variables were utilized in SUDAAN to generate the analyses for this study.

Chi-Square Analysis

A table was created to look at the relationships between all the study independent variables and dependent variables (Tables 14, 23, 28 and 31). Chi-Square statistics were generated in SUDAAN and SAS for each of these relationships, for the original dataset variables and the recoded study variables. The SUDAAN data was evaluated for significance (p-value is significant at the 0.01 level) in each of the variable relationships, for both the original dataset and subsequent study variables. This analysis was used to determine what variables would be included in the logistic regressions. A table of Chi-square values was developed to show the chi-square value between each independent and dependent variable relationship. A color coding scheme was utilized to denote significance. This table was developed as an informational tool to look at the relationship between two variables only, and not as a matrix that compared the various chi-square values.

Regression Analysis

Logistic regression was used as the primary analytical method for dichotomized dependent variables. In a logistic regression analyses, the coefficients reported were odds ratio, defined as the ratio of the predicted probability of being a case to the predicted probability of not being a case. When these probabilities are equal, the odds ratio is 1. When the probability of being a case is greater than the probability of not being a case,

the odds ratio is >1 , and < 1 when the probability of being a case is less than not being a case. The upper and lower bounds of the 95 percent confidence intervals for the odds ratio were also reported. The data were reported if it were significant at probabilities of equal to or less than 0.01. These results were also reported for each category of the categorical, independent variables (age, race, education, income and alcohol levels).

In addition, an ordinary least squares regression (OLS) was run using the average monthly alcohol consumption variable as the dependent variable and the study trait characteristic variables and drug use variable as the independent variables. The alcohol average monthly consumption variable did not have a normal distribution. The '0' values, or those respondents that reported they did not consume alcohol in the past month were not included because they were analyzed with a logit regression. In addition, the values for alcohol consumption were truncated at 90+ drinks in the past months. These original variable values were used in the OLS (not the log). To address the non-normal count data, we conducted two analyses. The OLS was run in SUDAAN. The results of the OLS were reported as the Unstandardized Beta Coefficient, Standard Error, t-test and the p-value of t-test.

A Poisson regression was also run in SUDAAN, where the alcohol average monthly consumption was the dependent variable. Those respondents that did not drink alcohol in the past month were not included in order to examine the effects of the level of consumption. The Poisson addressed the issue of over-dispersion with a scaled deviance value/DF of 1.0000 for the analysis. The Poisson regression results were reported as Unstandardized Beta Coefficients, Standard Error of Betas, t-tests, p-values and the Incidence Density Ratio (Odds Ratio) with 95 percent Confidence Intervals. These

statistics were reported for all of the study independent variables, including the individual categories within the categorical variables (e.g., age, race, education and income) in order to better understand trends of the data.

Model Main Effects and Goodness of Fit

The model main effects for each regression model were also run in SUDAAN. The degrees of freedom, Wald F statistic and p-value of the Wald F statistic were reported for each variable in each of the regression equations. The Goodness of Fit for the logistic regression models were reported as the Cox and Snell r-square. The goodness of fit for the OLS regression model was reported as the r-square.

Statistical Analysis

The unit of analysis of this study was at the individual level. The logistic regressions, OLS regression and Poisson regression were performed in accordance with the hypotheses and in two stages in order to coincide with the specific aims of the study. The weighted sample (212,686,651) was used for all statistical analysis.

For Aim I, the trait characteristic variables (predisposing and enabling) were defined as the set of independent variables that were regressed individually on the alcohol use variables (frequency alcohol) dependent variables. The test of Hypothesis 1a is that the independent variables (age, male gender, education greater than high school, mental health symptoms), and illicit drug use were expected to increase the odds ratios of the frequency of alcohol use. In Hypothesis 1b, trait characteristics (predisposing: male gender; enabling: mental health symptoms) and illicit drug use were expected to positively predict the quantity of alcohol use.

In Hypotheses 1c, trait characteristics (predisposing: male gender; enabling: mental health symptoms) and illicit drug use were expected to positively predict the quantity of alcohol use. OLS and Poisson regressions were also used as statistical methods to test the same hypothesis with a continuous variable for alcohol use. In Hypothesis 1d, trait characteristics, alcohol frequency and quantity, and illicit drug use were expected to positively increase the odds ratio for assessed need for treatment. The Aim I model estimations are based on the following equations:

-Hypothesis 1a: Alcohol frequency = $a + \text{Trait Variables} + \text{Illicit Drug Use} + E$
[Logistic Regression]

-Hypothesis 1b: Alcohol quantity = $a + \text{Trait Variables} + \text{Illicit Drug Use} + E$
[Logistic Regression]

-Hypothesis 1c: Alcohol quantity = $a + \text{Trait Variables} + \text{Illicit Drug Use} + E$
[OLS and Poisson Regression]

-Hypothesis 1d: Assessed Need for Alcohol Treatment = $a + \text{Trait Variables} + \text{Alcohol Frequency and Quantity} + \text{Illicit Drugs} + E$
[Logistic Regression]

where 'a' stands for constant and 'E' stands for error.

Aim II was to investigate the relationship of trait characteristics and alcohol use (frequency and quantity), illicit drug use, disablement, risk behavior, alcohol abuse/dependence and alcohol treatment. To test Hypothesis 2a, trait characteristics, alcohol frequency and quantity, and illicit drug use were expected to show an increase in the odds ratio for disablement, risk behavior, and alcohol abuse or dependence. In

Hypothesis 2b, trait characteristics, alcohol frequency and quantity, and illicit drug use were expected to show an increase in the odds ratio for alcohol treatment.

The test of Hypothesis 2c is that trait characteristics, alcohol frequency and quantity, illicit drug use and select disablement and risk variables were expected to show an increase in the odds ratio for alcohol treatment. The Aim II model estimations are based on the following equations for logistic regressions:

-Hypothesis 2a: Alcohol Symptom Response = a + Trait Variables + Alcohol Frequency and Quantity + Illicit Drugs + E
[Logistic Regression]

-Hypothesis 2b: Alcohol Treatment = a + Trait Variables + Alcohol Frequency and Quantity + Illicit Drugs + E
[Logistic Regression]

-Hypothesis 2c: Alcohol Treatment = a + Trait Variables + Alcohol Frequency and Quantity + Illicit Drugs + Disablement + Risk Behavior + E
[Logistic Regression]

where 'a' stands for constant and 'E' stands for error.

Summary

This study was designed to examine factors related to alcohol use and the consequences of alcohol use. The model was designed to investigate a Substance Use Disablement and Recovery Model developed from a combination of frameworks and a literature review.

CHAPTER V: RESULTS

This study examined factors associated with alcohol use and the consequences of alcohol use in adult community dwelling populations in the U.S. The study examined secondary data from a national probability survey – the NSDUH in 2003 which was weighted to represent 212,686,651 individuals. The descriptive statistics data showed that there were 25,623,260 individuals that never used alcohol and 146,552,398 individuals (68.91%) who used alcohol in the past year (See Table 13). Of those that used alcohol, 35,331,304 (16.61 %) reported bingeing (defined as five or more drinks on one occasion in the past month), and 15,527,966 (7.30 %) reported heavy use (five or more drinks on five or more occasions in the past month). Those individuals considered at risk for alcohol problems defined as those males under 65 who drank 61 or more drinks in the past month, and women or those males 65 years of age and older who drank 31 or more drinks in the past month were found to be 17,476,250 (8.46%) individuals. Of those who drank alcohol, the range of drinks was one to 2,250 in the past month. More than sixteen million (16,865,820) individuals had an evaluated need for treatment, based on whether the respondents answers to DSM-IV questions classified them as abusing alcohol, being dependent on alcohol or having received alcohol treatment in the past year. However, only 1.4 percent of the study sample reported a perceived need for treatment showing a large number of individuals who drink at excess levels but don't acknowledge that they have an alcohol problem or exhibit motivation to obtain treatment for a drinking problem.

The study findings also identified a number of problems or consequences that were self-reported to be related to alcohol (Table 13). Of the sample, 10,572,060 report

having exacerbated emotional or physical problems in the past 12 months caused by alcohol. Role functions problems such as decreased activities, problems with family and friends and problems at home, work or school were reported by 10,936,360 individuals in the past 12 months. The experience of emotional, physical, or role function problems in the past 12 months related to alcohol was reported by 16,516,050 individuals. These problems were defined as alcohol disablement for purposes of this study.

Many individuals who used alcohol reported engaging in risky behaviors. Of the total sample, 10,701,870 reported engaging in dangerous activities defined as regularly drinking alcohol in the past 12 months and doing something that might cause physical danger (Table 13). Alcohol use while driving was reported by 30,711,740 individuals. Finally, 16,463,700 individuals reported alcohol use that was at the level defined as abuse or dependence using the DSM-IV criteria which includes problems with relationships, as well as legal consequences, alcohol seeking behavior and withdrawal symptoms.

Finally this study examined alcohol treatment. In the study sample, an estimated 13,705,523 had received some alcohol treatment in their lifetime, although the amount of treatment and the time period was unknown. In addition, 2,200,708 individuals had alcohol treatment, 3,032,179 had alcohol and drug treatment, and 27,942,898 had mental health treatment in the past 12 months. Finally, 15,618,070 individuals were evaluated as needing alcohol treatment and did not receive it in the past 12 months, defined here as an alcohol treatment gap. When the numbers of individuals who use alcohol and have disablement problems and engage in risky behavior are considered, with the numbers of individuals that experienced treatment gap, the scope of the national problem becomes apparent.

The analysis first examined a subset of variables to understand trait (socio-demographic) factors and drug use in relation to alcohol use considering a number of different measures of alcohol use (frequency and quantity) and abuse. Second, the study examined the relationship of trait factors and alcohol use on alcohol disablement, alcohol risk behavior, alcohol abuse/dependence and treatment.

Table 13 shows the means and standard deviations for the alcohol average use variable were computed. The frequencies of variables were evaluated to ensure that there were enough respondents to use in the regression analyses, defined as five percent (5%) of the total study population. A correlation matrix was generated among all the independent variables, and pairwise correlations of .80 were considered to represent possible multi-collinearity, with values of .95 considered having serious multi-collinearity. The researcher reviewed the correlation coefficients and rendered decisions on the utilization of variables.

התאחדות המורים

[illegible]

NEED STUDY VARIABLES	Estimated Weighted Sample [1000s]	Estimated Weighted Sample % [100]	Missing Data Yes Response [1000s]	Missing Data Yes Response [Percent]
Estimated Weighted Sample: 212,686,651				
FREQUENCY:				
Alcohol Use Past Year				
-No	66,134.3	31.09		
-Yes	<u>146,552.4</u>	<u>68.91</u>	0	0
Alcohol Use Past Month				
-No	97,257.6	45.73		
-Yes	<u>115,429.1</u>	<u>54.27</u>	0	0
Drug Use Past Year				
-No	182,958.4	86.02		
-Yes	<u>29,728.3</u>	<u>13.98</u>	0	0
QUANTITY:				
Alcohol Past Month Levels				
[Independent Variable]				
-No Use	97,257.6	45.73		
-Use [No Binge or Heavy]	64,569.8	30.36		
-Binge	35,331.3	16.61		
-Heavy	<u>15,527.9</u>	<u>7.30</u>	0	0
[Dependent Variable]*				
-Past Month Use: No Binge or Heavy	63,071.9	57*		
-Past Month Binge or Heavy	<u>46,236.3</u>	<u>42*</u>	0	0
	109308*			
Alcohol Past Month Average				
[Independent Variable]				
-0	97,257.6	47.08		
-Less than 10	52,173.4	25.26		
->10 to 20	18,460.1	8.94		
->20 to 30	11,898.1	5.76		
->30 to 60	15,509.1	7.51		
->60	<u>11,267.5</u>	<u>5.45</u>	6120.8	0.02
[Dependent Variable]*				
Continuous Variable (1-90+ Drinks)	109,308*	<u>100*</u>		
Alcohol Past Month Age/Gender Risk				
[Independent Variable]				
-No	189,089	91.54	0	0
-Yes	<u>17,476.3</u>	<u>8.46</u>		
[Dependent Variable]				
-Past Month Use: No Risk Level	91,831.9	84.01*		
-Past Month Risk Level	<u>17,476.3</u>	<u>15.99*</u>	0	0
	109,308*			
ASSESSMENT:				
Evaluated Need Alcohol Treatment Past Year				
-No	19,820.8	92.07		
-Yes	<u>16,865.8</u>	<u>7.93</u>	0	0

RESPONSE STUDY VARIABLES	Estimated Weighted Sample [1000s]	Estimated Weighted Sample % [100]	Missing Data [1000s]	Missing Data [Percent]
Estimated Sample Weight: 212,686,651				
SYMPTOMS:				
Alcohol Emotional or Physical Problems				
-No	201,567.8	95.02		
-Yes	<u>10,572.1</u>	<u>4.98</u>	546.8	0.000002
Alcohol Role Problems				
-No	201,189.0	94.84		
-Yes	<u>10,936.36</u>	<u>5.16</u>	561.3	0.000002
Any Alcohol Problems				
-No	195,677.1	92.22		
-Yes	<u>16,516.1</u>	<u>7.78</u>	493.5	0.000002
Alcohol and Dangerous Activities				
-No	201,326.4	94.95		
-Yes	<u>10,701.9</u>	<u>5.05</u>	658.4	0.000003
Alcohol and Driving				
-No	138,704.2	81.87		
-Yes	<u>30,711.7</u>	<u>18.13</u>	43270.7	0.0002
Alcohol Abuse or Dependence				
-No	196,223.0	92.26		
-Yes	<u>16,463.7</u>	<u>7.74</u>	0	0
CHANGE BEHAVIOR:				
Received Alcohol Treatment Ever				
-No	198,981.1	93.56		
-Yes	<u>13,705.5</u>	<u>6.44</u>	0	0
Received Alcohol, Drug, Mental Health Treatment Past 12 Months				
-No	182,797.6	85.95		
-Yes	<u>29,889.1</u>	<u>14.05</u>	0	0
Alcohol Treatment Gap Past Year				
-No	197,068.6	92.66		
-Yes	<u>15,618.1</u>	<u>7.34</u>	0	0

*These variables are based on a population that only includes those respondents who drank alcohol in the past month. The weighted frequency for this population is 109,308,180.

This chapter presents the rationale for the development of the study aims and hypotheses, and reported the results of the analyses. The findings from chi-square tests were conducted and presented. Then regression analyses are presented for each aim and the tests of specific hypotheses.

Specific Aim 1 addressed whether traits (predisposing and enabling) and illicit drug use were predictive of alcohol use (frequency and quantity) and assessed need for treatment. Hypothesis 1a was designed to test whether traits and drug use predicted the frequency of alcohol use. Hypothesis 1b was developed to test more specific data in terms of risk patterns of alcohol consumption. Therefore, the study trait and drug use variables were independently regressed on the alcohol binge/heavy and age/gender risk dependent variables. Hypothesis 1c continued this test with an OLS and Poisson regression that utilized the continuous variable for alcohol monthly average consumption as the dependent variable. Hypothesis 1d tested the hypothesis that traits, drug use and quantity alcohol use would predict an assessed need for treatment. The first set of logistic regressions included the alcohol levels and age/gender risk independent variables. They were replaced with the categorical, alcohol monthly consumption independent variable in the second set of logistic regressions.

Specific Aim 1: To investigate the relationships of traits and drug use to alcohol use (alcohol frequency and quantity; and alcohol assessed need for treatment).

Specific Aim 1 addressed whether traits (inherent and acquired) and illicit drug use were predictive of alcohol use (frequency and quantity) and assessed need for treatment. Chi square tests were conducted to examine the relationship of the independent to the dependent variables for Aim 1. The dependent variables are alcohol use and assessed need for treatment. Table 14 shows the summary of these tests.

Table 14: Specific Aim 1 Chi-square Matrix for Traits and Alcohol Use

	Alcohol Use Ever	Alcohol Use in the Past Year	Alcohol Use in the Past Month	Alcohol Binge or Heavy [DV]	Alcohol Age & Gender Risk [DV]	Alcohol Average Drinks in the Past Month	Evaluated Need for Alcohol Treatment in the Past 12 Months
Age	111.53	463.45	291.72	902.68	160.20	111.53	935.70
Gender	161.61	174.46	368.22	366.87	2.48	161.61	250.31
Race	219.37	156.56	189.16	58.11	36.36	219.37	4.64
Education	289.32	471.39	551.81	322.70	54.74	289.32	40.71
Employed	163.69	407.78	361.84	32.91	13.93	163.39	77.53
Income	437.24	506.17	598.95	130.29	60.83	437.24	29.77
Insurance	170.72	417.13	433.15	299.97	72.14	170.72	205.37
Mental Health Symptoms	84.90	34.63	18.08	6.72	16.63	84.90	206.04
Drug Use in the Past Year	458.23	919.53	793.04	715.23	291.81	458.23	681.78
Alcohol Monthly Levels							1271.37
Alcohol Monthly Drinks							1082.88

All of the independent variables in the Chi-square models were significant at the .01 level or greater except for the relationship of gender and age/gender related at risk alcohol use. This may be expected since alcohol use is risk adjusted for gender (defined as less than 31 drinks per month for all females and those over 65 and less than 61 drinks

Specific Aim 1: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 2: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 3: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 4: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 5: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 6: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 7: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 8: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 9: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Specific Aim 10: To investigate the relationship of time and drug use in alcohol use (alcohol frequency and quantity and alcohol assessed need for treatment).

Table 1- Specific Aim 1 Chi-square tests for trends and alcohol use

Alcohol Use	Time	Chi-square	p-value	df
1-2	1-2	1.23	.27	1
3-4	1-2	1.23	.27	1
5-6	1-2	1.23	.27	1
7-8	1-2	1.23	.27	1
9-10	1-2	1.23	.27	1
11-12	1-2	1.23	.27	1
13-14	1-2	1.23	.27	1
15-16	1-2	1.23	.27	1
17-18	1-2	1.23	.27	1
19-20	1-2	1.23	.27	1
21-22	1-2	1.23	.27	1
23-24	1-2	1.23	.27	1
25-26	1-2	1.23	.27	1
27-28	1-2	1.23	.27	1
29-30	1-2	1.23	.27	1
31-32	1-2	1.23	.27	1
33-34	1-2	1.23	.27	1
35-36	1-2	1.23	.27	1
37-38	1-2	1.23	.27	1
39-40	1-2	1.23	.27	1
41-42	1-2	1.23	.27	1
43-44	1-2	1.23	.27	1
45-46	1-2	1.23	.27	1
47-48	1-2	1.23	.27	1
49-50	1-2	1.23	.27	1
51-52	1-2	1.23	.27	1
53-54	1-2	1.23	.27	1
55-56	1-2	1.23	.27	1
57-58	1-2	1.23	.27	1
59-60	1-2	1.23	.27	1
61-62	1-2	1.23	.27	1
63-64	1-2	1.23	.27	1
65-66	1-2	1.23	.27	1
67-68	1-2	1.23	.27	1
69-70	1-2	1.23	.27	1
71-72	1-2	1.23	.27	1
73-74	1-2	1.23	.27	1
75-76	1-2	1.23	.27	1
77-78	1-2	1.23	.27	1
79-80	1-2	1.23	.27	1
81-82	1-2	1.23	.27	1
83-84	1-2	1.23	.27	1
85-86	1-2	1.23	.27	1
87-88	1-2	1.23	.27	1
89-90	1-2	1.23	.27	1
91-92	1-2	1.23	.27	1
93-94	1-2	1.23	.27	1
95-96	1-2	1.23	.27	1
97-98	1-2	1.23	.27	1
99-100	1-2	1.23	.27	1

All of the independent variables in the Chi-square models were significant at the .01 level or greater except for the relationship of gender and alcohol assessed need for treatment. This may be expected since alcohol use is risk adjusted for gender identified as less than 31 drinks per month for all females and those over 62 and less than 61 drinks

per month for males under age 65. Race and evaluated need for alcohol treatment in the past 12 months was also not significant. The relationships of these variables are shown in the regression models. Hypothesis 1a was designed to test whether traits and drug use predicted the frequency of alcohol use.

HYPOTHESIS 1a: Traits (age, male gender, more education, increased income and select mental health symptoms) and illicit drug use in the past year will positively predict alcohol use (frequency: past year and past month).

Table 15: Logistic Regression results for the Frequency of Alcohol Use

	Alcohol Use Ever [WS=212687] (N=37026)	Alcohol Use in the Past Year [WS=212687] (N=37026)	Alcohol Use in the Past Month [WS=212687] (N=37026)
Age			
-18 to 25	1.370 (1.069-2.119)	3.101 (2.518-3.818)**	2.180 (1.782-2.666)**
-26 to 34	1.643 (1.263-2.138)**	2.602 (2.086-3.245)**	1.762 (1.431-2.169)**
-35 to 49	1.670 (1.293-2.158)**	1.860 (1.518-2.279)**	1.586 (1.302-1.933)**
-50 to 64	1.379 (1.058-1.798)	1.330 (1.213-1.458)	1.296 (1.053-1.595)**
Male Gender	1.741 (1.515-2.001)**	1.330 (1.213-1.458)**	1.412 (1.259-1.582)**
Race			
-Non Hispanic Black or African American	0.512 (0.425-0.617)**	0.522 (0.458-0.595)**	0.559 (0.496-0.630)**
-Hispanic	0.460 (0.389-0.543)**	0.718 (0.623-0.828)**	0.740 (0.652-0.839)**
-Other	0.252 (0.204-0.313)**	0.455 (0.375-0.552)**	0.507 (0.422-0.610)**
Education			
-High School	1.386 (1.189-1.616)**	1.499 (1.331-1.688)**	1.412 (1.259-1.582)**
-Some College	2.333 (1.962-2.774)**	2.102 (1.855-2.383)**	1.956 (1.738-2.200)**
-College/Grad School	2.335 (1.883-2.945)**	2.415 (2.080-2.805)**	2.363 (2.073-2.693)**
Employed	1.110 (0.958-1.285)	1.250 (1.120-1.395)	1.152 (1.043-1.273)**
Income			
-\$10,000 to \$19,999	1.409 (1.203-1.649)**	1.125 (0.998-1.267)	1.090 (0.976-1.217)
-\$20,000 to \$29,999	1.779 (1.451-2.181)**	1.503 (1.310-1.725)**	1.378 (1.222-1.554)**
-\$30,000 to \$39,999	2.176 (1.710-2.769)**	1.572 (1.348-1.835)**	1.538 (1.347-1.757)**
-\$40,000 to \$49,999	2.227 (1.717-3.018)**	1.806 (1.483-2.199)**	1.786 (1.503-2.122)**
-\$50,000 to \$75,000	3.009 (2.044-4.428)**	2.375 (1.885-2.991)**	2.026 (1.699-2.417)**
-\$75,000 and Above	2.997 (1.970-4.560)**	2.409 (1.889-3.072)**	2.227 (1.805-2.746)**
Insurance			
-Medicare & Medicaid	0.988 (0.815-1.198)	0.824 (0.710-0.957)	0.782 (0.677-0.903)**
-Private	0.998 (0.848-1.174)	1.039 (0.926-1.167)	1.043 (0.940-1.158)
-Both	0.786 (0.601-1.027)	0.968 (0.787-1.191)	1.023 (0.841-1.245)
Mental Health Symptoms	1.531 (1.357-1.727)**	1.145 (1.049-1.250)**	
Drug Use in Past Year	5.459 (4.030-7.395)**	4.685 (3.975-5.521)**	3.530 (3.178-3.921)**
Cox and Snell R-square	.099	.155	.145

**p-value is significant at the 0.01 level

Comparison Group

Age = 65 and Older

Ethnicity = White

Education = <High School

Income = <\$10,000

Insurance = None

Expected Results. Those in age groups 26-35 and 35-49 had higher odds ratios for ever having used alcohol (1.6 odds ratios). Those aged 18-25 had the highest odds ratios for alcohol use in the past month and the past year (increased odds ratio) with gradually declining ratios in each age group. Male gender and increased education levels increased the odds ratios for all alcohol frequency outcomes. Increased income levels also increased the odds ratios for all alcohol frequency measures while income levels of \$10,000-\$19,999 were not significant for alcohol use in the past year or past month. Mental health symptoms increased the odds ratio for ever having used alcohol and alcohol use in the past year while drug use in the past year had the highest odds ratio for all alcohol frequency measures. An increase in education and income reflected a linear increase in the odds ratios except for alcohol use ever and \$75,000+.

Unexpected Results. Ages 18-25 and 50-64 were not significant for alcohol use ever, and ages 50-64 were not significant for alcohol use in the past month. Employment increased the odds ratios for alcohol use in the past year and past month and public insurance reduced the odds ratios for alcohol use in the past month. It was also interesting to find that all race categories significantly reduced the odds ratios for alcohol use and alcohol use in the past year and past month compared to non-Hispanic whites.

HYPOTHESIS 1b: Traits (age, male gender, more education, increased income and select mental health symptoms), and illicit drug use past year, will positively predict alcohol risk patterns of consumption (binge or heavy and age/gender).

Hypothesis 1b was developed to test more specific data in terms of the quantity of alcohol consumption. Therefore, the study trait and drug use variables were independently regressed on the alcohol binge/heavy and age/gender risk dependent variables. Table 16 shows the results of the logistic regression for the quantity of alcohol use measures.

Table16: Logistic Regression results for Alcohol Use

	Alcohol Use Past Month: Binge or Heavy (5 or more drinks on 1 or more occasions in the past month) [WS=109308] (N=20473)	Past Month At Risk Alcohol Use (All Females, & Male 65+ = 31+/Month, Male < 65 = 60+/Month) [WS=109308] (20473)
Age		
-18 to 25	5.767 (4.027-8.260)**	0.688 (0.474-0.998)
-26 to 34	4.167 (2.893-6.000)**	0.524 (0.360-0.763)**
-35 to 49	2.783 (1.979-3.914)**	0.595 (0.411-0.861)**
-50 to 64	1.697 (1.194-2.411)**	0.626 (0.427-0.918)
Male Gender	2.741 (2.444-3.029)**	1.048 (0.926-1.186)
Race		
-Non Hispanic Black or African American	0.871 (0.723-1.050)	0.556 (0.434-0.713)**
-Hispanic	0.963 (0.800-1.158)	0.592 (0.471-0.744)**
-Other	0.630 (0.509-0.780)**	0.619 (0.452-0.849)**
Education		
-High School	0.661 (0.545-0.802)**	0.729 (0.597-0.890)**
-Some College	0.500 (0.414-0.605)**	0.734 (0.603-0.893)**
-College/Grad School	0.342 (0.280-0.418)**	0.623 (0.496-0.781)**
Employed	1.154 (0.993-1.342)	0.896 (0.756-1.061)
Income		
-\$10,000 to \$19,999	1.019 (0.869-1.195)	1.191 (1.000-1.418)
-\$20,000 to \$29,999	1.000 (0.840-1.190)	1.174 (0.965-1.429)
-\$30,000 to \$39,999	0.946 (0.775-1.154)	1.037 (0.818-1.315)
-\$40,000 to \$49,999	0.747 (0.605-0.923)**	0.999 (0.739-1.349)
-\$50,000 to \$75,000	0.894 (0.704-1.135)	0.992 (0.761-1.293)
-\$75,000 and Above	0.840 (0.644-1.097)	0.978 (0.689-1.388)
Insurance		
-Medicare & Medicaid	1.121 (0.892-1.408)	0.742 (0.582-0.947)
-Private	0.854 (0.730-0.999)	0.684 (0.579-0.808)**
-Both	0.835 (0.607-1.148)	0.775 (0.536-1.119)
Mental Health Symptoms	1.058 (0.957-1.169)	1.158 (1.024-1.310)
Drug Use in Past Year	2.758 (2.450-3.105)**	3.005 (2.648-3.411)**
Cox and Snell R-square	.197	.052

**p-value is significant at the 0.01 level

Comparison Groups:

Age = 65 and Older

Ethnicity = White

Education = <High School

Income = < \$10,000

Insurance = None

Expected Results. Ages 18 to 64 increased the odds ratios for alcohol binge or heavy consumption in the past month in a linear direction with the youngest age (18-25) having the highest odds. Ages 26-49 had a reduced odds ratio for alcohol use that was defined to be at risk based on age and gender. Male gender increased the odds ratio for binge/heavy alcohol use and all levels of education reduced the odds ratios for alcohol bring or heavy alcohol use. Similarly, an income of \$40,000 to \$49,999 significantly reduced the odds for binge or heavy drinking. As hypothesized, drug use significantly increased the odds ratio for binge or heavy drinking and for at-risk drinking as defined for age and gender groups. As age and education increased, there was a linear decrease in the odds ratios with binge/heavy alcohol use.

Unexpected Results. Ages 18-25 and 50-64 and male gender were not significant for age/gender alcohol risk. All categories of race reduced the odds ratios for age/gender alcohol risk compared to non-Hispanic whites and Hispanics had lower risk for binge and heaving drinking. It was also a surprise to find that all income groups were not significant predictors, except for the group of \$40,000-\$49,999 which had lower odds for binge or heavy drinking, and mental health symptoms were not significant for either of the outcome variables.

HYPOTHESIS 1c: Traits (age, male gender, more education, increased income and select mental health symptoms), and illicit drug use in the past year, will positively predict alcohol use (average monthly consumption).

Hypothesis 1c was tested with OLS and Poisson regressions that utilized a continuous variable for alcohol monthly average consumption as the dependent variable.

Table 17 shows the results of the OLS regression.

Table 17: Ordinary Least Squared regression for Average Monthly Alcohol Consumption

Estimated Weighted Sample: 109,308,180 (N=20473)	Beta Coefficient [Unstandardized]	SE BETA	T-TEST B = 0	P-value T-Test B = 0
INTERCEPT	22.585	2.286	9.880	0.0000
Age				
-18 to 25	2.351	1.995	1.179	2.389
-26 to 34	-0.678	1.937	-0.350	0.7264
-35 to 49	0.214	1.938	0.110	0.9122
-50 to 64	0.001	1.915	0.000	1.0000
Male Gender	10.921	0.539	20.272	0.0000
Race				
-Non Hispanic Black or African American	-5.733	0.974	-5.889	0.0000
-Hispanic	-6.099	1.002	-6.085	0.0000
-Other	-6.078	1.120	-5.428	0.0000
Education				
-High School	-4.007	1.119	-3.580	0.0004
-Some College	-4.577	1.093	-4.185	0.0000
-College/Grad School	-6.777	1.124	-6.030	0.0000
Employed	-0.669	0.843	-0.793	0.4281
Income				
-\$10,000 to \$19,999	1.227	0.889	1.381	0.1676
-\$20,000 to \$29,999	1.597	0.985	1.622	0.1052
-\$30,000 to \$39,999	0.342	1.074	0.318	0.7504
-\$40,000 to \$49,999	0.202	1.229	0.165	0.8693
-\$50,000 to \$75,000	0.965	1.178	0.819	0.4131
-\$75,000 and Above	0.546	1.448	0.377	0.7061
Insurance				
-Medicare & Medicaid	-3.415	1.319	-2.589	0.0098
-Private	-4.071	0.949	-4.288	0.0000
-Both	-3.582	1.916	-1.869	0.0619
Mental Health Symptoms	0.906	0.556	1.628	0.1039
Drug Use in Past Year	14.093	0.725	19.435	0.0000
R-square	.126			

Comparison Groups:

Age = 65 and Older
 Ethnicity = White
 Education = <High School
 Income = < \$10,000
 Insurance = None

The findings show that age, employment status, income and mental health symptoms were not related to the average monthly alcohol consumption. As expected,

male gender and drug use in the past year were significant positive predictors of the alcohol consumption. In contrast, all racial groups compared to non-Hispanic whites reduced the amount of alcohol consumption. Higher education levels, as well as either public or private health insurance were negative predictors of alcohol consumption. The model predicted 12.6 percent of the variance.

Because the average monthly alcohol consumption variable was skewed, we the relationship was tested using a Poisson regression shown in Table 18.

Table 18: SUDAAN Poisson Regression results for Average Monthly Alcohol Use

WS=109,308,180 (N=20473)	Beta Coefficient	SE BETA	T-TEST B = 0	P-value T-Test B = 0	Incidence Density Ratio
INTERCEPT	3.01 (2.81-3.20)	0.10	29.77	0.0000	20.21 (16.57-24.63)
Age					
-18 to 25	0.07 (-0.11 to 0.25)	0.09	0.81	0.4179	1.08 (0.90 to 1.29)
-26 to 34	-0.04 (-0.22 to 0.13)	0.09	-0.47	0.6358	0.96 (0.80 to 1.14)
-35 to 49	-0.01 (-0.18 to 0.16)	0.09	-0.07	0.9404	0.99 (0.83 to 1.18)
-50 to 64	-0.01 (-0.18 to 0.16)	0.09	-0.13	0.8995	0.99 (0.83 to 1.18)
-65 and Older	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Gender					
-Male	0.50 (0.45 to 0.55)	0.03	19.73	0.0000	1.64 (1.56 to 1.73)**
-Female	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Race					
-Non Hispanic Black or African American	-0.25 (-0.34 to -0.15)	0.05	-5.31	0.0000	0.78 (0.71 to 0.86)
-Hispanic	-0.25 (-0.34 to -0.16)	0.05	-5.58	0.0000	0.78 (0.71 to 0.85)
-Other	-0.29 (-0.41 to -0.17)	0.06	-4.75	0.0000	0.75 (0.66 to 0.84)
-Non Hispanic White	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Education					
-High School	-0.14 (-0.21 to -0.06)	0.04	-3.46	0.0006	0.87 (0.81 to 0.94)
-Some College	-0.16 (-0.24 to -0.08)	0.04	-4.02	0.0001	0.85 (0.79 to 0.92)
-College/Grad School	-0.27 (-0.25 to -0.18)	0.04	-6.30	0.0000	0.77 (0.70 to 0.83)
-Less than High School	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Employed					
-Yes	-0.02 (-0.09 to 0.05)	0.03	-0.62	0.5330	0.98 (0.91 to 1.05)
-No	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Income					
-\$10,000 to \$19,999	0.05 (-0.02 to 0.12)	0.04	1.28	0.2023	1.05 (0.98 to 1.12)
-\$20,000 to \$29,999	0.06 (-0.02 to 0.14)	0.04	1.52	0.1276	1.06 (0.98 to 1.15)
-\$30,000 to \$39,999	0.01 (-0.08 to 0.10)	0.05	0.23	0.8192	1.01 (0.92 to 1.11)
-\$40,000 to \$49,999	-0.00 (-0.11 to 0.10)	0.06	-0.08	0.9397	1.00 (0.89 to 1.11)
-\$50,000 to \$75,000	0.04 (-0.06 to 0.14)	0.05	0.80	0.4261	1.04 (0.94 to 1.15)
-\$75,000 and Above	0.03 (-0.10 to 0.15)	0.06	0.47	0.6413	1.03 (0.91 to 1.17)
-Less than \$10,000	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Insurance					
-Medicare & Medicaid	-0.11 (-0.21 to -0.01)	0.05	-2.22	0.0266	0.89 (0.81 to 0.99)
-Private	-0.15 (-0.21 to -0.08)	0.03	-4.39	0.0000	0.86 (0.81 to 0.92)
-Both	-0.12 (-0.28 to 0.04)	0.08	-1.51	0.1324	0.88 (0.75 to 1.04)
-No Insurance	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Mental Health Symptoms					
-Yes	0.04 (-0.00 to 0.09)	0.02	1.82	0.0690	1.05 (1.00 to 1.10)
-No	0.00 (0.00 to 0.00)	0.00			1.00 (1.00 to 1.00)
Drug Use in Past Year					
-Yes	0.51 (0.46-0.55)	0.02	21.14	0.0000	1.66 (1.58 to 1.74)**
-No	0.00 (0.00-0.00)	0.00			1.00 (1.00 to 1.00)

The results of the Poisson regression showed similar results to the OLS regression. The findings show that age, employment status, income, and mental health symptoms were not related to the average monthly alcohol consumption. Male gender and drug use in the past year were significant positive predictors of the alcohol consumption. All racial groups compared to non-Hispanic whites predicted lower alcohol consumption. Higher education levels and private health insurance were negative predictors of alcohol consumption.

Table 19 shows the Poisson regression with the main effects.

Table 19: SUDAAN Poisson Regression Model Main Effects For Alcohol Use

Contrast	Degrees of Freedom	Wald F	P-value Wald F
OVERALL MODEL	24	5767.91	0.0000
MODEL MINUS INTERCEPT	23	75.08	0.0000
INTERCEPT	.	.	.
N_AGE	4	4.02	0.0031
N_GENDER	1	389.38	0.0000
N_RACE	3	24.40	0.0000
N_EDUC	3	13.42	0.0000
N_EMPLOY	1	0.39	0.5330
N_INCOME	6	0.76	0.6039
N_INS	3	6.43	0.0003
N_MENTAL	1	3.32	0.0690
N_DRUG_Y	1	446.95	0.0000

The Poisson regression was also run in SAS as shown in Tables 20 and 21.

Table 20: SAS Poisson Regression results for Alcohol Consumption Levels

WS=109,308,180 (N=20473)	Degrees of Freedom	Estimate and Wald 95% Confidence Limits	SE	Chi- Square	Pr > Chi- Square
Parameter					
INTERCEPT	1	3.0060 (2.9153 to 3.0966)	0.0463	4221.55	<.0001
Age					
-18 to 25	1	0.0740 (-0.0067 to 0.1546)	0.0412	3.23	0.0273
-26 to 34	1	-0.0423 (-0.1215 to 0.0369)	0.0404	1.09	0.2954
-35 to 49	1	-0.0067 (-0.0821 to 0.0688)	0.0385	0.03	0.8625
-50 to 64	1	-0.0111 (-0.0859 to 0.0637)	0.0382	0.08	0.7713
-65 and Older	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Gender					
-Male	1	0.4968 (0.4665 to 0.5270)	0.0154	1037.11	<.0001
-Female	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Race					
-Non Hispanic Black or African American	1	-0.2454 (-0.2976 to -0.1932)	0.0266	84.95	<.0001
-Hispanic	1	-0.2526 (0.0247 to -0.3010)	0.0247	104.60	<.0001
-Other	1	-0.2936 (-0.3655 to -0.2217)	0.0367	64.09	<.0001
-Non Hispanic White	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Education					
-High School	1	-0.1365 (-0.1800 to -0.0929)	0.0222	37.67	<.0001
-Some College	1	-0.1583 (-0.2031 to -0.1135)	0.0229	47.88	<.0001
-College/Grad School	1	-0.2675 (-0.3158 to -0.2191)	0.0247	117.68	<.0001
-Less than High School	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Employed					
-Yes	1	-0.0217 (-0.0601 to 0.0167)	0.0196	1.23	0.2683
-No	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Income					
-\$10,000 to \$19,999	1	0.0464 (0.0231 to 0.0012)	0.0231	4.04	0.0444
-\$20,000 to \$29,999	1	0.0626 (0.0144 to 0.1108)	0.0246	6.49	0.0109
-\$30,000 to \$39,999	1	0.0107 (-0.0424 to 0.0637)	0.0271	0.15	0.6940
-\$40,000 to \$49,999	1	-0.0042 (-0.0633 to 0.0550)	0.0302	0.02	0.8898
-\$50,000 to \$75,000	1	0.0411 (-0.0172 to 0.0993)	0.0297	1.91	0.1672
-\$75,000 and Above	1	0.0296 (-0.0341 to 0.0933)	0.0325	0.83	0.3622
-Less than \$10,000	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Insurance					
-Medicare & Medicaid	1	-0.1132 (-0.1706 to -0.0557)	0.0293	14.90	0.0001
-Private	1	-0.1477 (-0.1873 to -0.1081)	0.0202	53.42	<.0001
-Both	1	-0.1235 (-0.2004 to -0.0465)	0.0393	9.88	0.0017
-No Insurance	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Mental Health Symptoms					
-Yes	1	0.0442 (0.0165 to 0.0718)	0.0141	9.81	0.0017
-No	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Drug Use in Past Year					
-Yes	1	0.5073 (0.4755 to 0.5391)	0.0162	979.02	<.0001
-No	0	0.0000 (0.0000 to 0.0000)	0.0000	.	.
Scale	0	10.8105 (10.8105 to 10.8105)			

Table 21: SAS Poisson Regression Model Main Effects for Alcohol Consumption

Contrast	Number of Degrees of Freedom	F Value	Pr > F	Chi-Square	Pr > Chi-Square
N_AGE	4	6.57	<.0001	26.26	<.0001
N_GENDER	1	1080.64	<.0001	1080.64	<.0001
N_RACE	3	75.18	<.0001	225.54	<.0001
N_EDUC	3	39.53	<.0001	118.60	<.0001
N_EMPLOY	1	1.22	0.2689	1.22	0.2689
N_INCOME	6	2.03	0.0585	12.16	0.0585
N_INS	3	17.57	<.0001	52.71	<.0001
N_MENTAL	1	9.85	0.0017	9.85	0.0017
N_DRUG_Y	1	939.33	<.0001	939.33	<.0001

In summary, the Poisson regression found that male gender and illicit drug use in the past year were significant with an increased incidence density ratio. Age was not found to be significant. Non-white racial groups and increasing education categories, as well as private insurance, were significant negative predictors of alcohol consumption.

HYPOTHESES 1d: Traits (age, male gender and mental health symptoms), use of illicit drugs in the past year and quantity risk levels of monthly alcohol use [(a) binge, heavy, age/gender risk (b) monthly average] will positively predict an evaluated need for alcohol treatment.

Hypothesis 1d was tested to determine whether traits, drug use and quantity alcohol use would predict an assessed need for treatment. The first set of logistic regressions included the alcohol levels and age/gender risk independent variables. They were replaced with the categorical alcohol monthly consumption independent variable in the second set of logistic regressions (Table 22).

Table 22: Logistic Regression results for the Evaluated Need for Alcohol Treatment

	Evaluated Need for Alcohol Treatment in the Past 12 Months (a) [WS=206566] (N=35764)	Evaluated Need for Alcohol Treatment in the Past 12 Months (b) [WS=212687] (N=37026)
Age [a & b]		
-18 to 25	3.663 (2.065-6.496)**	4.858 (2.720-8.676)**
-26 to 34	3.366 (1.921-5.898)**	4.360 (2.472-7.691)**
-35 to 49	2.274 (1.298-3.983)**	2.704 (1.540-4.749)**
-50 to 64	1.588 (0.886-2.846)	1.703 (0.945-3.069)
Male Gender	1.807 (1.568-2.083)**	1.559 (1.351-1.800)**
Race		
-Non Hispanic Black or African American	1.134 (0.917-1.402)	1.147 (0.923-1.425)
-Hispanic	1.118 (0.932-1.341)	1.174 (0.968-1.423)
-Other	1.142 (0.894-1.458)	1.156 (0.908-1.471)
Education		
-High School	0.904 (0.746-1.094)	0.880 (0.729-1.063)
-Some College	1.011 (0.835-1.225)	0.951 (0.788-1.148)
-College/Grad School	0.977 (0.783-1.217)	0.858 (0.688-1.069)
Employment	1.115 (0.941-1.320)	1.150 (0.972-1.360)
Income		
-\$10,000 to \$19,999	1.001 (0.843-1.190)	1.017 (0.857-1.207)
-\$20,000 to \$29,999	0.938 (0.760-1.159)	0.951 (0.773-1.171)
-\$30,000 to \$39,999	0.759 (0.604-0.955)	0.754 (0.600-0.947)
-\$40,000 to \$49,999	0.844 (0.629-1.133)	0.793 (0.594-1.058)
-\$50,000 to \$75,000	0.860 (0.635-1.165)	0.779 (0.577-1.053)
-\$75,000 and Above	0.703 (0.470-1.052)	0.631 (0.425-0.938)
Insurance		
-Medicare & Medicaid	1.182 (0.960-1.454)	1.255 (1.019-1.547)
-Private	0.828 (0.704-0.974)	0.833 (0.707-0.983)
-Both	0.942 (0.614-1.444)**	0.971 (0.629-1.498)
Mental Health Symptoms	2.213 (1.910-2.564)**	2.221 (1.917-2.575)**
Drug Use in Past Year	1.938 (1.704-2.205)**	2.014 (1.770-2.292)**
Alcohol Levels: Past Month [a]		
-Use: No Binge or Heavy	1.378 (1.101-1.726)**	
-Use: Binge	5.962 (4.896-7.259)**	
-Use: Heavy	10.165 (7.938-13.017)**	
-Age & Gender Related Risk	2.886 (2.385-3.492)**	
Alcohol Average: # Drinks Past Month: [b]		
-Less than 10		1.419 (1.131-1.780)**
->10 to 20		4.494 (3.523-5.734)**
->20 to 30		6.474 (5.146-8.145)**
->30 to 60		11.279 (9.130-13.933)**
->60		27.190 (21.618-34.198)**
Cox and Snell R-square	.151	.149

**p-value is Significant at the 0.01 level

Comparison Groups:
Age = 65 and Older
Ethnicity = White
Education = <High School
Income = < \$10,000
Insurance = None

Expected Results. Ages 18-49, male gender, mental health symptoms, illicit drug use in the past year, all alcohol levels, alcohol age/gender risk and all categories of average monthly alcohol consumption were positively predictive of a need for alcohol treatment (increased odds ratios). Surprisingly, past month heavy alcohol use carried an odds ratio of 10.165 (95% CI 7.938-13.017) and consumption of more than 60 drinks in the past month carried an odds ratio of 27.190 (95% CI 21.618-34.198).

Unexpected Results. Ages 50-64 were not found to be significant and having both public and private insurance did positively predict an evaluated need for alcohol treatment; however, there was not an increase in the odds ratio for this relationship.

Specific Aim 2: To investigate the relationship of trait characteristics, as well as drug frequency and alcohol need characteristics on alcohol response characteristics.

Specific Aim 2 addressed whether traits (predisposing and enabling), illicit drug use and alcohol use (frequency and quantity) were predictive of alcohol disablement, alcohol risk behavior, alcohol abuse/dependence and treatment. The first phase of this aim focused on disablement, risk and abuse/dependence. The findings from chi-square tests were conducted and presented in Table 23.

Table 23: Specific Aim 2 Chi-square Matrix for Disablement, Risk and Abuse/Dependence

	Alcohol Caused or Exacerbated Emotional or Physical Problems: Past 12 Months	Alcohol Caused Role Function Problems: Past 12 Months	Alcohol Caused or Exacerbated Emotional, Physical or Role Function Problems: Past 12 Months	Alcohol and Dangerous Activities	Alcohol and Drive	Alcohol Abuse or Dependence
Age	169.88	415.32	486.98	668.96	598.06	912.21
Gender	30.97	130.88	106.49	207.42	302.44	238.05
Race	9.67	11.95	8.00	6.10	96.75	5.16
Education	4.19	39.62	18.72	30.20	129.58	37.11
Employed	11.49	33.08	40.92	66.22	215.46	80.12
Income	5.93	29.06	13.80	16.20	139.05	24.76
Insurance	68.72	114.39	148.33	127.02	255.18	189.21
Mental Health	184.29	177..55	254.66	160.87	150.33	201.75
Drug Use Past Year	289.86	407.00	554.49	486.11	810.21	665.33
Alcohol Monthly Levels	549.40	742.13	1021.86	818.71	1873.23	1281.15
Alcohol Monthly Drinks	455.03	576.44	818.59	723.27	1844.25	1095.38

All of the independent variables in the Chi-square model were significant at the 0.01 level or greater except for the relationships alcohol caused emotional or physical problems with race, education and income; alcohol caused role function problems and race; alcohol caused emotional, physical or role function problems and race and income; and alcohol abuse/dependence and race.

HYPOTHESES 2a: Trait characteristics (male gender and mental health symptoms) and need characteristics [illicit drugs past year and quantity risk levels of monthly alcohol use (a) binge, heavy, age and gender risk (b) monthly average] will positively predict alcohol disablement, alcohol risk and alcohol abuse/dependence. Ages 18-34 will predict risk and abuse/dependence.

Hypothesis 2a was tested to determine if traits, drug use and alcohol use would predict disablement, risk and abuse/dependence. The first set of logistic regressions included the alcohol levels and age/gender risk independent variables. They were replaced with the categorical, alcohol monthly consumption variable in the second set of logistic regressions so that the number of drinks as well as risk drinking patterns could be analyzed. Tables 24-27 show the logistic regression results.

Table 24: Logistic Regression results for Alcohol Use [Levels] and Disablement.

	Alcohol Caused or Exacerbated Emotional or Physical Problems: Past 12 Months [WS=202210] (UW=35666)	Alcohol Caused Role Function Problems: Past 12 Months [WS=206166] (UW=35667)	Alcohol Caused or Exacerbated Emotional, Physical or Role Function Problems: Past 12 Months [WS=206234] (UW35675)
Age			
-18 to 25	1.374 (0.715-2.637)	1.945 (1.001-3.780)	1.897 (1.092-3.293)
-26 to 34	1.673 (0.864-3.242)	2.222 (1.153-4.284)	1.973 (1.128-3.452)
-35 to 49	1.535 (0.802-2.938)	1.823 (0.946-3.515)	1.738 (1.002-3.015)
-50 to 64	1.096 (0.561-2.143)	1.327 (0.666-2.645)	1.323 (0.747-2.345)
Male Gender	1.075 (0.894-1.294)	1.634 (1.385-1.927)**	1.316 (1.136-1.525)**
Race			
-Non Hispanic	0.970 (0.717-1.311)	1.108 (0.853-1.439)	0.994 (0.792-1.247)
-Black/African American			
-Hispanic	0.883 (0.707-1.103)	1.497 (1.220-1.837)**	1.293 (1.071-1.560)**
-Other	0.907 (0.657-1.252)	1.418 (1.077-1.867)	1.108 (0.872-1.407)
Education			
-High School	0.891 (0.710-1.117)	0.87 (0.692-1.086)	0.892 (0.735-1.081)
-Some College	0.982 (0.783-1.233)	0.987 (0.788-1.237)	1.042 (0.857-1.268)
-College/Grad School	1.141 (0.884-1.472)	0.853 (0.643-1.130)	1.070 (0.847-1.351)
Employment	1.014 (0.840-1.223)	1.160 (0.954-1.410)	1.092 (0.928-1.285)
Income			
-\$10,000 to \$19,999	0.977 (0.787-1.213)	0.935 (0.761-1.149)	0.916 (0.762-1.100)
-\$20,000 to \$29,999	0.931 (0.724-1.198)	0.866 (0.681-1.101)	0.929 (0.753-1.147)
-\$30,000 to \$39,999	0.830 (0.626-1.100)	0.778 (0.584-1.037)	0.809 (0.633-1.033)
-\$40,000 to \$49,999	0.749 (0.505-1.110)	0.733 (0.502-1.071)	0.710 (0.517-0.974)
-\$50,000 to \$75,000	0.857 (0.588-1.248)	0.619 (0.424-0.904)	0.775 (0.564-1.064)
-\$75,000 and Above	0.955 (0.652-1.398)	0.675 (0.449-1.105)	0.838 (0.612-1.148)
Insurance			
-Medicare & Medicaid	1.442 (1.132-1.837)**	1.193 (0.937-1.519)	1.229 (1.056-1.599)
-Private	0.749 (0.613-0.915)**	0.761 (0.634-0.914)**	0.756 (0.645-0.885)**
-Both	0.816 (0.454-1.464)	0.801 (0.462-1.389)	0.741 (0.454-1.210)
Mental Health Symptoms	2.694 (2.189-3.315)**	2.399 (1.991-2.891)**	2.448 (2.101-2.853)**
Drug Use in Past Year	1.704 (1.455-1.995)**	1.839 (1.589-2.128)**	1.770 (1.559-2.010)**
Alcohol Levels			
-Use: No Binge/Heavy	2.784 (2.085-3.716)**	1.375 (1.021-1.853)	2.211 (1.766-2.767)**
-Past Month Binge	6.425 (4.921-8.389)**	5.187 (4.070-6.611)**	6.337 (5.170-7.767)**
-Past Month Heavy	8.588 (6.088-12.116)**	7.989 (5.894-10.827)**	9.363 (7.163-12.239)**
-Past Month At Risk	2.394 (1.874-3.058)**	2.627 (2.106-3.276)**	2.480 (2.030-3.029)**
Cox and Snell R-square	.070	.092	.114

Table 25: Logistic Regression results for Alcohol Use [Levels] and Risk and Abuse/Dependence.

	Alcohol and Dangerous Activities [WS=206072] (N=35650)	Alcohol and Drive [WS=163436] (30131)	Alcohol Abuse or Dependence [WS=206566] (N=35764)
Age			
-18-25	3.087 (1.403-6.795)**	2.265 (1.441-3.559)**	3.453 (1.914-6.230)**
-26-34	2.371 (1.082-5.194)	2.047 (1.298-3.227)**	3.154 (1.772-5.616)**
-35-49	1.565 (0.720-3.400)	1.639 (1.054-2.548)	2.077 (1.166-3.700)
-50-64	0.971 (0.424-2.222)	1.137 (0.722-1.791)	1.496 (0.822-2.725)
-Male Gender	1.826 (1.559-2.139)**	1.435 (1.284-1.604)**	1.740 (1.507-2.010)**
Race			
-Non Hispanic	1.057 (0.795-1.405)	0.799 (0.654-0.977)	1.143 (0.916-1.425)
-Black/African American			
-Hispanic	1.032 (0.825-1.292)	0.719 (0.595-0.870)**	1.169 (0.970-1.409)
-Other	0.978 (0.677-1.413)	0.860 (0.678-1.090)	1.195 (0.934-1.529)
Education			
-High School	1.028 (0.819-1.291)	1.631 (1.366-1.947)**	0.892 (0.734-1.084)
-Some College	1.191 (0.946-1.499)	1.874 (1.566-2.243)**	1.001 (0.824-1.218)
-College/Grad School	1.094 (0.852-1.404)	2.070 (1.688-2.539)**	0.967 (0.773-1.209)
Employment	1.101 (0.917-1.322)	1.156 (0.974-1.372)	1.126 (0.945-1.341)
Income			
-\$10,000 to \$19,999	1.085 (0.886-1.328)	1.375 (1.169-1.618)**	1.014 (0.849-1.211)
-\$20,000 to \$29,999	1.057 (0.832-1.341)	1.714 (1.432-2.051)**	0.963 (0.778-1.193)
-\$30,000 to \$39,999	0.944 (0.727-1.227)	1.606 (1.306-1.975)**	0.779 (0.617-0.983)
-\$40,000 to \$49,999	1.259 (0.906-1.749)	1.760 (1.409-2.200)**	0.868 (0.642-1.173)
-\$50,000 to \$75,000	0.951 (0.688-1.315)	1.599 (1.281-1.996)**	0.894 (0.659-1.215)
-\$75,000 and Above	0.746 (0.462-1.205)	1.769 (1.371-2.284)**	0.737 (0.490-1.106)
Insurance			
-Medicare & Medicaid	1.189 (0.922-1.532)	0.923 (0.763-1.117)	1.180 (0.952-1.462)
-Private	1.012 (0.848-1.208)	1.143 (0.987-1.324)	0.865 (0.733-1.021)
-Both	1.086 (0.592-1.989)	0.819 (0.558-1.204)	0.977 (0.627-1.521)
Mental Health Symptoms	2.297 (1.952-2.704)**	1.641 (1.471-1.832)**	2.226 (1.914-2.587)**
Drug Use in Past Year	1.953 (1.681-2.270)**	2.550 (2.261-2.876)**	1.878 (1.648-2.140)**
Alcohol Levels			
-Use: No Binge/Heavy	1.481 (1.103-1.988)**	2.880 (2.388-3.473)**	1.583 (1.244-2.015)**
-Past Month Binge	6.920 (5.274-9.080)**	8.458 (7.064-10.127)**	6.955 (5.623-8.601)**
-Past Month Heavy	11.847 (8.627-16.269)**	13.997 (10.978-17.846)**	12.043 (9.284-15.622)**
-Past Month At Risk	2.116 (1.728-2.593)**	1.760 (1.480-2.094)**	2.877 (2.378-3.482)**
Cox and Snell R-square	.106	.214	.152

**p-value is significant at the 0.01 level

Comparison Groups:

Age = 65 and Older

Ethnicity = White

Education = <High School

Income = < \$10,000

Insurance = None

Table 26: Logistic Regression results for Alcohol Use [Monthly Average] and Disablement

	Alcohol Caused or Exacerbated Emotional or Physical Problems: Past 12 Months [WS=212140] (N=36867)	Alcohol Caused Role Function Problems: Past 12 Months [WS=212125] (N=36875)	Alcohol Caused or Exacerbated Emotional, Physical or Role Function Problems: Past 12 Months [WS=212193] (N=36883)
Age			
-18 to 25	1.610 (0.817-3.174)	2.458 (1.260-4.797)**	2.338 (1.328-4.117)**
-26 to 34	1.938 (0.975-3.855)	2.745 (1.421-5.306)**	2.386 (1.343-4.240)**
-35 to 49	1.694 (0.866-3.312)	2.113 (1.094-4.083)	1.974 (1.125-3.463)
-50 to 64	1.148 (0.574-2.298)	1.413 (0.705-2.832)	1.395 (0.776-2.508)
Male Gender	0.948 (0.788-1.140)	1.442 (1.226-1.696)**	1.176 (1.015-1.363)
Race			
-Non Hispanic	0.989 (0.728-1.344)	1.111 (0.850-1.451)	1.012 (0.803-1.276)
-Black/African American			
-Hispanic	0.914 (0.734-1.139)	1.554 (1.263-1.911)**	1.350 (1.120-1.627)**
-Other	0.929 (0.674-1.281)	1.426 (1.092-1.864)**	1.126 (0.891-1.423)
Education			
-High School	0.882 (0.703-1.108)	0.847 (0.678-1.060)	0.875 (0.723-1.059)
-Some College	0.947 (0.756-1.186)	0.939 (0.751-1.175)	0.992 (0.818-1.203)
-College/Grad School	1.040 (0.803-1.346)	0.761 (0.576-1.005)	0.959 (0.760-1.209)
Employment	1.033 (0.856-1.248)	1.189 (0.979-1.445)	1.118 (0.951-1.315)
Income			
-\$10,000 to \$19,999	0.990 (0.796-1.231)	0.953 (0.779-1.167)	0.930 (0.775-1.115)
-\$20,000 to \$29,999	0.941 (0.733-1.209)	0.880 (0.692-1.120)	0.939 (0.762-1.157)
-\$30,000 to \$39,999	0.822 (0.621-1.089)	0.774 (0.578-1.036)	0.804 (0.630-1.025)
-\$40,000 to \$49,999	0.724 (0.488-1.075)	0.697 (0.481-1.011)	0.680 (0.497-0.932)
-\$50,000 to \$75,000	0.801 (0.550-1.168)	0.571 (0.391-0.832)**	0.719 (0.524-0.987)
-\$75,000 and Above	0.890 (0.609-1.302)	0.619 (0.412-0.930)	0.774 (0.566-1.059)
Insurance			
-Medicare & Medicaid	1.493 (1.174-1.899)**	1.262 (0.992-1.605)	1.360 (1.106-1.671)**
-Private	0.746 (0.610-0.912)**	0.764 (0.636-0.919)**	0.756 (0.644-0.889)**
-Both	0.833 (0.461-1.505)	0.812 (0.468-1.410)	0.759 (0.462-1.248)
Mental Health	2.703 (2.203-3.317)**	2.417 (2.010-2.906)**	2.456 (2.112-2.855)**
Drug Use in Past Year	1.733 (1.482-2.027)**	1.916 (1.654-2.221)**	1.824 (1.608-2.068)**
Alcohol Average Number Drinks Past Month:			
-Less than 10	2.377 (1.767-3.197)**	1.546 (1.178-2.029)**	2.141 (1.711-2.681)**
->10 to 20	6.405 (4.705-8.719)**	3.747 (2.780-5.050)**	5.449 (4.288-6.925)**
->20 to 30	7.074 (5.244-9.542)**	5.383 (4.092-7.083)**	6.534 (5.165-8.265)**
->30 to 60	10.837 (7.919-14.829)**	9.157 (6.877-12.194)**	10.703 (8.416-13.612)**
->60	19.091 (14.029-25.979)**	19.245 (14.722-25.157)**	21.382 (16.900-27.052)**
Cox and Snell R-square	.070	.090	.113

Table 27: Logistic Regression results for Alcohol Use [Monthly Average], Risk and Abuse/Dependence.

	Alcohol and Dangerous Activities [WS=212028] (N=36857)	Alcohol and Drive [WS=169416] (N=31347)	Alcohol Abuse or Dependence [WS=212687] (N=37026)
Age			
-18 to 25	4.337 (1.943-9.682)**	3.208 (2.007-5.127)**	4.661 (2.566-8.466)**
-26 to 34	3.289 (1.486-7.279)**	2.882 (1.794-4.630)**	4.159 (2.322-7.450)**
-35 to 49	1.980 (0.903-4.342)	2.078 (1.315-3.285)**	2.504 (1.403-4.468)**
-50 to 64	1.112 (0.480-2.577)	1.302 (0.813-2.085)	1.618 (0.884-2.962)
Male Gender	1.652 (1.401-1.947)**	1.368 (1.226-1.526)**	1.495 (1.293-1.730)**
Race			
-Non Hispanic	1.063 (0.795-1.420)	0.832 (0.681-1.018)	1.157 (0.922-1.452)
-Black/African American			
-Hispanic	1.073 (0.850-1.354)	0.777 (0.642-0.940)**	1.231 (1.010-1.500)
-Other	0.988 (0.689-1.415)	0.891 (0.704-1.128)	1.210 (0.948-1.544)
Education			
-High School	1.004 (0.800-1.259)	1.579 (1.316-1.895)**	0.868 (0.716-1.052)
-Some College	1.122 (0.893-1.411)	1.736 (1.440-2.092)**	0.939 (0.775-1.137)
-College/Grad School	0.962 (0.750-1.235)	1.788 (1.451-2.204)**	0.846 (0.676-1.058)
Employment	1.140 (0.951-1.368)	1.201 (1.010-1.429)	1.163 (0.978-1.383)
Income			
-\$10,000 to \$19,999	1.094 (0.895-1.336)	1.379 (1.172-1.623)**	1.030 (0.864-1.229)
-\$20,000 to \$29,999	1.066 (0.840-1.352)	1.719 (1.438-2.055)**	0.976 (0.791-1.205)
-\$30,000 to \$39,999	0.929 (0.714-1.208)	1.581 (1.289-1.940)**	0.773 (0.613-0.975)
-\$40,000 to \$49,999	1.163 (0.840-1.611)	1.645 (1.325-2.042)**	0.813 (0.605-1.093)
-\$50,000 to \$75,000	0.858 (0.619-1.190)	1.475 (1.181-1.844)**	0.809 (0.597-1.096)
-\$75,000 and Above	0.660 (0.414-1.054)	1.612 (1.248-2.082)**	0.661 (0.444-0.984)
Insurance			
-Medicare & Medicaid	1.270 (0.980-1.645)	0.986 (0.813-1.195)	1.259 (1.014-1.563)
-Private	1.016 (0.849-1.215)	1.140 (0.986-1.318)	0.872 (0.737-1.032)
-Both	1.095 (0.593-2.021)	0.843 (0.568-1.251)	1.009 (0.643-1.582)
Mental Health Symptoms	2.305 (1.954-2.718)**	1.647 (1.477-1.838)**	2.234 (1.921-2.597)**
Drug Use in Past Year	2.032 (1.748-2.362)**	2.600 (2.314-2.921)**	1.951 (1.711-2.224)**
Alcohol Average Number Drinks Past Month:			
-Less than 10	1.519 (1.131-2.040)**	2.566 (2.122-3.103)**	1.622 (1.270-2.071)**
->10 to 20	4.727 (3.440-6.497)**	7.005 (5.750-8.533)**	5.207 (4.026-6.735)**
->20 to 30	7.624 (5.657-10.276)**	9.271 (7.389-11.633)**	7.551 (5.931-9.615)**
->30 to 60	12.452 (9.503-16.316)**	13.792 (11.310-16.819)**	13.269 (10.576-16.648)**
->60	21.503 (15.990-28.916)**	19.347 (15.723-23.807)**	32.252 (25.300-41.114)**
Cox and Snell R-square	.104	.216	.150

**p-value is Significant at the 0.01 level

Comparison Groups:
 Age = 65 and Older
 Ethnicity = White
 Education = <High School
 Income = < \$10,000
 Insurance = None

Expected Results. Those in age group 18-25 had higher odds ratios for alcohol and dangerous activities. Those ages 18-34 had the highest odds ratios for alcohol and driving as well as alcohol abuse/dependence. Male gender increased the odds for all of the outcome variables (except that there was not a significant relationship between male gender and alcohol causing emotional or physical problems). Similarly, mental health symptoms and drug use increased the odds ratios for each of the disablement and risk outcomes as well as alcohol abuse/dependence. Importantly, each level of alcohol use progressively increased the odds ratios for each outcome variable (except that past month alcohol use [no binge or heavy] was not significant with alcohol caused role function problems). Age/gender alcohol risk also had an increased odds ratio for each of the study outcomes.

Unexpected Results. Past month alcohol use (no binge or heavy) did not increase the odds ratios for alcohol role function problems. It was also a surprise that Hispanic race did increase the odds ratio for alcohol role function problems and alcohol and driving, while other race increased the odds ratio for alcohol role function problems with the alcohol monthly average variable in the regression equation. Furthermore, it was unexpected that all levels of education and income would increase the odds ratios for alcohol and driving.

The next phase of Specific Aim 2 was to test if traits, drug use and alcohol use would predict treatment. Chi square tests were conducted to examine the relationship of the independent to the dependent variables for this phase. The dependent variables are alcohol treatment ever, alcohol or drug or mental health treatment in the past 12 months, and alcohol treatment gap in the past 12 months. Table 28 shows these tests.

Table 28: Specific Aim 2 Chi-square Matrix for Alcohol Treatment

	Alcohol Treatment Ever	Alcohol, Drug, or Mental Health Treatment: Past 12 Months	Alcohol Treatment Gap: Past 12 Months
Age	106.52	71.23	892.93
Gender	232.82	190.56	229.79
Race	38.26	123.09	7.12
Education	60.54	17.55	30.57
Employed	6.85	18.21	95.75
Income	9.57	37.03	18.24
Insurance	100.03	61.77	176.47
Mental Health Symptoms	162.40	781.94	189.98
Drug Use in Past Year	282.78	145.40	636.56
Alcohol Monthly Levels	313.88	7.94	1244.95

All of the independent variables in the Chi-square models were significant at the 0.01 level or greater except for the relationships of employment and alcohol treatment ever, and income and alcohol treatment gap.

HYPOTHESIS 2b: Traits [age, male gender, education, income and mental health symptoms) and use (illicit drugs past year and quantity risk levels of monthly alcohol use (a) binge, heavy, age and gender risk (b) monthly average] will positively predict treatment (alcohol treatment ever, alcohol, drug or mental health treatment in the past 12 months, and treatment gap for alcohol).

Hypothesis 2b was designed to test whether traits, drug use and alcohol use predicted treatment. The first logistic regressions for Hypothesis 2b included the alcohol levels and age/gender risk variables which were independently regressed on the treatment variables. They were replaced with the categorical, alcohol monthly consumption variable in the second set of logistic regressions so that the number of drinks as well as risk drinking patterns could be analyzed. Tables 29 and 30 show the results.

Table 29: Logistic Regression results for Alcohol Use [Levels] and Treatment

	Alcohol Treatment Ever [WS=206566] (UW=35764)	Alcohol, Drug, or Mental Health Treatment: Past 12 Months [WS=206566] (UW=35764)	Alcohol Treatment Gap: Past 12 Months [WS=206566] (UW=35764)
Age			
-18 to 25	1.685 (1.036-2.740)	1.896 (1.405-2.558)**	3.641 (1.955-6.782)**
-26 to 34	2.717 (1.663-4.440)**	2.440 (1.802-3.305)**	3.204 (1.746-5.881)**
-35 to 49	4.048 (2.482-6.601)**	3.005 (2.250-4.013)**	1.969 (1.073-3.612)
-50 to 64	2.873 (1.752-4.712)**	2.731 (2.023-3.686)**	1.541 (0.821-2.892)
Male Gender	2.998 (2.584-3.479)**	0.535 (0.476-0.603)**	1.667 (1.439-1.931)**
Race			
-Non Hispanic	0.822 (0.652-1.037)	0.529 (0.436-0.641)**	1.098 (0.865-1.393)
-Black/African American			
-Hispanic	0.435 (0.346-0.547)**	0.521 (0.431-0.630)**	1.190 (0.983-1.440)
-Other	0.603 (0.405-0.809)	0.438 (0.333-0.577)**	1.198 (0.930-1.542)
Education			
-High School	0.979 (0.802-1.195)	1.121 (0.946-1.327)	0.893 (0.732-1.089)
-Some College	0.986 (0.800-1.213)	1.226 (1.036-1.450)	1.025 (0.839-1.252)
-College/Grad School	0.703 (0.540-0.917)**	1.406 (1.166-1.695)**	0.994 (0.790-1.252)
Employment	1.045 (0.863-1.266)	0.711 (0.628-0.806)**	1.160 (0.973-1.384)
Income			
-\$10,000 to \$19,999	1.050 (0.872-1.265)	1.018 (0.875-1.185)	1.039 (0.869-1.244)
-\$20,000 to \$29,999	0.991 (0.774-1.270)	1.045 (0.891-1.227)	1.003 (0.803-1.253)
-\$30,000 to \$39,999	1.057 (0.816-1.370)	0.900 (0.748-1.083)	0.792 (0.622-0.670)
-\$40,000 to \$49,999	0.880 (0.640-1.210)	1.020 (0.820-1.268)	0.945 (0.698-1.279)
-\$50,000 to \$75,000	0.786 (0.573-1.079)	0.912 (0.713-1.166)	0.962 (0.707-1.311)
-\$75,000 and Above	0.888 (0.595-1.325)	0.722 (0.552-0.945)	0.792 (0.524-1.195)
Insurance			
-Medicare & Medicaid	1.338 (1.075-1.665)**	2.066 (1.715-2.490)**	1.057 (0.844-1.323)
-Private	0.583 (0.483-0.704)**	1.077 (0.920-1.260)	0.873 (0.738-1.034)
-Both	0.937 (0.625-1.403)	1.399 (1.036-1.890)	1.051 (0.668-1.653)
Mental Health Symptoms	2.084 (1.792-2.423)**	4.529 (3.973-5.164)**	2.148 (1.846-2.498)**
Drug Use in Past Year	3.011 (2.566-3.532)**	2.103 (1.853-2.386)**	1.718 (1.509-1.956)**
Alcohol Levels			
-Use: No Binge/Heavy	0.450 (0.361-0.561)**	1.014 (0.900-1.144)	1.889 (1.461-2.441)**
-Past Month Binge	0.963 (0.799-1.162)	0.817 (0.704-0.949)**	8.410 (6.712-10.538)**
-Past Month Heavy	1.237 (0.949-1.611)	0.685 (0.536-0.876)**	14.305 (10.889-18.794)**
-Past Month At Risk	1.488 (1.164-1.904)**	1.279 (1.040-1.573)	2.725 (2.245-3.308)**
Cox and Snell R-square	.069	.094	.147

Table 30: Logistic Regression results for Alcohol Use [Monthly Average] and Treatment.

	Alcohol Treatment Ever	Alcohol, Drug, or Mental Health Treatment: Past 12 Months	Alcohol Treatment Gap: Past 12 Months
	[WS=212687] (N=37026)	[WS=212687] (N=37026)	[WS=212687] (N=37026)
Age			
-18 to 25	1.853 (1.140-3.014)	1.820 (1.350-2.454)**	5.023 (2.694-9.267)**
-26 to 34	2.955 (1.808-4.829)**	2.339 (1.730-3.163)**	4.327 (2.355-7.951)**
-35 to 49	4.264 (2.613-6.958)**	2.922 (2.188-3.902)**	2.418 (1.322-4.425)**
-50 to 64	2.924 (1.782-4.797)**	2.676 (1.981-3.614)**	1.688 (0.899-3.173)
Male Gender	2.964 (2.550-3.445)**	0.522 (0.464-0.588)**	1.439 (1.240-1.670)**
Race			
-Non Hispanic	0.825 (0.652-1.042)	0.524 (0.433-0.635)**	1.112 (0.871-1.420)
-Black/African American			
-Hispanic	0.444 (0.353-0.557)**	0.518 (0.428-0.625)**	1.257 (1.027-1.539)
-Other	0.606 (0.452-0.814)**	0.435 (0.330-0.573)**	1.214 (0.945-1.558)
Education			
-High School	0.975 (0.799-1.190)	1.123 (0.948-1.330)	0.866 (0.711-1.056)
-Some College	0.964 (0.783-1.188)	1.239 (1.047-1.467)	0.958 (0.787-1.167)
-College/Grad School	0.669 (0.513-0.872)**	1.447 (1.198-1.746)**	0.865 (0.686-1.090)
Employment	1.053 (0.869-1.276)	0.706 (0.624-0.800)**	1.200 (1.007-1.431)
Income			
-\$10,000 to \$19,999	1.062 (0.881-1.281)	1.021 (0.878-1.187)	1.053 (0.882-1.258)
-\$20,000 to \$29,999	1.002 (0.783-1.281)	1.046 (0.892-1.227)	1.014 (0.815-1.263)
-\$30,000 to \$39,999	1.059 (0.818-1.372)	0.903 (0.750-1.087)	0.784 (0.617-0.997)
-\$40,000 to \$49,999	0.867 (0.632-1.189)	1.031 (0.829-1.283)	0.882 (0.655-1.188)
-\$50,000 to \$75,000	0.763 (0.557-1.045)	0.929 (0.726-1.189)	0.869 (0.639-1.182)
-\$75,000 and Above	0.845 (0.567-1.259)	0.737 (0.563-0.965)	0.711 (0.475-1.064)
Insurance			
-Medicare & Medicaid	1.364 (1.097-1.697)**	2.054 (1.705-2.476)**	1.132 (0.901-1.421)
-Private	0.583 (0.484-0.704)**	1.077 (0.921-1.260)	0.881 (0.741-1.046)
-Both	0.947 (0.632-1.420)	1.398 (1.035-1.889)	1.085 (0.686-1.717)
Mental Health Symptoms	2.092 (1.799-2.434)**	4.525 (3.970-5.157)**	2.158 (1.854-2.510)**
Drug Use in Past Year	3.112 (2.658-3.644)**	2.088 (1.842-2.368)**	1.780 (1.560-2.031)**
Alcohol Average Number Drinks Past Month:			
-Less than 10	0.485 (0.390-0.602)**	1.055 (0.936-1.188)	1.918 (1.478-2.489)**
->10 to 20	0.770 (0.598-0.990)	0.787 (0.661-0.938)**	6.268 (4.823-8.147)**
->20 to 30	0.970 (0.736-1.279)	0.910 (0.722-1.147)	8.954 (6.902-11.616)**
->30 to 60	1.061 (0.847-1.329)	0.792 (0.653-0.961)	15.822 (12.440-20.123)**
->60	1.712 (1.379-2.125)**	1.000 (0.820-1.220)	36.179 (28.124-46.540)**
Cox and Snell R-square	.068	.094	.144

**p-value is Significant at the 0.01 level

Comparison Groups:

Age = 65 and Older

Ethnicity = White

Education = <High School

Income = < \$10,000

Insurance = None

Expected Results. Those ages 26-64 increased the odds ratio for alcohol treatment ever. Those in age groups 18-64 increased the odds ratio for alcohol or drug or mental health treatment in the past 12 months. Those aged 18-25 and 26-34 carried the highest odds ratios for alcohol treatment gap in the past 12 months. It was interesting that those aged 50-64 increased the odds ratios for alcohol treatment gap in the past 12 months when the alcohol monthly average variable was in the regression. Age exhibited a bell shaped curve for alcohol treatment ever and alcohol or drug or mental health treatment in the past 12 months, with a linear decline for alcohol treatment gap as age increased.

Male gender showed an increase in the odds ratios for alcohol treatment ever and alcohol treatment gap in the past 12 months when the alcohol levels variable and the age/gender alcohol risk variable were in the regression. A college education decreased the odds for alcohol treatment ever, and increased the odds ratio for treatment in the past 12 months. Mental health symptoms and illicit drug use increased odds ratios for each of the treatment outcomes. Past month alcohol use (no binge or heavy) and age/gender alcohol risk increased the odds of alcohol treatment ever, and all alcohol levels (use, binge and heavy) as well as age/gender alcohol risk increased the odds for alcohol treatment gap in the past 12 months.

Consuming more than 60 drinks per month increased the odds ratio for alcohol treatment ever. It was also of interest that 10-20 drinks/month was the only category that showed an increase in the odds ratio for alcohol or drug or mental health treatment in the past 12 months. It was not surprising that all categories of monthly alcohol consumption increased the odds ratio for alcohol treatment gap in the past 12 months. The most

interesting trend was that alcohol consumption (levels and monthly average) showed a consistent increase in the odds ratios for alcohol treatment ever and alcohol treatment gap and a steady decrease in the odds ratios for treatment gap, though not all values were significant.

Unexpected Results. Those aged 18-25 were not significant for treatment ever and those in the age groups of 35-50 and 50-64 were not significant for alcohol treatment gap when the alcohol monthly average variable was in the regression. Hispanic race decreased the odds ratios for treatment ever and all race categories, when compared to white, decreased the odds ratios for treatment in the past 12 months. The analysis also found that public insurance increased the odds ratio for alcohol treatment ever and alcohol or drug or mental health treatment in the past 12 months.

It was also surprising that past month alcohol binge or heavy use were not significant for alcohol treatment ever and that past month alcohol use (no binge or heavy) and age/gender risk were not significant for alcohol or drug or mental health treatment in the past 12 months. Similarly, consuming 10-60 drinks/month was not significant for alcohol treatment ever, and less than 10 drinks/month or 20-60+ drinks/month were not found to be significant for alcohol or drug or mental health treatment in the past 12 months.

The next phase of Specific Aim 2 was to test the predictability of traits, drug use, alcohol use and selected alcohol disablement and risk variables on treatment. The dependent variable alcohol treatment gap in the past 12 months was excluded from the logistic regressions due to the fact that the selected disablement and risk variables that were selected for use as independent variables in the regressions were used in the

NSDUH 2003 survey to determine treatment gap. Chi square tests were conducted to examine the relationship of the independent to the dependent variables for this phase. The dependent variables are alcohol treatment ever, and alcohol or drug or mental health treatment in the past 12 months Table 31 shows these tests.

Table 31: Specific Aim 2 Chi-square Matrix for Disablement and Treatment

	Alcohol Treatment Ever	Alcohol, Drug, or Mental Health Treatment: Past 12 Months
Alcohol: Emotional or Physical Problems	152.35	155.97
Alcohol: Role Function Problems	183.17	109.53
Alcohol and Dangerous Activities	134.25	63.42
Alcohol and Drive	178.58	56.95

All of the chi-square values between the independent and the dependent variables in Table 31 were significant at the 0.01 level or greater.

HYPOTHESIS 2c: Traits (age, male gender, education, income and mental health symptoms) and use [illicit drugs past year and quantity risk levels of monthly alcohol use (a) binge, heavy, age and gender risk (b) monthly average] and selected disablement and risk variables (emotional, physical and role problems, alcohol and dangerous activities and driving a car) will positively predict treatment (alcohol treatment ever, alcohol, drug or mental health treatment in the past 12 months).

Hypothesis 2c was tested to determine whether traits, drug use, alcohol use and selected disablement and risk behavior variables would predict alcohol treatment ever, and alcohol or drug or mental health treatment in the past 12 months. The alcohol disablement variables (alcohol caused emotional or physical problems and alcohol caused role functions problems) and the alcohol risk variables (alcohol and dangerous activities and alcohol and driving) were added to the regression equations as independent variables.

The first set of logistic regressions included the study trait, drug use, alcohol levels and age/gender alcohol risk variables. The second set of logistic regressions replaced the alcohol levels and age/gender risk variables with the categorical alcohol monthly average variable. These different sets of variables were independently regressed on the alcohol treatment ever and alcohol or drug or mental health treatment in the past 12 months, dependent variables. The important differences that were found in these regressions, when compared to the prior regressions with treatment outcomes, were reported. The results of the regressions follow in Table 32.

Table 32: Logistic Regression results for Treatment.

	Alcohol Treatment Ever [e]	Alcohol, Drug, or Mental Health Treatment: Past12 Months [e]	Alcohol Treatment Ever [f]	Alcohol, Drug, or Mental Health Treatment: Past12 Months [f]
Age [e & f]				
-18 to 25	2.085 (0.946-4.598)	1.986 (1.398-2.822)**	2.426 (1.099-5.355)	1.808 (1.269-2.575)**
-26 to 34	3.229 (1.444-7.222)**	2.479 (1.748-3.515)**	3.738 (1.670-8.366)**	2.264 (1.598-3.208)**
-35 to 49	4.741 (2.154-10.436)**	3.077 (2.190-4.323)**	5.409 (2.458-11.902)**	2.890 (2.054-4.065)**
-50 to 64	3.230 (1.449-7.199)**	2.903 (2.036-4.139)**	3.740 (1.688-8.286)**	2.787 (1.952-3.980)**
Male Gender	2.666 (2.244-3.169)**	0.491 (0.432-0.560)**	2.602 (2.207-3.069)	0.481 (0.422-0.547)**
Race				
-Non Hispanic	0.888 (0.665-1.187)	0.496 (0.402-0.610)**	0.864 (0.653-1.144)	0.489 (0.397-0.602)**
-Black/African American				
-Hispanic	0.469 (0.357-0.615)**	0.590 (0.482-0.723)**	0.522 (0.397-0.686)**	0.585 (0.478-0.717)**
-Other	0.727 (0.537-0.984)	0.462 (0.343-0.621)**	0.699 (0.524-0.932)	0.459 (0.341-0.617)**
Education				
-High School	0.875 (0.686-1.116)	1.120 (0.930-1.349)	0.875 (0.694-1.104)	1.124 (0.933-1.354)
-Some College	0.749 (0.585-0.959)	1.183 (0.977-1.433)	0.742 (0.581-0.948)	1.210 (0.999-1.466)
-College/Grad School	0.515 (0.378-0.703)**	1.446 (1.169-1.789)**	0.479 (0.355-0.648)**	1.520 (1.227-1.883)**
Employment	0.969 (0.782-1.200)	0.781 (0.674-0.905)**	0.973 (0.786-1.206)	0.771 (0.665-0.893)**
Income				
-\$10,000 to \$19,999	0.998 (0.796-1.252)	0.977 (0.836-1.143)	1.008 (0.809-1.254)	0.977 (0.836-1.141)
-\$20,000 to \$29,999	1.032 (0.786-1.356)	1.087 (0.901-1.312)	1.037 (0.801-1.343)	1.086 (0.901-1.310)
-\$30,000 to \$39,999	0.925 (0.688-1.243)	0.909 (0.741-1.115)	0.925 (0.682-1.238)	0.911 (0.742-1.119)
-\$40,000 to \$49,999	0.842 (0.577-1.228)	0.998 (0.780-1.277)	0.839 (0.586-1.201)	1.014 (0.792-1.299)
-\$50,000 to \$75,000	0.763 (0.545-1.069)	0.885 (0.681-1.148)	0.776 (0.557-1.082)	0.913 (0.701-1.188)
-\$75,000 and Above	0.824 (0.524-1.295)	0.705 (0.514-0.968)	0.812 (0.521-1.266)	0.737 (0.536-1.013)
Insurance				
-Medicare & Medicaid	1.453 (1.116-1.893)**	1.816 (1.468-2.247)**	1.453 (1.126-1.876)**	1.794 (1.449-2.222)**
-Private	0.651 (0.519-0.816)**	1.012 (0.851-1.204)	0.646 (0.520-0.802)**	1.016 (0.854-1.209)
-Both	0.969 (0.523-1.798)	1.384 (0.980-1.954)	1.002 (0.548-1.832)	1.376 (0.974-1.945)
Mental Health	1.709 (1.446-2.019)**	4.090 (3.538-4.728)**	1.706 (1.451-2.006)**	4.088 (3.539-4.722)**
Drug Use in Past Year	2.807 (2.313-3.407)**	1.862 (1.622-2.138)**	2.827 (2.349-3.402)**	1.826 (1.591-2.096)**
Alcohol Levels [e]				
-Use: No Binge/Heavy	0.925 (0.716-1.197)	1.086 (0.948-1.245)		
-Past Month Binge	1.456 (1.130-1.875)**	0.720 (0.601-0.863)**		
-Past Month Heavy	1.533 (1.077-2.182)	0.477 (0.353-0.643)**		
-Past Month At Risk	1.155 (0.888-1.504)	1.079 (0.861-1.350)		
Alcohol Monthly Average Past Month: [f]				
-Less than 10			0.875 (0.694-1.102)	1.124 (0.981-1.289)
->10 to 20			1.167 (0.869-1.568)	0.729 (0.604-0.880)**
->20 to 30			1.388 (1.005-1.919)	0.815 (0.628-1.058)
->30 to 60			1.309 (0.992-1.725)	0.628 (0.496-0.796)**
->60			1.595 (1.221-2.084)**	0.629 (0.487-0.812)**
[e & f]				
-Alcohol Emotional/Physical	2.057 (1.636-2.586)**	2.172 (1.811-2.604)**	2.044 (1.645-2.539)**	2.193 (1.828-2.631)**
-Alcohol Role	2.259 (1.807-2.825)**	1.745 (1.408-2.163)**	2.263 (1.822-2.810)**	1.686 (1.362-2.087)**
-Alcohol and Dangerous Activities	1.361 (1.047-1.767)	1.371 (1.101-1.709)**	1.385 (1.074-1.784)	1.315 (1.058-1.635)
-Alcohol and Driving	1.234 (1.011-1.506)	1.183 (1.011-1.385)	1.272 (1.048-1.545)	1.196 (1.022-1.400)
Cox and Snell R-square	.088	.102	.087	.102

**p-value is significant at the 0.01 level

Comparison Groups:
 Age = 65 and Older
 Ethnicity = White
 Education = <High School
 Income = < \$10,000
 Insurance = None

Expected Results. Each of the disablement, independent variables increased the odds ratios for alcohol treatment ever and alcohol or drug or mental health treatment in the past 12 months. Alcohol and dangerous activities also increased the odds ratio for treatment in the past 12 months for the alcohol levels regression, but not for the alcohol monthly average regression. Past month binge alcohol use and more than 60 drinks per month increased the odds ratio for alcohol treatment ever.

Those ages 26-34, 35-49 and 50-64 had an increased odds ratio for alcohol treatment ever and all age categories increased the odds for treatment in the past 12 months. Age exhibited a bell shaped curve for each of the treatment outcome measures. A college education had an increased odds ratio for treatment in the past 12 months with public insurance increasing the odds for both alcohol treatment ever and treatment in the past 12 months. Not surprising, mental health symptoms and drug use also showed an increase in the odds ratios for each of the treatment outcome variables.

Unexpected Results. There were no other significant alcohol outcomes that increased the odds for either treatment outcome, aside from those reported in the expected results. Also, it was noticed that as alcohol consumption increased, the odds ratios for alcohol treatment ever increased while the odds ratios for treatment in the past 12 months generally decreased.

Synthesis of Study Variables in Relation to all of the Logistic Regressions

Age. Each age category had an increase in the odds ratios for alcohol frequency in the past month and year starting with age 18-25. Overall, age reflected a bell shaped curve for ever using alcohol. As age increased there was also a progressive decline in the odds ratios for past month binge/heavy alcohol consumption. Age continued to have increased odds ratios for evaluated treatment need. Those aged 18-25 and 26-34 had an increased odds ratio for alcohol and dangerous activities and those in the age cohorts 18-25, 26-34 and 35-49 were at an increased risk for drinking and driving and abuse/dependence. Ages 26-54 were more likely to have ever had alcohol treatment but were also at an increased risk for treatment gap.

Research has found that the prevalence of 12 month alcohol dependence is highest in the age group of 18-29 (9%), with a progressive decline in all subsequent age groups. This finding would be supported by the results of this study. This study adds that as age increases, the use of alcohol declines with past year and past month use, as well as with the risk levels (binge/heavy) and the actual quantities of alcohol consumption. In addition, the need for alcohol treatment also follows this decline with age. Interestingly, there is a bell shaped curve for treatment ever and in the past 12 months, with a progressive decline in the odds ratios for treatment gap. Similarly, age exhibits a bell shaped, non significant curve with the disablement outcome variables; however, when treatment is controlled for, the combined disablement variable (emotional or physical or role functions problems) exhibits a progressive decline in the odds ratios.

Gender. Male gender increased the odds ratios for every alcohol use category. In addition, male gender continued to exhibit an increase in the odds ratios for an

evaluated treatment need, disablement, risk behaviors and abuse/dependence.

Furthermore, male gender was more likely to have ever received alcohol treatment and to be at risk for treatment gap.

Research has consistently found male gender to be higher in prevalence of alcohol related categories than female gender. The lifetime prevalence of alcohol abuse related to gender has been reported as 12.5 percent for men and 6.4 percent for women (Kessler et al., 1997). Twelve month rates of alcohol dependence have been documented as 20.1 percent for men and 8.2 percent for women (Caetano et al., 2002). This study supports the findings of prior research. Additionally, this study underscores male gender as a significant predictor for disablement, risk behaviors, need for treatment, receipt of treatment and treatment gap.

Ethnicity. Non-Hispanic black, Hispanic and other race were significant for ever using alcohol in the past year and past month and age/gender alcohol risk, with other race also significant for past month binge/heavy alcohol use. These relationships had odds ratios that were less than the non-Hispanic white comparison group. All of the race groups were significant for decreasing the amount of alcohol consumption in the OLS and Poisson regressions. In addition, Hispanic race had an increased odds ratio for disablement. Hispanic race was also significant for treatment, with all race categories significant for treatment in the past 12 months; however, these relationships had odds ratios that were less than those for the comparison group.

Research has reported the 12 month prevalence of alcohol dependence as four percent white, five percent black, seven percent Hispanic, and three percent other ethnicity (Caetano et al., 1997). The study findings are supportive of the data found in

the empirical literature in regard to the increased risk for alcohol abuse or dependence for Hispanic as compared to white. This study adds that there is a greater likelihood that non-Hispanic black, Hispanic and other race used alcohol less frequently, with less likelihood of risk patterns of consumption and were less likely to consume as great a quantity of alcohol when compared to non-Hispanic white. However, Hispanic and other race were at increased risk for disablement though less likely to have ever received alcohol treatment or received alcohol or drug or mental health treatment in the past 12 months.

Education. More education showed a progressive increase in the odds ratios for ever using alcohol, alcohol use in the past year and in the past month. Conversely, more education exhibited a general decline in the odds ratios for past month binge/heavy drinking and age/gender alcohol risk, with each of these relationships having an odds ratio that was less than the comparison group of those with less than a high school education. An increase in education was indicative of a decline in alcohol consumption for the OLS and Poisson regressions.

More education increased the odds ratios for drinking and driving. A college education was significant for alcohol treatment ever with odds ratios that were less than the comparison group. A college education did increase the odds ratio for treatment in the past 12 months as well as the risk for drinking and driving.

Research has found that having at least one year of college education displayed greater odds of at risk drinking (Ruchlin, 1997). Additionally, it has been reported that the prevalence of 12 month alcohol dependence remains relatively stable, between four and five percent, with education (Caetano, 2002). This study found that education

increased the odds of consuming alcohol while decreasing the odds of risk consumption patterns and the absolute quantity of alcohol consumed. Additionally, education increased the odds for receiving treatment in the past 12 months. More education did increase the odds ratios for drinking and driving; however, education was not significant with the other outcome variables (disablement, risk or abuse/dependence).

Employment. Employment had an increased odds ratio for alcohol use ever and alcohol use in the past year and past month. Employment was significant for treatment in the past 12 months. These odds ratios, however, were less than the comparison group in all cases. These findings are consistent with the research that an increase in the consumption of alcohol lends to an increase in the rate of unemployment in males (Mullay et al., 1993) and injuries on the job, while decreasing white collar jobs and fringe benefits. These consequences could include missed days and/or decreased functionality at work, legal issues such as drunken driving charges that prohibit access to driving, as well as accidents and/or disablement associated with drinking and driving.

Income. There were increased odds ratios for each income category in relation to ever using alcohol and alcohol use in the past year and in the past month. There were no significant findings that increased the odds ratios for income and alcohol risk pattern consumption (binge/heavy and age/gender) or the amount of alcohol consumed; however, an increase in income progressively increased the odds ratios for drinking and driving.

Interestingly, research reports the 12 month prevalence of alcohol dependence as six percent (<\$10,000), three percent (\$10,000-\$19,999), five percent (\$20,000-\$29,999), six percent (\$30,000-\$39,000), two percent (\$40,000-\$59,000) and five percent (\$60,000+) (Caetano et al., 2002). Another study found that increased income lent to

increased alcohol consumption (Ettner, 1995) while the National Co-morbidity Study reported that the prevalence of most psychiatric disorders decreased with an increase in socio-economic status (Kessler et al., 1994). The study findings were that when income increases there is also an increase in the odds ratios for using alcohol; however an increase in income is related to a decreased odds ratio of alcohol risk consumption (binge/heavy and age/gender) and the quantity of alcohol consumed. This study cannot state that there is a relationship with the findings from the NCS, since psychiatric disorders may contribute more to limiting income as opposed to limited income causing a psychiatric disorder.

Health Insurance. Public insurance and private insurance were significant in the OLS regressions and decreased the amount of alcohol consumed. In the Poisson regression private insurance was significant with an incidence density ratio that was less than the comparison group of no insurance. Public insurance also increased the odds ratio for disablement, ever receiving alcohol treatment and treatment in the past 12 months.

The limited research on health insurance and its relationship to alcohol consumption has reported that Medicaid recipients exhibit the highest likelihood of having a diagnosis of an alcohol, drug or mental illness, and reporting the greatest perceived unmet need for these services (Wells et al., 2002). Additionally, emergency room research has concluded that Medicaid vs. Worker's Compensation more often paid for alcohol related services. This study could not support data that suggests public insurance increases the risk of alcohol consumption. This study did find that public insurance did predict treatment.

Select Mental Health Symptoms. Mental health symptoms had increased odds ratios for ever using alcohol and alcohol use in the past month, though this variable was not significant for alcohol risk consumption patterns (binge/heavy) or the amount of alcohol consumption. Mental health symptoms did increase the odds ratios for an evaluated treatment need, ever receiving alcohol treatment and treatment in the past 12 months.

Research is prolific in the investigation of mental health disorders, and the co-morbid relationships between these disorders, alcohol disorders and drug disorders (Kessler, et al., 1994; Kessler et al., 1997; Pridgerson et al., 2001; Arian et al., 2001; Thomas et al., 2001 and Welte, 2001). Therefore, it is not surprising that this study found select mental health symptoms were predictive of so many of the study outcomes. Surprisingly, these mental health symptoms did not predict past month binge alcohol use or past month heavy alcohol use, yet did predict an evaluated need for alcohol treatment in the past 12 months, as well as alcohol abuse or dependence in the past 12 months.

Illicit Drug Use. Drug use in the past year increased the odds ratios for alcohol use, alcohol risk consumption patterns, the amount of alcohol consumed, an evaluated need for treatment, treatment ever or in the past 12 months, treatment gap, and each of the study alcohol disablement and alcohol risk outcomes as well as alcohol abuse dependence. Importantly, drug use was a predictor of the amount of alcohol use in the OLS and Poisson regressions with an increased incidence density ratio in the Poisson regression.

Research has found that the lifetime occurrence of alcohol abuse or dependence and drug abuse or dependence was 13.5 percent and 6.1 percent respectively. Those with

either an alcohol or drug disorder were found to be seven times more likely to have the other addictive disorder when compared to the rest of the population. The study results are supportive of the co-morbid relationship between illicit drug use and alcohol use.

Alcohol Consumption. This study found that alcohol levels (use: no binge/heavy, binge and heavy) increased the odds ratios for an evaluated need for alcohol treatment, disablement, risk and abuse/dependence. The levels of alcohol consumption also progressively increased the odds ratios for treatment gap. Age/gender alcohol risk consumption also showed an increase in the odds ratios for each of the study alcohol disablement and alcohol risk variables as well as alcohol abuse/dependence. Age/gender risk did also increase the odds ratio for alcohol treatment gap in the past 12 months.

This study found that average monthly alcohol consumption levels of less than 10 drinks per month had an increased odds ratio for evaluated treatment need, disablement, risk and abuse/dependence. In each of the regressions there was a progressive increase in the odds ratios for each subsequent increase in the amount of alcohol consumed. Consuming 60 or more drinks per month were the only significant finding that increased the odds ratio for treatment ever or treatment in the past 12 months. Each category of alcohol consumption beginning with less than 10 drinks per months did increase the odds ratios for alcohol treatment gap.

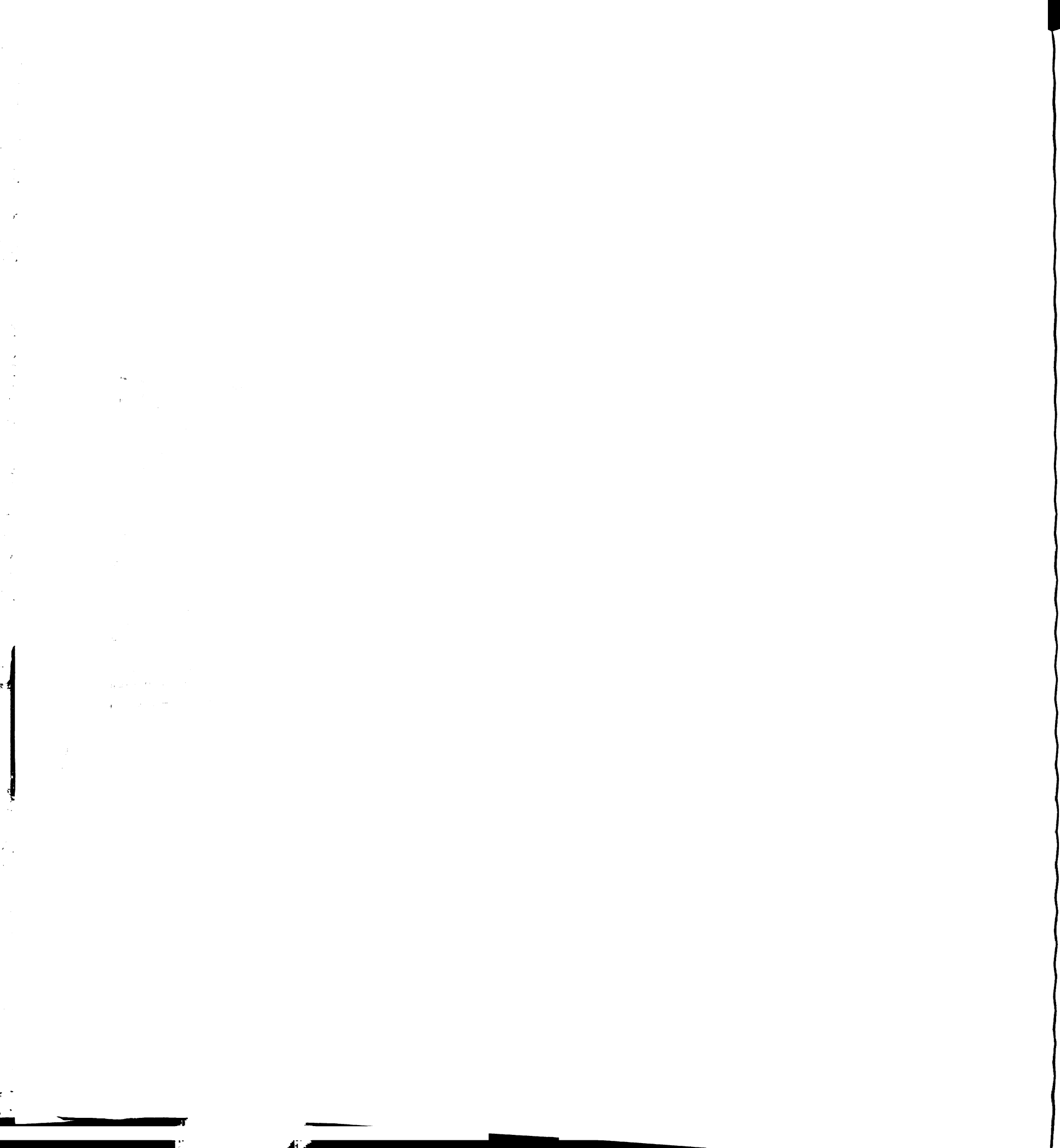
The Epidemiologic Catchment Area study cites the rate for lifetime occurrence of alcohol abuse or dependence as 13.5 percent (Kessler et al., 1994). The consumption of 5 or more drinks in one day during the past 12 months translates into being six times more likely of being alcohol dependent (Caetano, Tam, Greenfield, Cherpitel & Midanik,

1997). Additionally, the linear increase between alcohol quantity/frequency and related problem outcomes is documented.

Specifically, respondents with minor alcohol related problems are reported to have drunk an average of 2.6 drinks on an average of two days/week with heavy alcohol consumption between 12 and 13 days in a year. Comparatively, individuals with minor and severe alcohol related problems consumed an average of 4.7 drinks on an average of 3.5 days/week with 58 heavy drinking days in the year (Russell, Light, & Gruenewald, 2004). This data translate into a monthly average of 22.5 and 71 drinks when accounting for the product of the number of drinks x the number of days in the week drinks were consumed.

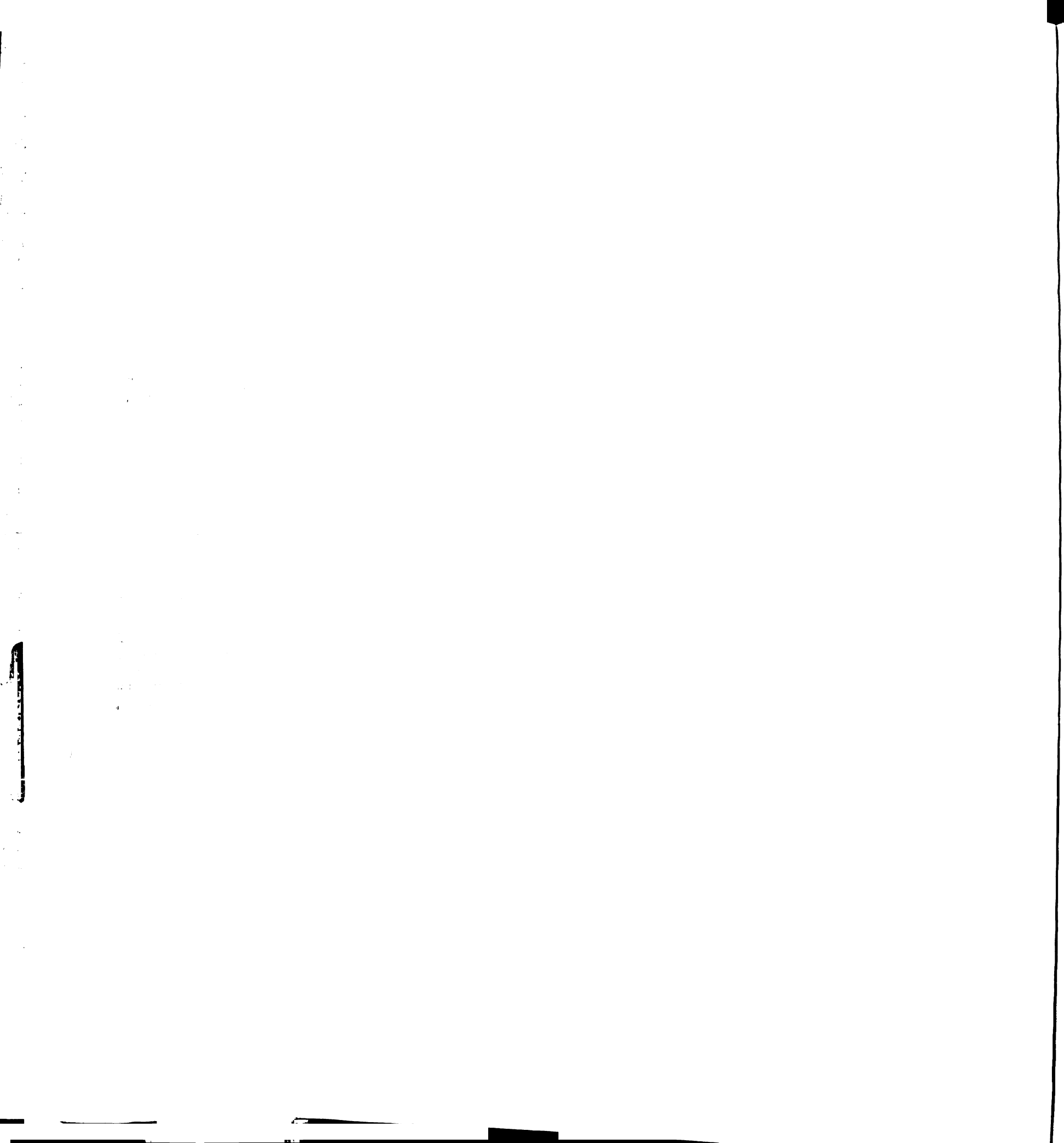
This study supports the risk of drinking five or more drinks on an occasion. In this regard, past month binge drinking (five or more drinks on one occasion in the past month) had an increase in odds ratios (OR = 6.337, 95% CI = 5.170-7.767) for alcohol abuse/dependence when not controlling for treatment as well as when controlling for treatment (OR = 7.413, 95% CI = 6.055-9.075). This study found similar results for the alcohol disablement and alcohol risk variables. Most noticeably, however, this study found that average monthly consumption totals of less than 10 drinks/month increased the odds ratios for the outcomes.

Disablement & Risk Behavior (Independent Variables). Alcohol emotional or physical problems and alcohol role functions problems increased the odds ratios for alcohol treatment ever and alcohol or drug or mental health treatment in the past 12 months. Alcohol and dangerous activities increased the odds ratio for treatment in the past 12 months.



Summary

The goal of this chapter was to examine the hypotheses developed from the research using a sociological framework that was incorporated in each prior chapter. The findings show that alcohol consumption has a negative impact on disablement, risk behaviors, and alcohol abuse or dependence. Many individuals seek treatment for alcohol but for others, a treatment gap remains.



CHAPTER VI: DISCUSSION

This study examined factors associated with alcohol use and the consequences of alcohol use in adult community dwelling population in the U.S. The study examined secondary data from a national probability survey – the NSDUH in 2003 which was weighted to represent 212,686,651 individuals. The data showed that there were 25,623,260 individuals that never used alcohol and 146,552,398 individuals (68.91%) who used alcohol in the past year. Of those that used alcohol, 35,331,304 (16.61 %) reported bingeing (defined as five or more drinks on one occasion in the past month), and 15,527,966 (7.30 %) reported heavy use (five or more drinks on five or more occasions in the past month). Those individuals considered at risk for alcohol problems defined as those males under 65 who drank 61 or more drinks in the past month, and women or those males 65 years of age and older who drank 31 or more drinks in the past month were found to be 17,476,250 (8.46%) individuals. Of those who drank alcohol, the range of drinks was one to 2,250 in the past month. More than sixteen million (16,865,820) individuals had an evaluated need for treatment, based on whether the respondents answers to DSM-IV questions classified them as abusing alcohol, being dependent on alcohol or having received alcohol treatment in the past year. However, only 1.4 percent of the study sample reported a perceived need for treatment showing a large number of individuals who drink at excess levels but don't acknowledge that they have an alcohol problem or exhibit motivation to obtain treatment for a drinking problem.

The findings from this study also identify a number of problems or consequences that were self-reported to be related to alcohol use. Of the sample, 10,572,060 report having exacerbated emotional or physical problems in the past 12 months caused by

alcohol. Role functions problems such as decreased activities, problems with family and friends and problems at home, work or school were reported by 10,936,360 individuals in the past 12 months. The experience of emotional, physical, or role function problems in the past 12 months related to alcohol was reported by 16,516,050 individuals. These problems were defined as alcohol disablement for purposes of this study.

Many individuals who used alcohol reported engaging in risky behaviors. Of the total sample, 10,701,870 reported engaging in dangerous activities defined as regularly drinking alcohol in the past 12 months and doing something that might cause physical danger. Alcohol use while driving was reported by 30,711,740 individuals. Finally, 16,463,700 individuals reported alcohol use that was at the level defined as abuse or dependence using the DSM-IV criteria which includes problems with relationships, as well as legal consequences, alcohol seeking behavior and withdrawal symptoms.

Finally this study examined alcohol treatment. In the study sample, an estimated 13,705,523 had received some alcohol treatment in their lifetime, although the amount of treatment and the time period was unknown. In addition, 2,200,708 individuals had alcohol treatment, 3,032,179 had alcohol and drug treatment, and 27,942,898 had mental health treatment in the past 12 months. Finally, 15,618,070 individuals were evaluated as needing alcohol treatment and did not receive it in the past 12 months, defined here as an alcohol treatment gap. When the numbers of individuals who use alcohol and have disablement problems and engage in risky behavior are considered, with the numbers of individuals that experienced treatment gap, the scope of the national problem becomes apparent.

This study first examined a subset of variables to understand trait (socio-demographic) factors and drug use in relation to alcohol use considering a number of different measures of alcohol use (frequency and quantity) and abuse/dependence. Second, this study examined the relationship of trait factors and alcohol use on alcohol disablement, alcohol risk behavior, alcohol abuse/dependence and treatment.

Factors Associated with Alcohol Use

This study used multivariate analyses to examine selected factors associated with alcohol use. The trait characteristics examined were: age, gender, race (predisposing factors); and education, employment status, income and health insurance (enabling factors). Two other factors were examined: mental health symptoms and drug use in the past year.

Alcohol use was examined in terms of frequency (ever having used alcohol, use in the past year and use in the past month). For those that used alcohol, the quantity of alcohol use was examined in terms of binge (defined as five or more drinks on one occasion in the past month) or heavy use (five or more drinks on five or more occasion in the past month). The individuals who were at risk based on age and gender characteristics (defined as females of all ages and those males that are 65 years of age and older that drink 31 or more drinks in the past month, and those males aged 18-64 that drink 61 or more drinks in the past month) were also examined. The average number of drinks in the past month was examined along with those individuals evaluated as needing alcohol treatment in the past 12 months based on how the respondent's answered DSM-IV questions in the NSDUH, and were categorized as either abusing alcohol, being alcohol dependent or receiving alcohol treatment in the past 12 months. The following

section discusses the main findings of these analyses conducted in SUDDAN using logit, OLS and Poisson regressions.

Discussion of the Study Findings

In terms of age, as expected the frequency and quantity of alcohol use declines with age. This is consistent with previous studies that show declining use with age (Kessler et al., 1994). This could be associated with less physiological tolerance for alcohol associated with aging (Lucey et al., 1997), growing maturity of individuals, or diminished health status that encourages individuals to reduce or give up alcohol use (Ruchlin, 1997).

It was not a surprise to find that male gender increased the odds ratios for the frequency and the quantity of alcohol use. In fact, male gender was one of two variables that were found to be significant predictors of the amount of alcohol consumed in all regressions including the OLS and Poisson regressions. Being male in society appears to be related to social and environmental factors that differentiate gender behavior and contribute to differing patterns of drinking or differences in the reporting of alcohol use (Biener, 1987; Hilton, 1987; Robbins, 1989).

It was an interesting finding that non-Hispanic black, Hispanic and other race, compared to white race decreased the odds ratios for ever having used alcohol, alcohol in the past month and the past year. The OLS and Poisson regressions affirmed the negative relationship between non-white individuals and alcohol use.

More education increased the odds ratios for the frequency of alcohol use, but reduced the odds of risk patterns of alcohol consumption such as binge/heavy, age/gender and the actual number of drinks consumed. The OLS and Poisson regressions confirmed

this finding. The fact that an increase in education decreased the quantity of alcohol consumption lends to some speculation. It is possible that education provides an awareness of problematic behaviors and adverse consequences. It is very likely though that an increase in education also leads toward increased opportunities for professionalism, income, satisfaction and possibly relationships.

As such, there may be more modulating factors that provide immediate feedback for changing problem behaviors. It could be that professional endeavors require more frequent and consistent human interactions, and that the fear of losing ones professional status and/or the income associated with this status and lifestyle opportunities decrease the likelihood of jeopardizing these benefits. Additionally, satisfaction derived from the pursuit of career opportunities may become a mechanism for gratification that assists a person to prevent excess alcohol use.

Those individuals who achieve higher education may not have been challenged by social, environmental or genetic issues that pose obstacles to achieving a higher education (e.g., physical or sexual abuse, mental health conditions, poverty, discrimination, disability, etc.), and therefore have reduced problems with alcohol. The findings for income mirrored those for education and the same social and environmental constraints may apply for income as they do for education.

Employment increased the odds ratios for using alcohol but not for the amount of alcohol consumed. Public and private health insurance were each found to be associated with the amount of alcohol consumed in the OLS regression, controlling for other factors. The Poisson regression also found that private insurance was a significant factor that decreased the amount of alcohol consumed.

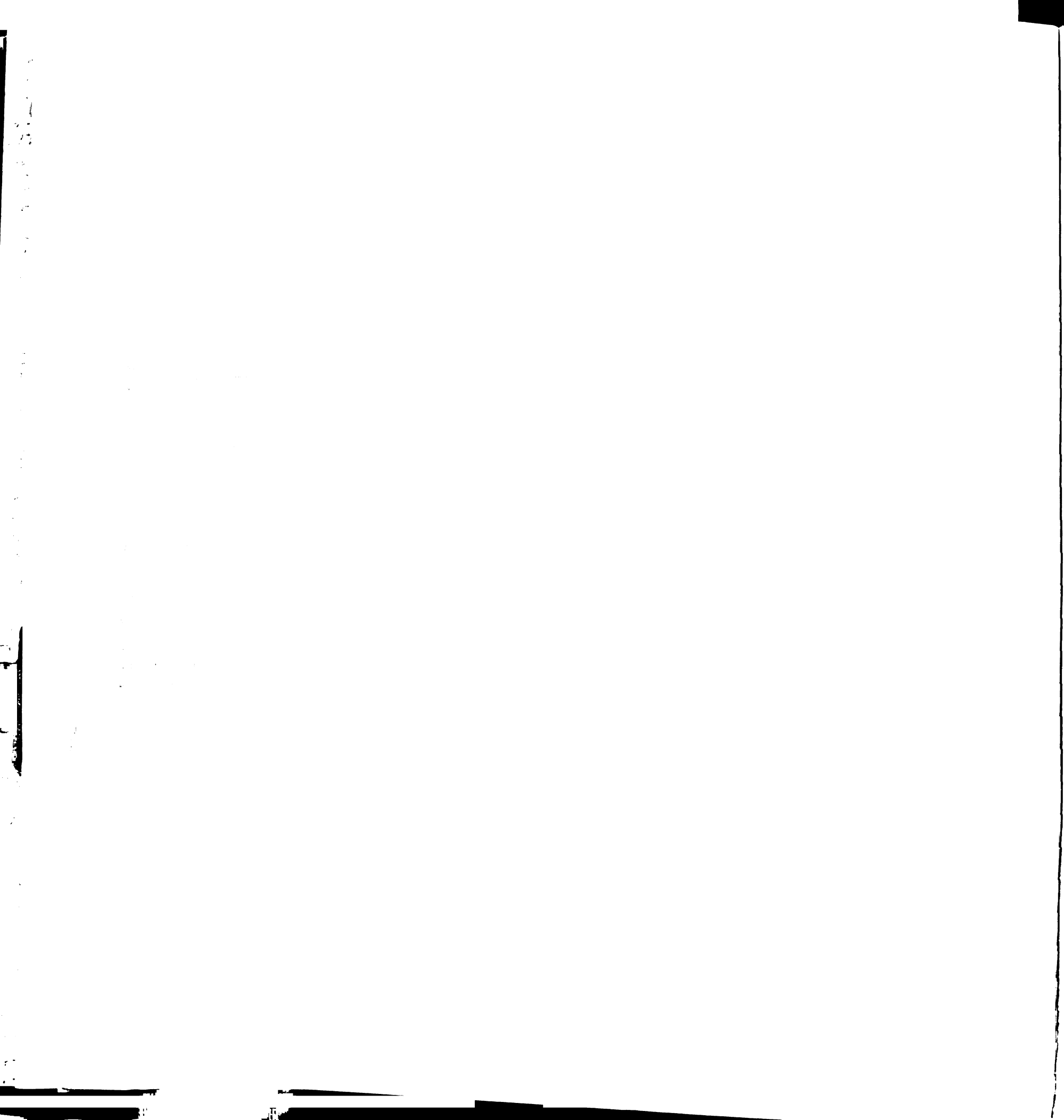
The outcomes associated with mental health symptoms were unexpected in this study. This variable increased the odds ratios for the frequency of alcohol use but not for the quantity of alcohol consumed. In fact, the OLS and Poisson regressions found that mental health symptoms were not related to the amount of alcohol consumed.

Importantly, the OLS and Poisson regressions found drug use and male gender to be the strongest predictors of the amount of alcohol consumed. It was not a surprise that illicit drug use in the past year was a predictor variable that increased the odds ratios for all of the study dependent variables (Kessler et al., 1994).

Alcohol Disablement, Risk and Abuse/Dependence

The second aim of the study was to examine the consequences of alcohol use on disablement, risk behaviors and role functioning. It was interesting that age was not significant for the alcohol disablement outcomes including emotional or physical problems, role function problems or a combination of problems, controlling for other factors. As expected, younger age groups increased the odds ratios for alcohol risk behaviors such as dangerous activities and driving under the influence as well as for alcohol abuse or dependence. Overall, the odds ratios for alcohol risk and alcohol abuse/dependence variables declined with age.

Male gender increased the odds ratios for the alcohol disablement, alcohol risk and alcohol abuse/dependence outcomes, as expected. Perhaps disablement and risky behaviors are more tolerated socially with men than for women. Certainly, the research indicates that males drink more and experience more alcohol problems than females (Biener, 1987; Hilton, 1987; Kessler, 1994); Robbins, 1989)



Although Hispanics had lower alcohol use, they surprisingly had an increased odds ratio for role disablement and emotional or physical or role disablement, and also showed lower odds ratios for alcohol or drug or mental health treatment in the past 12 months. There are several possible explanations for these findings. It is conceivable that Hispanics in general may have closer and more frequent socialization patterns that identify role function disablement with greater sensitivity than whites. Second, there may be treatment access issues for Hispanics. Cultural differences were not well addressed in the NSDUH 2003, so this study was not able to determine the social context associated with different races and how that social context might manifest as a modulator of certain behavior patterns.

An increase in education led to increased odds ratios for drinking and driving. The NSDUH 2003 did not ask whether the amount of alcohol they consumed before driving was in excess of the legal limits or posed safety concerns. But even small amounts of alcohol can impair driving. Perhaps individuals with higher education may be prone to believing they are able to control their driving when they have been drinking or that they are drinking in social situations which may lead to drinking and driving in order to get home.

This study found that alcohol levels (use: no binge or heavy, binge and heavy) did progressively increase the odds ratios for evaluated need for treatment, alcohol disablement, alcohol risk and alcohol abuse/dependence. It was evident from the findings that an increase in the consumption of alcohol lent toward adverse outcomes. This applied to both the patterns of risk that were investigated (binge, heavy and age/gender) as well as the categories of alcohol consumption. Most notably was the low level of

alcohol consumption that led to an increase in the odds ratios for the study outcomes (less than 10 drinks per month). It must be remembered that there is a bias toward underreporting alcohol consumption in surveys. Nonetheless, it is obvious that adverse consequences from alcohol consumption occur at relatively low levels.

Mental health symptoms did not increase the odds ratios for alcohol use, yet did increase the odds of having emotional or physical problems related to alcohol, role function problems related to alcohol use and the combination of these problems related to alcohol use. It also increased the odds of dangerous activities, driving while drinking and alcohol abuse or dependence. One possible explanation is that when a mental health issue exists, then alcohol is truly an exacerbation of that issue, and perhaps a lesser amount of alcohol is required to manifest problems.

Another explanation is that four of the seven mental health symptoms dealt with phobias and with a symptom associated with anxiety. Alcohol may be a common approach to address these types of symptoms. In addition, mental health problems may carry a greater social stigma than substance use and may not be reported as accurately as alcohol use. Moreover, individuals with mental health symptoms could lack awareness about the synergistic effect of the mental health symptoms with alcohol.

Treatment and Treatment Gap

Finally, this study examined the impact of alcohol use and the consequences of alcohol use on treatment and the treatment gap. Importantly, those aged 18-25 were not found to be significant predictors of alcohol treatment ever but did predict treatment in the past 12 months. For younger individuals, role function problems may not be modulated as strictly by relationships or professional or social expectations and the

negative consequences associated with alcohol are viewed less seriously by the members of this group. Those aged 26-64 did have an increased odds ratio for alcohol treatment ever. An alcohol treatment gap was identified for the 18-34 age groups. Interestingly, the odds ratios for treatment ever and treatment in the past 12 months followed a bell shaped curve with the highest odds of treatment for the 35-49 year age group.

Male gender also increased the odds ratios for alcohol treatment ever, but reduced the odds of treatment in the past 12 months, controlling for other factors. The fact that male gender had a decreased odds ratio for treatment in the past 12 months may further support the assumption that male gender is not as strong a modulator for treatment seeking as are disablement and risk behavior consequences.

Employment decreased the odds ratios for treatment in the past 12 months. It also may be that individuals that are employed are precluded from taking adequate time off for treatment. Since private insurance carriers have decreased the service offerings for alcohol treatment, perhaps this is a factor in not getting treatment. Or perhaps providers try treatments (such as medications) that allow individuals to continue working. Economic pressures and fear of losing employment may prevent treatment or admission of alcohol problems. Finally, job satisfaction and the work environment may modulate alcohol use.

Public insurance increased the odds ratios for alcohol treatment ever and alcohol or drug or mental health treatment in the past 12 months. Specifically, public insurance presented as an avenue for treatment seeking once adverse consequences of alcohol use, such as disablement were manifested. This is not surprising since the trend for alcohol treatment over the past decade has been a decrease in the service provisions of private

insurance carriers while public insurance has not followed suit as dramatically. In particular, the cessation of inpatient alcohol treatment programs in lieu of outpatient services is a key example. Another example is the practice of ambulatory detoxification, where clients self medicate with prescribed benzodiazepines while at home or work (Powell, Penick, Read, & Ludwig, 1985).

In terms of treatment, alcohol levels did not predict alcohol treatment ever or alcohol or drug or mental health treatment in the past 12 months, but binge alcohol use did predict alcohol treatment ever. In terms of treatment, consuming 60 or more drinks/month increased the odds ratio for alcohol treatment. Alcohol levels did strongly and progressively increase the odds ratios for having an alcohol treatment gap.

It was also evident that at certain points in the consumption of alcohol, respondents seek treatment. It was not clear why binge behaviors and heavy drinking would reduce the odds for alcohol, drug, or mental health treatment in the past year. Furthermore, each category of consumption for alcohol monthly average strongly and progressively increased the odds ratios for alcohol treatment gap, indicating that most current problematic drinkers are not seeking treatment.

The select alcohol disablement variables (emotional or physical problems and role functions problems) did increase the odds ratios for treatment ever and treatment in the past 12 months. In addition, the select alcohol risk variable (alcohol and dangerous activities) also increased the odds ratio for treatment in the past 12 months. These findings underscore our inherent assumption that alcohol consumption can be a trajectory that increases until modulating factors cause a change in behavior.

The modulating factors identified in this study are alcohol disablement and alcohol risk issues. Unfortunately, more consumers of high quantities of alcohol are not currently seeking treatment and may not yet be experiencing negative outcomes or the pressure to make a change. This scenario poses a threat to the respondents' personal wellbeing, the wellbeing of others and the economic toll associated with alcohol.

In summary, male gender and drug use are the strongest predictors of the quantity of alcohol consumption. The quantity of alcohol consumption is a strong predictor for disablement, risk behavior and alcohol abuse/dependence. These alcohol related outcomes occur at relatively low levels of alcohol consumption. Disablement and risk behaviors predict alcohol treatment. Unfortunately, alcohol treatment occurs after individuals have very high alcohol consumption levels. There is a large gap in alcohol treatment that underscores current problem drinkers are not receiving treatment. The NSDUH was limited in items that would allow for the reasons for treatment gap, the degree of disablement associated with alcohol use and cultural issues that affect alcohol.

Policy Implications and Future Research

The most important finding of this study relates to the low levels of alcohol use that increased the odds ratios for disablement, risk behaviors, alcohol abuse/dependence and a treatment gap for alcohol services. These reported levels of alcohol use were lower than those levels recommended by the National Institute on Alcohol Abuse (NIAAA) and Alcoholism , Center for Substance Abuse Treatment (CSAT) and the Dietary Guidelines for Americans (2005).

The policy implications of these findings are that the recommended guidelines for alcohol use may be in need of review. More importantly, the methodology for

establishing the recommended alcohol use levels requires scrutiny and possible revision. Specifically, the fact that the Dietary Guidelines for Americans 2005 are predicated on alcohol's relationship to mortality, and profiles associated with macronutrients and micronutrients, dispels the importance of evaluating the complete picture of alcohol's social consequences.

It is understood that the estimates of alcohol use may be underreported in the NSDUH 2003 due to memory issues and the stigmatization of alcohol abuse; however, the Dietary Guidelines for Americans 2005 are also based on respondent's self reports of consuming four or fewer alcoholic beverages each day. Therefore, the self reports of this study should be equally weighted, and be viewed in terms of expressing the actual lived experiences of U.S. community-dwelling adults. These lived experiences are genuine consequences with emotional and physical problems, as well as social role function problems (family, friends, work, school, home and activities) that are disabling criteria which can be directly attributed to alcohol use. Furthermore, the self reported use of alcohol in conjunction with dangerous activities and driving a car raises concern at the levels of community and society.

The literature provides evidence of the negative consequences from alcohol on cognitive function, within intimate relationships, in the workplace, at school, as well as in crime and driving statistics. These outcomes are a direct gauge of alcohol's disabling contribution to emotional, physical and social role functioning. They manifest prior to 'mortality' and with greater social consequence than that attributed to macronutrient and micronutrient profiles. Understandably, the economic cost of alcohol related morbidity and mortality are substantial, and have been estimated at \$55 billion (Harwood, Fountain

and Livermore, 1998)). This figure does not; however, address the additional \$129 billion for specialty alcohol services, lost productivity due to morbidity, lost earnings due to crime, criminal justice and property damage costs, social welfare administration costs and fire damage costs that can be defined as alcohol's contribution to social consequences net of mortality cost and the medical cost of morbidity. As a result, the lived experiences reported by respondents in this study must be taken into account when developing guidelines for alcohol use.

Another important policy implication identified by this study relates to the need to improve the national databases on alcohol. The NSDUH survey was limited in questions related to disability. An investigation of databases underscored the fact that this study could focus on a dataset that extensively defined alcohol use or on one that extensively defined disability. The decision to use the NSDUH was predicated on the extensive manner in which it defined alcohol use.

Unfortunately, the NSDUH views alcohol abuse and alcohol dependence as the final outcome. It is understood that the criteria for alcohol abuse and alcohol dependence do mirror many of the criteria that can define a person as experiencing disablement. The questions, however, do not adequately measure the degree to which alcohol adversely affects individuals. It is this critical juncture that is not well integrated in current datasets, and an omission that restricts research on the impact of alcohol use on disablement and its related social consequences.

Most notably, the integration of alcohol use and disability questions should provide more detail in the NSDUH and other databases. Verbrugge & Jette (1994) define disability as "experienced difficulty doing activities in any domain of life, due to a health

or physical problem” (Verbrugge & Jette, 1994). In this regard, disability includes personal care activities of daily living (ADLs), household management instrumental activities of daily living (IADLs), paid employment, sleep, care for children and others, hobbies and other leisure activities, active sports and other physical recreation, entertainment away from home, religious services or activities, public service/clubs/adult education, socializing with friends and relatives, local transportation and travel (Verbrugge & Jette, 1994). This study defines disability in terms of questions that address disabling symptoms for mental, emotional, physical and role functionality, related to some of these categories; however, this list is not all inclusive

It is also important to expand questions about all disease processes. The empirical literature points to the complexity of studying co-morbidity but the NSDUH does not allow for this investigation because of limited information. There are also other important variables that should be included in the NSDUH related to alcohol. Questions about genetic predispositions and social and environmental variables should be added including physical abuse, sexual abuse, family history of substance abuse, geographic setting, access to alcohol and drugs, and life experiences such as warfare. Other information about health care and substance use such as gang involvement and the accumulation of life stressors would be helpful.

Furthermore, evaluating the gap in alcohol treatment for 15,000,000 persons demands additional design alterations of questions that will allow researchers to better understand this gap. Questions, specifically about why individuals lack an awareness of needing treatment, are needed to help with intervention strategies. Equally important is the need to better understand cultural differences in terms of how physical, mental and

role functions are valued and how the impairment of these areas of functioning by alcohol are accepted, identified and addressed.

More research should be conducted to examine the combination of average monthly alcohol consumption, especially in combination with illicit drug use and mental health symptoms. A current, longitudinal database would be valuable to allow for research on change over time. The application of current web-based technologies that ease the process of data input for respondents and data collection for researchers should be evaluated for studies on alcohol and disability, with these technologies allowing consumers access to data results, assessment instruments and health information bulletins.

Study Limitations

The design of the NSDUH 2003 is cross-sectional. In this regard, it is understood that it is not possible to provide evidence of causality between alcohol and the selected health outcomes (including measures of disability). However, certain disablement outcomes can be attributed to alcohol due to respondents self-reports.

The results of the survey responses are subject to certain types of bias. The two main types are associated with a respondents' inability to remember data as it happened or when it happened (RTI International, 2004). Recall decay, which is the tendency to forget things that happened long ago, may result in the under-reporting of estimates. This would most likely pertain to a timeframe removed to the 1960's or 1970's. In this study, the incidence estimates were all associated with the past 12 months, except for the variable alcohol use ever. It is not anticipated that this data element would be affected by recall delay unless a respondent had significant cognitive problems.

There is no doubt of some underreporting of alcohol use and even alcohol consequences in the NSDUH 2003. The social stigma associated with alcohol use and abuse can be a closely guarded individual and family secret. Additionally, the ability to estimate the number of drinks consumed with measurement values of one ounce for spirits, four ounces for wine and 12 ounces for beer challenge accurate recall. More importantly, as individuals consume more alcohol, the perception of the amount of alcohol consumed can decrease dramatically, causing another underestimate in alcohol use.

The second type of memory related bias is known as “forward telescoping, which is the tendency to report that an incident occurred more recently than it actually did” (RTI International, 2004). This type of bias would lead to an over-reporting of estimates in more recent years. In this study, it is entirely possible that the alcohol disablement and alcohol risk and alcohol abuse/disablement outcomes would be subject to forward telescoping, as these events were identified if they occurred within the past 12 months.

The NSDUH 2003 is strong on the measurement of alcohol consumption and mental health symptoms. It utilizes a quantity/frequency (QF) alcohol measurement method that allows for the measurement of at risk alcohol consumption (Dawson, 2003). In this regard, the question structure is pre-coded, which means the survey respondent must select categories that are provided by the survey question. These questions allow for describing an overall consumption of alcohol (beer, wine or liquor), but not alcohol patterns in terms of beverage specificity (beer, wine, liquor), and estimates of overall consumption have been reported as higher with the beverage specific method (Dawson, 2003). In addition, the survey respondent may not be aware that there are variations of

alcohol content among similarly categorized beverages (e.g., light beer vs. regular beer, fortified wine vs. regular wine, 80 proof vs. 100 proof liquor) (Dawson, 2003). As such, the data does not allow for exact measurement of alcohol consumption.

The NSDUH 2003 had low response frequencies for alcohol specific treatment. Treatment may be underreported. For example, individuals that report treatment for illicit drugs are likely to have a co-morbidity for alcohol, and will probably receive education on cross-addiction and the need to abstain from all abuse/dependence substances. In addition, individuals with certain psychiatric disorders (e.g., schizophrenia, depression, mania, bi-polar, anxiety) may also have a co-morbid alcohol problem. In this case, those who report formal mental health treatment will probably be counseled and educated on alcohol as well as cross-addiction to other substances. These groups might not be reflected in the NSDUH as receiving formal treatment for alcohol. Of course, it is understood that the universe of persons receiving drug or mental health treatment is greater than the proportion of this group that receives education on alcohol.

The classification scheme for alcohol abuse includes questions related to problems respondents encounter with legal issues, family relationships, work relationships, relationships with friends, as well as the focus on the acquisition and consumption of alcohol. The classification of alcohol dependence includes these same questions and adds questions that pertain to physiological consequences defined as withdrawal symptoms. These are questions that also contribute to the evaluation of disability. Therefore, there is overlap in the definition of some variables.

Due to the limited availability of disability related data in the NSDUH 2003, the questions that were utilized to determine whether a respondent was classified with

alcohol abuse or dependence were also used to construct the study disablement and risk behavior outcome variables. Again, this is an indication that the measures are not entirely due to the limitations of current database design. Ideally, the NSDUH would be redesigned to allow for a clear separation of alcohol use, drug use and mental health measures, with a more extensive selection of questions on those adverse consequences that can be directly attributed to their use. The current NSDUH measures fail to identify the degree to which human functioning is adversely affected by alcohol. Alcohol abuse and dependence only measures the presence or absence of the evaluative criteria, but they do not evaluate the degree to which the presence of the criteria has an effect on human functionality. The Disablement Process (Verbrugge & Jette, 1994) framework suggests the need to investigate a bi-directional trajectory that includes pathology, impairment, functional limitation and then disability. Furthermore, it must be possible to investigate the reversal of this trajectory so that the process of recovery and the outcomes associated with discontinuing problematic alcohol consumption can also be investigated.

Upon review of the study results, it is clear that the current version of the Substance Use Disablement and Recovery Model (SUDARM) misses variables of importance in the investigation of alcohol consumption and its relationship to predictor and outcome variables in community-dwelling populations. Further relatively low r-square values make it clear that there are many missing measures in the model for predicting the use of alcohol, as well as the treatment and treatment gap. It was acknowledged that some important variables of interest include genetic predisposition, community factors, access to care issues, family dynamics, physical and sexual abuse, spirituality, legal and judicial ramifications, health status, perceived need, cultural

context, language, health care and substance abuse policy, political & economic issues, and globalization. This is a limitation of the NSDUH dataset.

It is apparent that the SUDARM framework does capture important variables for research on alcohol and disablement, and provides a sound basis for beginning to explain the variations in alcohol use and its consequences. Although the framework was useful, it was subject to the limitations placed on it by the lack of available variables within the NSDUH that could examine more variables of interest within the context of substance abuse, disablement and recovery.

Discussion Conclusion

The Substance Use Disablement and Recovery Model served as a useful framework for this study. Future research will benefit in the investigation of the relationships of substance abuse, disablement and recovery in community-dwelling populations. A primary contribution was the identification of the risks for disablement and adverse social consequences that are present at relatively low levels of alcohol consumption when compared to non-drinking respondents, and the need to revise the methodology by which the recommended guidelines for alcohol use are established. Furthermore, the need for mental health and illicit drug use to be included in credible research on alcohol is validated by the study findings, as is the philosophy that the concepts of substance abuse and disablement are integral to each other.

The study findings have addressed the proposed hypotheses, yet many more questions and observations have been identified as a result of these findings. They highlight the degree to which current databases negatively affect the pursuit of much needed research. The conclusion of this study is to integrate alcohol and disability

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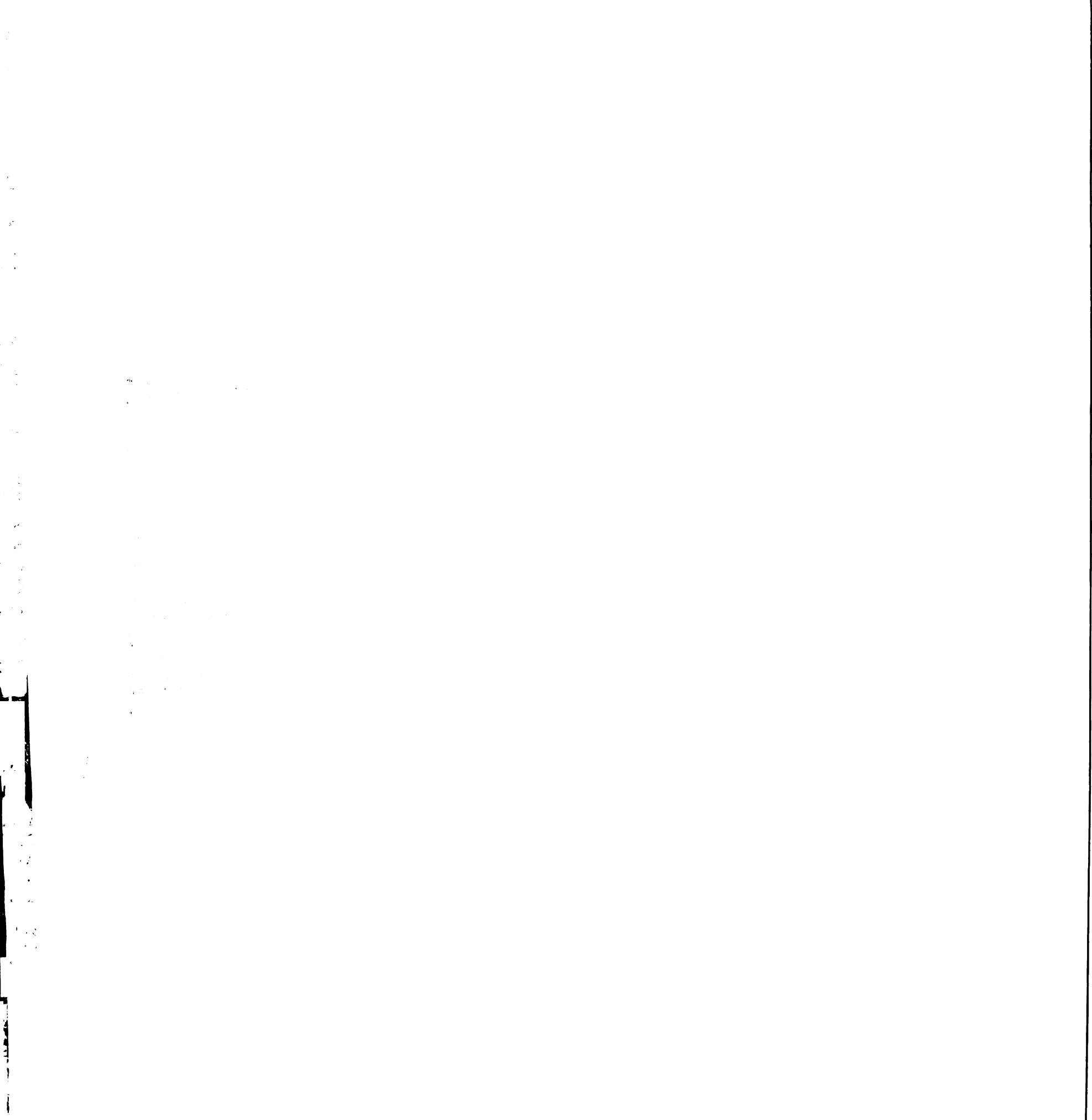
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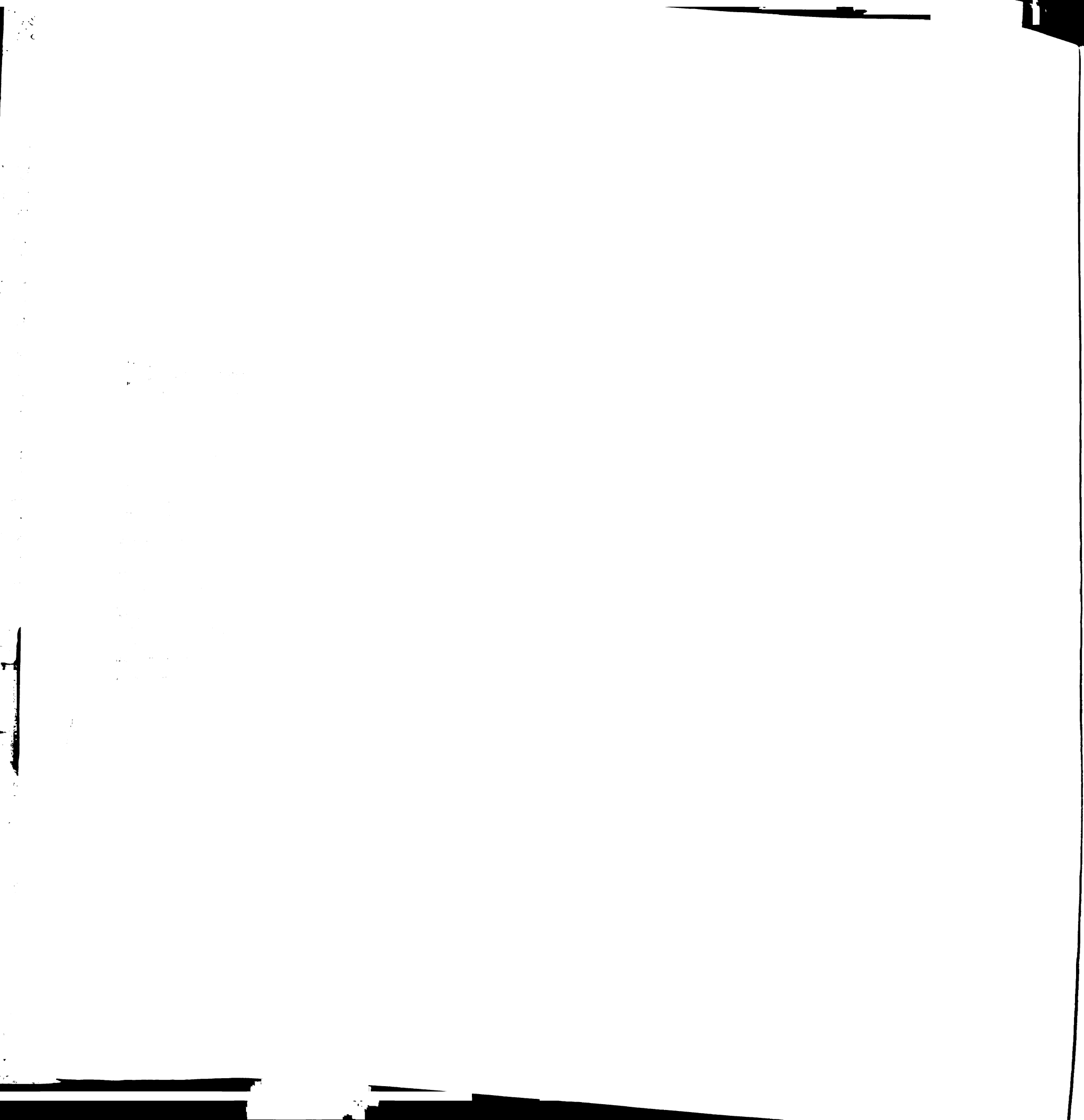
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