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## Alcohol Misuse and Depressive Symptomology among Males with a History of Service in the U.S. Armed Forces

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## Abstract

Ashley Davis

Alcohol misuse and depressive symptomology among males with a history of service in the U.S. Armed Forces

(Under the direction of Kymberle Sterling, Faculty Member)

**BACKGROUND:** Soldiers face extraordinary circumstances while serving in the U.S. Armed Forces. Soldiers are required at times to live away from family and friends for extended periods of time and work in hazardous environments. Once soldiers become veterans, the experiences of military life may continue to affect them long after their duties have been carried out. These conditions put them at greater risk for alcohol misuse and depression. The purpose of this is to determine whether there is an association between alcohol misuse and depression symptomology among males who have a history of service in the U.S. Armed Forces.

**METHODS:** Secondary data from NHANES 2005-2008 were used to analyze 1,381 men who expressed alcohol misuse and depressive symptomology. Chi-square tests were used to attain descriptive frequencies for alcohol misuse and depressive symptomology and demographic factors. Binary logistic regression was used for univariate and multivariate to test for associations between alcohol misuse, depressive symptomology, and demographic variables.

**RESULTS:** Alcohol misuse and depressive symptomology were significantly associated with male veterans with a history of service in the Armed Forces,  $p = .041$ . Age ( $p < .001$ ), race ( $p < .05$ ) marital status ( $p < .05$ ), and educational attainment ( $p < .01$ ) are the best predictors of alcohol misuse among male veterans. Similarly, depressive symptomology had the same predictors as alcohol misuse, except race.

**CONCLUSIONS:** The complex relationship between alcohol misuse and depressive symptomology among male veterans warrants further research. Public health professionals need to clearly establish standard measurement instruments for diagnosing these conditions. Once established, appropriate interventions can be implemented in order to combat these alcohol misuse and depressive symptomology among male veterans.

**INDEX WORDS:** alcohol misuse, depressive symptomology, military, veterans

Alcohol misuse and depressive symptomology among males with a history of service in the U.S.  
Armed Forces

by

Ashley Davis

B.S., State University of New York at Albany, 2005

A Thesis Submitted to the Graduate Faculty  
of Georgia State University in Partial Fulfillment of the  
Requirements for the Degree

MASTER OF PUBLIC HEALTH

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2010

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Armed Forces

by

Ashley Davis

Approved:

Kymerle Sterling, DrPH  
\_\_\_\_\_  
Committee Chair

Ike Okosun, MS, MPH, Ph.D., FRSPH  
\_\_\_\_\_  
Committee Member

Frances McCarty, Ph.D., M. Ed.  
\_\_\_\_\_  
Committee Member

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Ashley Davis  
314 Pine Tree Circle  
Decatur, GA 30032

The Chair of the committee for this thesis is:

Kymberle Sterling, DrPH  
Institute of Public Health  
Georgia State University  
P.O. Box 4018  
Atlanta, GA 30302-4018

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**ASHLEY MICHELLE DAVIS**

[AshleyDavis\\_2005@yahoo.com](mailto:AshleyDavis_2005@yahoo.com)

314 Pine Tree Circle

Decatur, GA 30032

(478) 951-8933

---

**EDUCATION**

**Georgia State University (GSU), Atlanta, GA**

*Masters of Public Health concentration in Prevention Sciences, May 2010*

**University at Albany, College of Arts and Sciences, Albany, NY**

*Bachelor of Science in Human Biology, May 2005*

**RESEARCH EXPERIENCE**

Graduate Research Assistant

08/08-Present

*Dr. Kymberly Sterling, Institute of Public Health, GSU, Atlanta, GA*

Undergraduate Research Assistant

06/03-08/03

*Dr. Anne Walsh, New York State Department of Health, Wadsworth Laboratory, Albany, NY*

**WORK EXPERIENCE**

AmeriCorps Member

09/07-08/08

*Volunteer Macon, Macon, Georgia*

Academic Resource Specialist

10/06-08/07

*Macon State College, Macon, Georgia*

Tutor

11/05-06/06

*Community Reach Incorporated, Jonesboro, GA*

NYS Assembly Intern

01/05-05/05

*New York State Assembly, Albany, NY*

Lab Assistant

08/01-12/03

*Dr. Greg Lnenicka, Biology Department at SUNY Albany, Albany, NY*

**COMPUTER SKILLS**

Proficient in Microsoft Word, Excel, and PowerPoint, and SPSS

**TECHNICAL SKILLS**

VITA Trained Tax Preparer, Results-Based Facilitation Trained, Polymerase Chain Reactions, Electrophoresis Gels, CPR and First Aid Trained.

## Table of Contents

Acknowledgements.....	iv
List of Table.....	ix
Introduction.....	1
Alcohol Misuse and Depression in the General Population.....	1
Alcohol Misuse and Depression in the U.S. Armed Forces.....	3
Study Purpose.....	4
Research Questions.....	5
Review of the Literature.....	6
Alcohol Misuse in the U.S.....	6
Alcohol Misuse among Groups.....	7
Alcohol Misuse among Veterans.....	11
Depression.....	14
Depression in the United States.....	15
Depression among Subgroups.....	15
Depression among Veterans.....	18
Alcohol Misuse and Depression .....	20
Alcohol Misuse and Depression among Veterans.....	20
Summary.....	22
Materials and Methods.....	23
Data Source .....	23
Survey Procedures.....	23
Participants.....	24
Study Variables.....	26
Statistical Analyses.....	26
Results.....	31
Descriptive Characteristics.....	31
Univariate Analyses.....	32
Multivariate Analyses.....	35
Discussion and Conclusion.....	41
Discussion.....	41
Alcohol Misuse and Depressive Symptomology.....	42
Limitations.....	44
Recommendations.....	45
Conclusion.....	46
References.....	48

**List of Tables**

<b>Table 1.1:</b> Demographic Statistics and Frequencies of Eligible Armed Services Population.....	28
<b>Table 2.1:</b> Demographic Statistics of Eligible Armed Services Population who Misuse Alcohol.....	29
<b>Table 2.2:</b> Descriptive Statistics and T-Test for Age by Alcohol Misuse Group.....	30
<b>Table 2.3:</b> Demographic Statistics of Eligible Armed Services Sample with Depressive Symptomology.....	31
<b>Table 2.4:</b> Descriptive Statistics and T-Test Results for Age by Presence of Depressive Symptomology.....	32
<b>Table 3.1:</b> Univariate Logistic Regression for Alcohol Misuse and Associated Variables.....	32
<b>Table 3.2:</b> Univariate analysis of Depressive Symptomology with Associated Independent Variables.....	34
<b>Table 4.1:</b> Multivariate Analysis of Associated Variables and Alcohol Misuse.....	37
<b>Table 4.2:</b> Multivariate Analysis with independent variables for Depression.....	39

## **Chapter I**

### **Introduction**

#### **1.1 Alcohol Misuse and Depression in the General Population**

Alcohol misuse is a major public health concern because the condition is costly yet preventable. Alcohol misuse is heavy consumption of alcohol, drinking more than 5 drinks of alcohol per occasion (Cherpitel & Ye, 2008). Men misuse alcohol more than women. Only 4.6% of women have 12 or more days of heavy drinking (5 drinks per day), compared to 16.5% of men (National Institute of Alcohol Abuse and Alcoholism, 2009). As males get older, the percentage engaging in heavy drinking for 12 or more days a year decreases from over 25% between ages 18 to 24 to 4.5% at age 65 and older (National Institute of Alcohol Abuse and Alcoholism, 2009). Differences in alcohol misuse among males exist within race, marital status, educational level, and income (National Institute of Alcohol Abuse and Alcoholism, 2009).

Misuse of alcohol is one of the leading causes of morbidity and mortality, resulting in over 107, 000 alcohol-related deaths every year (Fernandez, Hartman, & Olshaker, 2006). Additionally, excessive alcohol use can have far-reaching effects on physical and mental health. Alcohol misuse has been linked with liver disease, peripheral neuropathy, insomnia, seizures, poor nutrition, injuries, and hospitalization (St John,

Montgomery, & Tyas, 2009). As a result of these implications, alcohol misuse is one of the costliest public health problems in the United States (Williams, et al., 2006).

2

Another health concern that is rising in prevalence and whose notoriety has increased as a global public health issue is depression (Watts, 2008). Major depression is estimated to affect 6.7% of Americans aged 18 and older (Chakraborty, 2009). Similar to alcohol misuse, depression has been associated with numerous health issues. Some of these conditions are impairment, poor health, and mortality (Hasin, Goodwin, Stinson, & Grant, 2005).

The marked similarities between alcohol misuse and depression have made both disorders targets for research to find causal agents or risk factors for both. Substance use and depressive disorders frequently co-exist (Gratzer, et al., 2004). Due to their common co-occurrence, often one condition is recognized and the other condition is completely neglected. The National Comorbidity Study found that 48.5% of women and 24.3% of men with a lifetime alcohol-related problems also presented with major depression (Curran, Flynn, Kirchner, & Booth, 2000). It is reported that of individuals who suffer from depression, 25% acknowledge excessive alcohol consumption (Watts, 2008). Symptoms of depression can be caused by drinking or the subsequent withdrawal from drugs or alcohol (Curran, Booth, Kirchner, & Deneke, 2007). Alone, alcohol misuse and depression are devastating conditions, but together, they have much larger implications such as increased risk for suicide and deteriorating physical and mental health (Bazargan-Hejazi, Bazargan, Gaines, & Jemanez, 2008; Watts, 2008).

An affliction with one disorder increases the risk for developing the other disorder. Severe alcohol misuse can extend the length of time a person is depressed.

3

Excessive drinking can make life more stressful and relationships more difficult, which in turn promotes depression (Conner, Pinquart, & Gamble, 2009). Alcohol misuse is also associated with a downed mood and all-consuming sadness (Watts, 2008). On the other hand, untreated depression increases the risk for relapse once alcohol use is abstained (Pettinati, 2004). An individual suffering from depression may turn to alcohol under the pretense that it will soothe their feelings (Watts, 2008). The cyclical nature of alcohol misuse and depression can make the conditions much more difficult to detect and treat (Watts, 2008).

## **1.2 Alcohol Misuse and Depression in the U.S. Armed Forces**

Since excessive alcohol misuse and depression are complex disorders, they pose special problems for those who are currently serving or have served in the United States Armed Forces (Fernandez, et al., 2006). Life in the armed forces places extraordinary demands on soldiers, which can extend out beyond the service obligation. Soldiers are forced to live away from family and friends for periods of time and work in unsafe and unpredictable environments (Fernandez, et al., 2006). These conditions put soldiers at greater risk of alcohol abuse and depression.

Alcohol use is an integral part of military culture (Fernandez, et al., 2006). Men constitute 85% of military personnel and also have heavier drinking patterns than women (Fernandez, et al., 2006). Military culture can influence attitudes about drinking with co-

workers, amount of alcohol consumption, and expectations of repercussions associated with drinking, such as fighting, arguing with supervisors, sleeping on the job, and

4

showing up for work hung over (Fernandez, et al., 2006). Heavy alcohol use appears to be more prevalent among younger soldiers; with certain branches of the armed forces having higher prevalence than others (Fernandez, et al., 2006).

The prevalence of heavy drinking among soldiers 18 to 25 years old within the last month was 27.3% compared to 15.3% among civilians of the same age (Fernandez, et al., 2006). Among the branches of the military, Marines have the highest prevalence of heavy drinkers aged 18 to 25 at 35.4%, while the Army, Navy, and Air Force have prevalence rates of 27.6%, 26.0%, and 19.8% respectively (Fernandez, et al., 2006). Alongside high rates of drinking, depression may also be rampant (Dedert, et al., 2009), stemming from the cyclical nature of these disorders. Determining the existence of a relationship between unhealthy alcohol use and depression among veterans is important because of the trauma this group may have been exposed to during devastating wars which may increase their risk for these conditions. Studying these issues among this group can increase awareness of the comorbidity of alcohol misuse and depressive symptoms and help with diagnosis of these conditions.

### **1.3 Purpose of Study**

The aim of this study is to determine whether there is an association between alcohol misuse and depressive symptomology among males who have served in the United States Armed Forces. The rise of alcohol misuse and depression among veterans

makes this population a valuable source to study within public health. Extensive studies have attempted to address causation as well as the association between the two

5

conditions. Although much research has been concentrated in populations such as the elderly, emergency department patients, and primary care patients, few have examined veteran groups. As a result of the special circumstances these groups face, exploring the relationship veteran status has with both alcohol misuse and depressive symptomology can have important public health implications for both the military and civilian worlds.

#### **1.4 Research Questions**

The purpose of this study is to extend current research on the relationship between alcohol misuse and depressive symptomology among males who have served in the armed forces. The following question will be addressed in this study:

1. Is there an association between alcohol misuse and depressive symptomology, age, and racial/ethnic status among male veterans?

## **Chapter II**

### **Review of the Literature**

The aim of this study was to determine whether there was an association between alcohol misuse, depressive symptomology, age, and racial/ethnic status among males with a history in the U.S. Armed Forces. A literature review was needed to determine the association between alcohol misuse and depressive symptoms and how age and racial/ethnic status influenced those relationships. The literature review will include studies about alcohol misuse and depression in the general population, followed by studies relating to alcohol misuse and depressive symptomology among military personnel and veterans.

#### **2.1 Alcohol Misuse in the United States**

Alcohol consumption is common in the United States. Per capita, Americans consumed 2.31 gallons of ethanol for 2007 (National Institute on Alcohol Abuse and Alcoholism, 2009). Ethanol is the main agent used in the production of alcoholic beverages. According to the National Institute of Alcohol Abuse and Alcoholism, a standard drink contains 0.5 fl oz of absolute ethanol which translates into 12 fl oz of beer, 5 fl oz of wine, or 1.5 fl oz of 80 proof distilled liquor (National Institute on Alcohol Abuse and Alcoholism, 2005). Alcohol use problems occur when the drinker places himself/herself and possibly others at risk of harm

(National Institute on Alcohol Abuse and Alcoholism, 2005). Alcohol use can be categorized into levels based on risk of developing alcohol-related problems. Categories of alcohol use are as

7

follows: low-risk drinking is non-problematic alcohol use consisting of 7 drinks per week; at-risk drinking is drinking more than one drink per day; problem-drinking results in negative physical, psychological, and social consequences; alcohol abuse results in lack of the ability to fulfill responsibilities; and alcohol dependence is the total loss of control and the obsession with alcohol and causes symptoms of withdrawal (Blow & Barry, 2003).

Alcohol misuse is defined as consuming five or more units of alcohol per occasion (Cherpitel & Ye, 2008). Based on how alcohol misuse is defined, the condition does not fit into any particular alcohol category. Alcohol misuse falls between at-risk drinking and problem drinking. From January 2009 through June 2009, 23% of adults had at least 5 or more drinks in a day at least once in the past year, increasing 1% from 22% in 2008 (National Center for Health Statistics, 2009). Alcohol misuse has been estimated as low as 2% in primary care settings (Fiellin, Reid, & O'Connor, 2000) to as high as 29% in primary care settings (Whitlock, Polen, Green, Orleans, & Klein, 2004).

## **2.2 Alcohol Misuse Among Groups**

### **2.2.1 Race**

Prevalence among alcohol misuse between racial groups has not been thoroughly documented through epidemiological studies or reports, but it has been established with national data. Hispanics have the highest prevalence of alcohol misuse at 18.6%, followed by Caucasians

with 17.5%, and African Americans with the lowest prevalence at 11.1% for 2008 (National Institute of Alcohol Abuse and Alcoholism, 2009). The information that is reported in epidemiological studies or reports is frequency of consumption and frequency of days of use. As

8

reported by the Office of Applied Studies, Alaska Natives and American Indians, who are current drinkers, drank more on days they drank (6 drinks) than other racial groups. Current drinkers were defined as individuals who drank alcohol in the last 30 days. Hispanics were the next group to drink the most with 4 drinks, followed by whites and blacks with 3 drinks each, and Asians with 2.5 drinks (Office of Applied Studies, 2003). On the other hand, the Substance Abuse and Mental Health Service Administration reported whites having alcohol use rates of 51%, while blacks, Hispanics, and American Indian Natives/Alaska Natives had rates of 35.6%, 39.94% and 34.8% respectively (Department of Health and Human Services & Substance Abuse and Mental Health Service Administration, 2000).

### **2.2.2 Age**

Aside from racial dissimilarities, age is also a factor in alcohol misuse. The elderly is a particularly sensitive population to alcohol misuse, because of biological, social, and psychological changes associated with aging (Loukissa, 2007). As a result of these reasons, the elderly tend to drink more. Some factors of these changes include loneliness, social isolation, the loss of a significant other, and declining health due to acute or chronic conditions (Loukissa, 2007). In terms of determining prevalence in the elderly, ages 65 and older, the nature of the survey affects the frequency of reported alcohol misuse. For instance, community surveys report 2-16%, hospital surveys, 14-53%, and nursing home residents note up to 29% alcohol misuse

(Johnson, 2000). It is important to consider alcohol misuse among the elderly for the following reasons: the under detection of alcohol misuse among the elderly, the comorbidity associated with misuse, and the impact of this population on public health (Loukissa, 2007; Sarfraz, 2003).

9

The elderly are quickly becoming a large population who will place huge demands on the health care system. Recognition of alcohol misuse among this group can greatly increase their quality of life.

### **2.2.3 Education Level**

Race plays a determining factor in how educational attainment affects alcohol misuse in young adulthood. Paschall et al., found that low educational attainment was associated with alcohol misuse among African-American young adults (2000). On the other hand, high educational attainment was associated with alcohol misuse among Caucasian young adults (Paschall, Flewelling, & Faulkner, 2000). Factors such as unemployment or emotional distress did not account for the effect of low educational attainment on alcohol misuse. Overall, college status and favorable alcohol use attitudes accounted for the racial differences in the relationship between educational attainment and alcohol misuse (Paschall, et al., 2000). Although light or moderate drinking is associated with consumption patterns in the middle and upper classes (van Oers, Bongers, van de Goor, & Garretsen, 1999), cultural conceptions also play a large role in consumption patterns.

Much like African Americans, Hispanic men are also at more risk for alcohol misuse given low educational attainment and incomes of \$20,000 or more (Slone, et al., 2006). Among Hispanic subgroups, alcohol consumption varies widely, with Mexican Americans having a

higher prevalence of consumption than Hispanics of Caribbean descent (Slone, et al., 2006; Vega, Sribney, & Achara-Abrahams, 2003). Mexican American drinking patterns tend to shift toward United States norms after being in the States for 5 years (Slone, et al., 2006). Mexican-

10

born men have a tendency to drink less overall but more per occasion, compared to Mexican American men (Caetano & Mora, 1988). Overall, most research has shown that Hispanics have a higher incidence of alcohol-related problems than Whites (Slone, et al., 2006).

#### **2.2.4 Gender**

Apart from race, gender differences are also present in alcohol misuse problems. Men tend to have more problems with alcohol use and drink more than women (Nolen-Hoeksema, 2004). Differences between the genders have not been clarified (Slone, et al., 2006).

Interestingly, the difference between the genders disappears in heavy alcohol consumption (Caetano, 1997). There are several risk factors that affect men and women's consumption of alcohol. One risk factor for this difference is the way in which men and women cope with problems. It is suggested that men are more likely to avoid dealing with issues, making them more prone to alcohol misuse than women (Cooper, Russell, Skinner, Frone, & Mudar, 1992).

Negative physiological activities may deter women from misusing alcohol, compared to men (Nolen-Hoeksema & Hilt, 2006). Alcohol is metabolized faster in men than women, due to women's high fat to water ratio (Angove & Fothergill, 2003). Also, men are larger in stature than women, leading women to quickly achieve higher levels of blood alcohol concentrations than men who drink the same amount of alcohol (Scott, 2000). Even development of disease is different between the two sexes. Women are more likely to develop liver disease over a shorter

period of time and by drinking less alcohol than men (Angove & Fothergill, 2003). Men have a slower advancement to brain damage than women who misuse alcohol (Nolen-Hoeksema & Hilt, 2006). Last, men drinking 6 or more drinks per day raise their risk for heart disease, while

11

women only need to consume 3 or more drinks per day to have the same level of risk for heart disease (Nolen-Hoeksema & Hilt, 2006).

In addition to physiological factors, social factors also influence men and women's drinking habits. Women feel there is more social stigma for them drinking than for men (Nolen-Hoeksema, 2004). One explanation for this occurrence is gender roles. Alcohol consumption is considered to be acceptable as part of the male gender role, but not for the female gender role (Chassin, Tetzloff, & Hershey, 1985). Research has shown that individuals who embody feminine traits are less likely to consume alcohol regularly and when drinking alcohol, drink less, particularly among women (Ricciardelli, Connor, Williams, & Young, 2001). Also, masculine traits like aggression and overcontrol of emotion have been associated with heavy drinking in men and women (Nolen-Hoeksema & Hilt, 2006).

### **2.3 Alcohol Misuse among Veterans**

Each branch of the United States Armed Forces has a substance abuse program intended to deal with alcohol and drug abuse among active duty military personnel only. Military members that are identified as drug or alcohol dependent are detoxified, rehabilitated or referred (Department of Defense, 1985). Core capabilities of the substance abuse program include: education, deterrence, identification, referral, screening, targeted intervention, rehabilitation, and risk reduction. Rehabilitative and educational services are also given to the family member's of

affected military personnel (Department of Defense, 1985). Failure to comply with follow-up and continued use of alcohol or drugs results in discharge from the military (Department of Defense, 1985). Veterans of the Armed Forces are treated for alcohol abuse through the Veterans

12

Administration (VA) outpatient or inpatient rehabilitation center (United States Department of Veteran Affairs, 2010).

Much of the information gathered about veterans and military personnel, with respect to alcohol misuse, has been conducted within the VA health-care system or while soldiers are deployed abroad. In 2003, 22.6% of veterans, compared to 21.6% of civilians, reported alcohol misuse (Office of Applied Studies, 2005). An overwhelming consensus is that alcohol misuse is the greatest threat among men younger than 30 (Hawkins, Lapham, Kivlahan, & Bradley, 2010). Another risk factor that poses a problem for veterans and alcohol misuse is combat exposure. Combat exposure was measured using the Combat Experiences Scale (CES). Exposure was assessed through items such as being attacked or ambushed, seeing human remains, and other items (Wilk, et al., 2010). The link between the two has been established in studies involving the United Kingdom Armed Forces, the National Guard and active duty personnel, and Operation Iraqi Freedom military personnel (Jacobson, et al., 2008; Milliken, Auchterlonie, & Hoge, 2007; Rona, et al., 2007).

Rona et. al (2007) investigated the number and duration of deployments to Iraq and Afghanistan with mental health and severe alcohol problems among the United Kingdom Armed Forces. Among 5,547 veterans, deployments lasting longer than 9 months were significantly associated with severe alcohol problems, with between 19-23.9% of military personnel

experiencing severe alcohol problems,  $p < .001$ . Furthermore, soldiers with more than one deployment were more likely to severely misuse alcohol. Up to 18% of soldiers struggled with alcohol-related problems as a result of multiple deployments,  $p < .001$ .

13

Jacobson et. al (2008) explored alcohol use and pre- and post deployment among 48,481 United States military personnel, 45% white, 73.8% male. The study found a higher risk for beginning heavy weekly drinking, binge drinking, and alcohol-related problems for Reserve and National Guard deployed personnel than for nondeployed Reserve and National Guard personnel. The study outlined several potential explanations for Reserve and National Guard personnel to have elevated risk for new-onset heavy weekly drinking after deployment. Those reasons included: improper training and preparation for these soldiers for the added tensions of combat exposure; the stress of transitioning between military and civilian life, for the soldiers, as well as their families; and diminished access to support services.

Milliken and colleagues (2007) studied the health effects of 88,235 active duty (90.8% male) and National Guard soldiers returning from Iraq. One of the findings showed that soldiers, both active duty and National Guard, returning from the war tested positive for alcohol problems. Between 11% and 15% of active duty and National Guard soldiers, respectively, displayed alcohol problems, but were rarely referred for treatment. Although treatment should be considered the best solution, it can be perceived as counterproductive (Milliken, et al., 2007). Once a soldier refers him or herself, his or her commander is involved and if the soldier is non-compliant with the treatment program, this could reflect negatively on the soldier's career (Milliken, et al., 2007).

Alcohol misuse has been thoroughly linked to combat. But what many studies have failed to investigate is the association between combat exposure and later alcohol misuse (Wilk, et al., 2010). Wilk and colleagues (2010) found 25% of soldiers (1,120 soldiers, 96% male, ages

14

18-39) within their study screened positive for alcohol misuse 3-4 months after returning from deployment. Combat exposures were found to be associated with screening positive for alcohol misuse. Specifically, combat experiences that involved the threat of death or injury to oneself were more likely to be associated with a positive screening for alcohol misuse. The atrocities and casualties that soldiers see can continue to have effects on them long after the physical war has ended. This can have damaging effects for veterans and increase their risk for alcohol misuse (Wilk, et al., 2010).

## **2.4 Depression**

According to the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV), major depressive disorder (MDD) is defined as having an abnormal mood or a loss of all interest or pleasure which drastically interferes with an individual's life for 2 weeks or more (American Psychiatric Association, 2000). Additionally, five of the following symptoms must be present during the depressed two weeks: appetite or weight change, unusual weight loss or a loss of appetite, uncommon weight gain or an increase in appetite; sleep disturbances, either insomnia or hypersomnia; activity disturbance; a general lack of energy; unusual guilt or self-reproach; trouble concentrating or indecisiveness; and thoughts of death or suicide. Depression cannot be due to physical illness, normal bereavement or bipolar disorder (American Psychiatric Association, 2000).

## **2.5 Depression in the United States**

It is estimated by the World Health Organization that up to 340 million people worldwide will experience depression (Harris, 2004). Within the United States, almost 18 million people

15

have had a major depressive episode (National Institute of Mental Health). Data for the prevalence of MDD has varied widely due to differences in instrument measures (Hasin, et al., 2005). Based on the Epidemiologic Catchment Area (ECA), the prevalence of depression is 1.7% to 3.4% for 12-month and 3.0% to 5.9% for lifetime (Kessler, et al., 2003). The National Comorbidity Survey found current rates of the disorder at 8.6% and for lifetime rates, 14.9% (Hasin, et al., 2005). Despite differences in prevalence rates, both the ECA and NCS concurred that MDD is common within the United States (Hasin, et al., 2005; Kessler, et al., 2003).

## **2.6 Depression among subgroups**

### **2.6.1 Age**

Although MDD usually starts in the mid-20's, the disorder can begin at any age (Harris, 2004). Children and the elderly manifest symptoms of MDD differently from other adults (Harris, 2004). Children who suffer from depression may feign illness, refuse to go to school, become clingy, or may fear the death of a parent. On the other hand, older adolescents may pout, become disruptive at school, or may be irritable or pessimistic (National Institute of Mental Health). Studies have concluded that about 2.5% of children and almost 8.3% of adolescents in the United States suffer from depression (Birmaher, et al., 1996). A study sponsored by the National Institute of Mental health of adolescents aged 9 to 17 reported the 6-month prevalence of major depression at 4.9% (National Institue of Mental Health, 2000).

Furthermore, depression appears to be higher in young adulthood, tapers off in middle age, and resurges in adults' over 60 years of age (Kessler, Foster, Webster, & House, 1992).

Among the elderly, depressive symptomology has been found among 10-20% of community-dwellers (Blazer, Burchett, Service, & George, 1991; Kennedy, et al., 1989). Depression is

16

particularly burdensome to the elderly because of the likelihood of greater medical illness, disability, functional decline, and mortality (Whooley, Stone, & Soghikian, 2000).

Whooley et al. (2000) explored case-finding on depression and its effect on the number of depression diagnoses, prevalence of the condition, and health care utilization of the elderly over 2 years. Case-finding was determining whether a patient suffered from depression from a Geriatric Depression Scale (GDS) and if so determining the severity. Dependent on the severity of depression, if symptoms were mild or moderate, patients were evaluated and treated. If the depression was severe, then the patient was referred to the Psychiatry Department. The study found among 2,346 elderly, aged 65 and older, of whom almost 50% were male, initially, 14% of patients were found to have depression. Among the patients, there was no difference in the number of depression diagnoses ( $p = .39$ ), prevalence of depression ( $p = .41$ ), and health care utilization ( $p = .15$ ), between the case-finding group and the controls. In general, 50% of elderly patients who were depressed were still depressed at the conclusion of the 2 year follow-up.

### **2.6.2 Gender**

Among children and adolescents, gender and age differences in depressive symptoms have been validated through the literature (Hankin & Abramson, 2001). Symptoms tend to be relatively constant for girls up to age 12, where they increase, and peak at age 15. Contrastingly, boys' symptoms are slightly higher at age 12, but remain consistent otherwise (Twenge & Nolen-Hoeksema, 2002). Gender has little significance for depression scores in young children,

but for adolescents, there is a marked difference. Girls have an inclination to score higher on depression measures, starting at age 13 (Hankin & Abramson, 2001). Besides gender and age,

17

racial and ethnic differences persist throughout depressive symptoms among children and adolescents.

### **2.6.3 Race**

The meta-analysis conducted by Twenge et al. (2002) corroborated previous literature of higher rates of depression in Hispanic populations (Roberts, Roberts, & Chen, 1997). Hispanic children disclosed more depressive symptoms than either Caucasian or African American children. Additionally, depressive scores for Hispanic children were more than one standard deviation higher than African American children and more than two thirds of a standard deviation higher than Caucasian children (Twenge & Nolen-Hoeksema, 2002). Although this difference is very significant, research has not addressed nor answered why depressive symptoms are heightened among Hispanic children (Twenge & Nolen-Hoeksema, 2002).

Aside from racial and ethnic differences among children, variation in major depression rates among racial and ethnic lines exists in adults as well. Differences between races for depression largely depend on the type of depression being studied (Riolo, Nguyen, Greden, & King, 2005). As reported by Kessler et al. (2003), African Americans report lower rates of major depressive episode than Caucasians, when sociodemographic variations are taken into account. Whites have been found to have a higher risk of suffering from depression when they are impoverished (Riolo, et al., 2005). Hispanics have been shown to have rates of major depressive episode commensurate with Caucasians, based on the level of assimilation (Vega, et al., 1998).

Uneducated Mexican Americans have been found to have a higher prevalence of major depression, compared to other races (Riolo, et al., 2005). Among Asians, depression rates are as low as 3.5% (Zheng, et al., 1997).

18

Few studies have sufficiently assessed the rates of major depressive episode among Native Americans because of the small numbers (Beals, et al., 2005). One important finding of the Beals et al. (2005) study is rates of depression are lower among American Indian groups than the general population. This finding highlighted the influence of cultural differences on the instrument used for depression measurement. Some of the interview questions were difficult for the tribes to understand and answer. Among some tribes, admittance of depressive symptoms shows signs of weakness.

## **2.7 Depression among Veterans**

Amongst veterans entering the VA health care system from 2000-2007, 14% were diagnosed with depression (National Alliance on Mental Illness, 2009). Similar to alcohol misuse, combat exposure and combat-related post-traumatic stress disorder (C-PTSD) have been linked to depression among veterans (Koenen, et al., 2003). Koenen and colleagues (2003) found these associations among Vietnam veterans. Amidst 237 veterans, ages 36-55, male-male twin pairs, 90.4% white, twins with major depression were more likely to have combat exposure and C-PTSD than twins without major depression,  $p < .05$ . Even after adjusting for combat exposure, C-PTSD continued to be a predictor of major depression,  $p < .05$ .

A similar study by Dedert et al. (2009) examined the affiliation of lifetime trauma exposure to psychiatric symptoms in 356 veterans (mean age 37; 78% male; 46% white) who have served since September 11, 2001. Within this group, combat exposure was associated with

increased odds of major depressive disorder ( $p < .01$ ). Additionally, co-morbidity of PTSD and major depressive disorder was associated with combat exposure ( $p < .01$ ). Furthermore, accidents or disasters (such as natural disasters, serious motor-vehicle accidents, and any other serious

19

accidents) were also linked with depression ( $p < .01$ ) and both depression and PTSD ( $p < .01$ ), with an increased odds of 192% and 258% respectively. Exposure to traumatic life experiences were assessed for before, during, or after military service. Overall, trauma exposure besides war-related traumatic stress was related to current psychiatric status among veterans who served after 9/11 (Dedert, et al., 2009).

The Veterans Health Administration (VHA) provides specialty inpatient and outpatient mental health services at its medical centers and community-based outpatient clinics. Readjustment counseling is also available for veterans at any of the VA's Vet Centers. The program is centered around recovery, making sure each veteran achieves their full potential. Some of the VA's many services include: specialized PTSD services, psychosocial rehabilitation and recovery services, suicide programs, and evidence based psychotherapy programs. These services are available in specialty clinics, primary care clinics, nursing homes, and residential care facilities (United States Department of Veteran Affairs, 2010).

## **2.8 Alcohol Misuse and Depression**

Many studies have found an association between depression and level of alcohol consumption (Alati, et al., 2005; Dixit & Crum, 2000). But, in other studies, the relationship has been negative for some measures of alcohol consumption (Graham & Schmidt, 1999; Wang & Patten, 2001). Study findings may differ as a result of the ways depression and alcohol are measured (Graham, Massak, Demers, & Rehm, 2007).

Graham et al. (2007) concluded that the magnitude of the relationship between depression and alcohol consumption is influenced by measurement of these variables. Depression is sensitive to measurement when determining gender differences between

20

depression scores. The link between alcohol consumption and depression was consuming large amounts of alcohol per occasion, which was stronger for women than for men. Alcohol consumption's link to depression was consuming larger amounts per occasion, which appeared to be even stronger for women than men. This finding also validated that drinking patterns play a more significant role in depression than overall volume of consumption (Rehm J. , et al., 2004).

Haynes and colleagues (2005) tested alcohol consumption as a risk factor for depression and anxiety. Men who binge drank on a monthly basis had a three-fold increased odds of anxiety and depression at follow-up. No such association was established among women (Haynes, et al., 2005). This finding supports the idea that drinking patterns may be more significant than volume of consumption.

## **2.9 Alcohol Misuse and Depression Among Veterans**

Alcohol misuse and depression have been studied among soldiers currently deployed during war. Felker and colleagues (2008) examined the characteristics of military personnel of Operation Iraqi Freedom (OIF) who sought mental health during deployment. Of 296 soldiers, almost 75% were male between the ages of 18 and 24, 32% presented with depressive disorders and 11% experienced severe alcohol misuse. Uncertainty regarding alcohol misuse existed because the AUDIT-C asks about use over the last 12 months. Additionally, there may have been under-reporting due to the rules about alcohol use during deployment (Felker, Hawkins, Dobie,

Gutierrez, & McFall, 2008). This study found that although women were a smaller subset of the population, they were more likely to access mental health services.

21

The co-morbidity between alcohol misuse and depressive symptoms has been shown to exist well beyond war times. A study by Babic and colleagues (2004) analyzed whether there were differences between PTSD, depression, and alcohol misuse among former prisoners of war and veterans with no detainment. Among 160 male war veterans, former prisoners of war experienced higher levels of trauma than war veterans who were not detainees,  $p < .05$ . Former prisoners of war exhibited symptoms of PTSD 22% more than war veterans,  $p < .05$ . Likewise, former prisoners of war experienced 20% more depressive disorders than veterans without detainment experience,  $p < .05$ . Statistically significant differences were not found for alcohol misuse among both prisoners of war and those who were not prisoners of war. Overall, the severity and extent of prisoners of war traumatic experiences increased the higher numbers of PTSD and depression diagnoses among this group, as compared to veterans who were not prisoners of war.

## **2.10 Summary**

Today, the Armed Forces are filled to capacity with individuals who have volunteered to serve their country. Presently, a major war is ongoing that is changing the lives of both the soldiers who are fighting, the families of the soldiers, and the countries in which the war is

occurring. Once these soldiers leave the military, they also carry with them the casualties and trauma that they have experienced. Soldiers exposed to these types of ordeals are at more risk for

22

developing mental illness and alcohol-related problems. Public health professionals need to be aware of the special circumstances facing this vulnerable group of people.

Many of the studies addressing this complex issue have been extremely localized. Studies have focused exclusively on VA populations or active duty soldiers after deployment. Very little has focused on a representative, national sample of veterans or active duty soldiers. Through this study, a nationally representative sample of veterans will be used to address the association between alcohol misuse, depressive symptomology, and veteran status.

## **Chapter III**

### **Methods**

#### **3.1 Data Source**

Data from NHANES 2005-2008 were used for this study. NHANES data is collected through the National Center for Health Statistics. This data is a cross-sectional survey of the non-institutional US civilian population with no identifiers. About 5,000 people are surveyed yearly. NHANES oversamples people older than age 60, African Americans, and Hispanics to ensure representativeness. Individuals range in age from 0 to over 80 years old. Survey topics included demographic information, anthropometric measures, socioeconomic indicators, and dietary and health-related questions. Consecutive surveys from 2005 through 2008 were used to increase the sample size. The NHANES data for this study for the years 2005-2008 utilized stratified multistage probability sampling. Sampling was based on selection of clusters among households within single counties (National Center for Health Statistics, 2005). NHANES data was used for this study because it was a publicly available data set on a nationally representative sample. Also, this data had information on veteran status, alcohol use, and depression symptomology.

### **3.2 Survey Procedures**

Households selected to participate in the survey are notified through a letter from the National Center for Health Statistics Director. Interviews are then conducted in participants'

24

homes via computer-assisted technology and interviewers. Mobile centers are set up within the county to gather participants' health measurements.

### **3.3 Participants**

The population targeted in this study was males, ages 20 and older, who have served in the United States Armed Forces. The sample included men of all races: Hispanic, Mexican, White, Black, and those who classified themselves as multiracial. The total number of subjects included 1,381 men.

### **3.4 Study Variables**

The following variables were selected from the demographic and questionnaire sections for the study. All variables were self-reported by the participants.

#### **Race**

Race included Hispanic, Mexican, White, Black, Other, Indian, Alaska Native, Guamanian, Samoan, Other Pacific Islander, Asian Indian, Chinese, Filipino, Japanese, Korean, and Vietnamese. Race was measured by the following question, "What race {do you/does SP} consider {yourself/himself/herself} to be?" For purposes of this study, the variable was recoded,

combining Hispanic and Mexican into Hispanic. Those whose race was not white or black were coded as other.

## **Age**

25

Age was reported in years. Age was determined based on the question, “Best age in years of the sample person at time of HH screening.” The variable was recoded into 4 categories: 20-39 years old, 40-59 years old, 60-79 years old, and 80 years of age and higher.

## **Marital Status**

Marital status included married, widowed, divorced, separated, living with partner, and never married. The variable was recoded into 3 categories: Married/Living with Partner, Widowed/Divorced/Separated, and Never Married.

## **Education Level**

Education level included two questions in NHANES, one for youth ages 6-19 and the other for adults aged 20 and older. This study utilized the question asking the education level for those aged 20 and older. Education level categories included on NHANES were: less than 9<sup>th</sup> grade, 9<sup>th</sup>-11<sup>th</sup> grade, high school diploma or GED, some college or associates degree, and college graduate or above. For purposes of this study, some college and associates degree were combined into some college. The variable was recoded into 4 categories: less than high school, high school diploma/general equivalency diploma, some college, and college graduate or higher.

## **Income Level**

Income was categorized and ranged from \$0- \$100,000 or more. For this study, the variable was recoded into 5 categories: \$0-\$19,999, \$20,000-\$34,999, \$35,000-\$54,999, \$55,000-\$74,999, and \$75,000 and higher.

### **Alcohol Misuse**

Alcohol misuse was defined as consuming 5 or more drinks per occasion. Misuse was determined by the number of drinks a person consumed on days that an individual drank. The measure for alcohol misuse was one question: Was there ever a time in your life when you drank

26

5 or more drinks of any kind of alcoholic beverage almost every day? The variable was dichotomized into: 0- no (for those who did not misuse alcohol) and 1- yes (for those who misused alcohol).

### **Depressive Symptomology**

Depressive symptomology was defined as a composite score of 5 or more ascertained from a composite score of NHANES survey questions based on depressed mood, interest or pleasure in doing things, sleep habits, energy levels, changes in appetite, self-worth, concentration, changes in speech, and thoughts of death. The measures for depressive symptomology included the following set of questions: Over the last 2 weeks, how often have you been bothered by the following problems: little interest or pleasure in doing things?; feeling down, depressed, or hopeless?; trouble falling or staying asleep, or sleeping too much?; poor appetite or overeating?; feeling bad about yourself - or that you are a failure or have let yourself or your family down?; trouble concentrating on things, such as reading the newspaper or watching TV?; and thoughts that you would be better off dead or of hurting yourself in some way?. The variable was dichotomized into: 0- not depressed and 1- depressed. Measuring

depression by the DSM IV's definition, the sample size turned out very small. It was appropriate to examine symptoms of depression instead.

### **3.5 Statistical Analysis**

SPSS 17.0 for Windows was used to perform all analyses. Descriptive frequencies were obtained for demographics and included the sample number and percentages. Additionally, descriptive frequencies were obtained for alcohol misuse and depressive symptomology using chi-square tests to attain the frequencies, percentages, and p-values. T-test statistics for

27

continuous variables were used to acquire the mean, standard deviation, and p-value for both alcohol misuse and depressive symptomology. Age was treated as a continuous variable to obtain the mean age of both the alcohol misuse and depressive symptomology groups and was treated as categorical to determine which age groups were more at risk of alcohol misuse and depression symptoms.

Binary logistic regression was used to test for associations between alcohol misuse and depressive symptomology. This procedure was also used to test these dependent variables against educational attainment, income, race, marital status, and age, which served as independent variables and covariates. Logistic regression was used to address association between alcohol misuse, depressive symptomology, and veteran status, which was the first research question. Logistic regression was also used to address the second and third research questions of veteran status and its association to age, depressive symptomology and alcohol misuse and whether race/ethnicity was associated with alcohol misuse and depressive symptoms and veteran status.

## Chapter IV

### Results

The sample consisted of 1,381 males who had a history of serving in the United States Armed Forces (Table 1.1). This sample consisted of mostly white, 60-79 year old men whose income ranged between \$20,000- \$54,999. Most individuals within this cohort were married, with some college experience. Additionally, it is important to note that, income level had a large amount of missing with participants refusing to answer or not knowing their yearly income.

#### 4.1 Descriptive Characteristics

Table 1.1 Demographic Statistics and Frequencies of Eligible Armed Services Population

Variables	N	%
Race		

<b>Hispanic</b>	123	8.9
<b>White</b>	934	67.6
<b>Black</b>	295	21.4
<b>Other</b>	29	2.1
<b>Total</b>	1381	100.0
<b>Marital Status</b>		
<b>Married/Living with Partner</b>	966	69.9
<b>Widowed/Divorced/Separated</b>	316	22.9
<b>Never Married</b>	98	7.1
<b>Total</b>	1380	99.9
<b>Education Level</b>		
<b>&lt;High School</b>	270	19.6
<b>HS/GED</b>	379	27.4
<b>Some College</b>	437	31.6
<b>College Graduate+</b>	295	21.4
<b>Total</b>	1381	100.0
<b>Age</b>		
<b>20-39</b>	116	8.4
<b>40-59</b>	310	22.4
<b>60-79</b>	689	49.9
<b>80+</b>	266	19.3
<b>Total</b>	1381	100.0
<b>Income</b>		
<b>0-19,999</b>	237	17.2
<b>20,000-34,999</b>	322	23.3
<b>35,000-54,999</b>	285	20.6
<b>55,000-74,999</b>	147	10.6
<b>75,000+</b>	144	10.0
<b>Total</b>	1135	82.2

29

Table 2.1 Demographic Statistics of Eligible Armed Services Population who Misuse Alcohol

Variables	Alcohol Misuse				P-Value
	N	Yes	N	No	
<b>Race</b>					.045
<b>Hispanic</b>	19	17.3%	62	8.8%	
<b>White</b>	70	63.6%	486	68.8%	
<b>Black</b>	18	16.4%	142	20.1%	
<b>Other</b>	3	2.7%	16	2.3%	
<b>Total</b>	110	100.0%	706	100.0%	

<b>Marital Status</b>					<.001
<b>Married/Living with Partner</b>	66	60.0%	518	73.4%	
<b>Widowed/Divorced/Separated</b>	26	23.6%	145	20.5%	
<b>Never Married</b>	18	16.4%	43	6.1%	
<b>Total</b>	110	100.0%	706	100.0%	
<b>Education Level</b>					.001
<b>&lt;High School</b>	19	17.3%	93	13.2%	
<b>HS/GED</b>	41	37.3%	180	25.5%	
<b>Some College</b>	38	34.5%	242	34.3%	
<b>College Graduate+</b>	12	10.9%	191	27.1%	
<b>Total</b>	110	100.0%	706	100.0%	
<b>Age</b>					<.001
<b>20-39</b>	33	30.0%	58	8.2%	
<b>40-59</b>	45	40.9%	161	22.8%	
<b>60-79</b>	31	28.2%	369	52.3%	
<b>80+</b>	1	0.9%	118	16.7%	
<b>Total</b>	110	100.0%	706	100.0%	
<b>Income</b>					.134
<b>0-19,999</b>	20	21.5%	100	17.3%	
<b>20,000-34,999</b>	23	24.7%	167	28.9%	
<b>35,000-54,999</b>	24	25.8%	138	23.9%	
<b>55,000-74,999</b>	18	19.4%	76	13.1%	
<b>75,000+</b>	8	8.6%	97	16.8%	
<b>Total</b>	93	100.0%	578	100.0%	
<b>Depression</b>					.041
<b>No</b>	84	77.1%	593	84.8%	
<b>Yes</b>	25	22.9%	106	15.2%	
<b>Total</b>	109	100.0%	699	100.0%	

30

For alcohol misuse, only 816 participants completed the questionnaire. Of these, 110 males were classified as misusing alcohol, based on the definition of drinking 5 or more drinks per occasion (Table 2.1). Both income level and depression do not total 110 because of missing data. Observed among the group race ( $p < .05$ ), marital status ( $p < .001$ ), education level ( $p = .001$ ), age ( $p < .001$ ), and depressive symptomology ( $p < .05$ ) were all statistically significant with respect to alcohol misuse. Among those that suffered from alcohol misuse the majority were

white. This group was either married or living with a partner and completed high school or a GED. Over 40.0% of the population was between the ages of 40-59. Alcohol misusers with depressive symptomology were less than 25% of the entire group. Table 2.2 provides the mean age of individuals misusing and not misusing alcohol. . In this sample, those classified as misusing alcohol were significantly ( $p<.001$ ) younger ( $M=48.3$  years) than those who did not misuse ( $M=64.14$ ).

Table 2.2 Descriptive Statistics and T-Test for Age by Alcohol Misuse Group

Variable	Alcohol Misuse		P-Value
	Yes	No	
Age	48.30 $\pm$ 15.768	64.14 $\pm$ 14.458	<.001

Table 2.3 Demographic Statistics of Eligible Armed Services Sample with Depressive Symptomology

Variables	Depressive Symptomology				P-Value
	N	Yes	N	No	
<b>Race</b>					.471
<b>Hispanic</b>	20	9.4%	86	8.4%	
<b>White</b>	140	65.7%	704	69.0%	
<b>Black</b>	46	21.6%	213	20.9%	
<b>Other</b>	7	3.3%	18	1.8%	
<b>Total</b>	213	100.0%	1021	100.0%	
<b>Marital Status</b>					.003
<b>Married/Living with Partner</b>	132	62.0%	751	73.6%	
<b>Widowed/Divorced/Separated</b>	61	28.6%	205	20.1%	
<b>Never Married</b>	20	9.4%	65	6.4%	
<b>Total</b>	213	100.0%	1021	100.0%	

<b>Education Level</b>					.011
<High School	51	23.9%	173	16.9%	
HS/GED	55	25.8%	288	28.2%	
Some College	74	34.7%	318	31.1%	
College Graduate+	33	15.5%	242	23.7%	
<b>Total</b>	213	100.0%	1021	100.0%	
<b>Age</b>					<.001
20-39	15	7.0%	91	8.9%	
40-59	77	36.2%	209	20.5%	
60-79	86	40.4%	541	53.0%	
80+	35	16.4%	180	17.6%	
<b>Total</b>	213	100.0%	1021	100.0%	
<b>Income</b>					.004
0-19,999	53	29.6%	153	18.2%	
20,000-34,999	51	28.5%	248	29.5%	
35,000-54,999	42	23.5%	213	25.3%	
55,000-74,999	20	11.2%	110	13.1%	
75,000+	13	7.3%	118	14.0%	
<b>Total</b>	179	100.0%	842	100.0%	
<b>Alcohol Misuse</b>					.041
No	106	80.9%	593	87.6%	
Yes	25	19.1%	84	12.4%	
<b>Total</b>	131	100.0%	677	100.0%	

32

A total of 213 males exhibited depressive symptomology. Neither income nor alcohol misuse totaled 213 because of missing data. Table 2.3 displays the characteristics of the sample. All variables were statistically significant at  $p < .05$ , with the exception of race. Similar to those who did not experience depressive symptoms, males experiencing depressive symptoms were either married or living with a partner. Additionally, almost half of the sample had some college experience. This group was older, with almost half of those males being between the ages of 60-79. Table 2.4 gives the mean age of individuals with depression symptoms to be 62.11. Income levels are significantly lower in this group, with many making less than \$20,000 a year. Only about one fifth of males in this group are categorized as misusing alcohol.

Table 2.4 Descriptive Statistics and T-Test Results for Age by Presence of Depressive Symptomology

Variable	Depressive Symptomology		P-Value
	Yes	No	
Age	62.11±15.439	64.42±14.860	.046

#### 4.2 Univariate Analyses

33

Table 3.1 Univariate Logistic Regression for Alcohol Misuse and Associated Variables

Variables	Odds Ratio (OR)	P-Value	95% CI
<b>Race</b>			
White	1.00	.052	Reference
Black	0.88	.649	(0.51-1.53)
Hispanic	2.13	.010	(1.20-3.77)
Other	1.30	.681	(0.37-4.58)
<b>Marital Status</b>			
Married/Living with Partner	1.00	.001	Reference
Widowed/Divorced/Separated	1.41	.172	(0.86-2.30)
Never Married	3.29	< .001	(1.79-6.03)
<b>Education Level</b>			
<High School	3.25	.002	(1.52-6.98)
HS/GED	3.63	< .001	(1.85-7.12)
Some College	2.50	.008	(1.27-4.91)
College Graduate+	1.00	.002	Reference
<b>Age</b>			
20-39	67.14	< .001	(8.96-503.14)
40-59	32.98	.001	(4.48-242.68)
60-79	9.91	.025	(1.34-73.40)
80+	1.00	< .001	Reference
<b>Income</b>			
0-19,999	2.43	.045	(1.02-5.77)

<b>20,000-34,999</b>	1.67	.233	(0.72-3.88)
<b>35,000-54,999</b>	2.11	.082	(0.91-4.89)
<b>55,000-74,999</b>	2.87	.020	(1.19-6.96)
<b>75,000+</b>	1.00	.148	Reference
<b>Depression</b>			
<b>No</b>	1.00	---	Reference
<b>Yes</b>	1.67	.042	(1.02-2.72)

Table 3.1 displays the univariate logistic regression analysis predicting alcohol misusers from race, marital status, education, age, income, and depression status. Reference groups were

34

selected because the literature indicated that each reduced the likelihood of misusing alcohol. The reference groups were: being white, either living with a partner or being in a marriage, attaining a bachelor's degree or higher, older age, a high income, and no depressive symptomology.

The variable with the strongest association to alcohol misuse was age ( $p = < .001$ ). Compared to the reference group, 20-39 year olds had the highest odds (OR= 67.14; CI= 8.96-503.14), followed by 40-59 year olds (OR= 32.98; CI= 4.48-242.68), and 60-79 year olds (OR= 9.91; CI= 1.34-73.40). All levels of educational attainment were significantly associated with alcohol misuse compared to the reference group. Generally, the odds of alcohol misuse were higher for those with less education, compared to those who were college graduates. Non-completion of high school (OR= 3.25; CI= 1.52-6.98) and a high school diploma or GED (OR= 3.63; CI= 1.85-7.12) unveiled a 252% and 263% increased odds of misusing alcohol, respectively. Marital status also revealed a strong association to alcohol misuse ( $p = .001$ ). Never being married revealed a 229% increased odds of alcohol misuse compared to the reference

group (OR= 3.29; CI= 1.79-6.03). For race, being Hispanic was the only statistically significant group with increased odds of 122% for alcohol misuse (OR= 2.22; CI= 1.20-3.77). Males earning less than \$20,000 and those earning \$55,000-\$74,999 were highly associated with alcohol misuse. High earners exhibited a 187% increased odds of alcohol misuse (OR= 2.87; CI= 1.19-6.96), compared to those making over \$75,000. Low income earners presented a 143% increased odds of alcohol misuse (OR= 2.43; CI= 1.02-5.77). Overall, income was not a significant variable in the model,  $p = .148$ . Last, suffering from depressive symptomology was positively associated with alcohol misuse (OR= 1.67; CI= 1.02-2.72).

35

Table 3.2 Univariate analysis of Depressive Symptomology with Associated Independent Variables

<b>Variables</b>	<b>Odds Ratio (OR)</b>	<b>P-Value</b>	<b>95% CI</b>
<b>Race</b>			
<b>White</b>	1.00	.483	Reference
<b>Black</b>	1.09	.659	(0.51-1.44)
<b>Hispanic</b>	1.17	.555	(0.52-1.66)
<b>Other</b>	1.96	.140	(0.62-4.54)
<b>Marital Status</b>			
<b>Married/Living with Partner</b>	1.00	.003	Reference
<b>Widowed/Divorced/Separated</b>	1.69	.0025	(1.20-2.38)
<b>Never Married</b>	1.75	.040	(1.03-2.99)
<b>Education Level</b>			
<b>&lt;High School</b>	2.16	.002	(1.34-3.49)
<b>HS/GED</b>	1.40	.155	(0.88-2.23)
<b>Some College</b>	1.71	.018	(1.10-2.66)
<b>College Graduate+</b>	1.00	.012	Reference
<b>Age</b>			
<b>20-39</b>	1.00	< .001	Reference
<b>40-59</b>	2.24	.009	(1.22-4.10)
<b>60-79</b>	0.96	.904	(0.53-1.74)

<b>80+</b>	1.18	.621	(0.61-2.27)
<b>Income</b>			
<b>0-19,999</b>	3.14	.001	(1.64-6.04)
<b>20,000-34,999</b>	1.87	.059	(0.98-3.57)
<b>35,000-54,999</b>	1.79	.085	(0.92-3.47)
<b>55,000-74,999</b>	1.65	.188	(0.78-3.48)
<b>75,000+</b>	1.00	.005	Reference
<b>Alcohol Misuse</b>			
<b>No</b>	1.00	---	Reference
<b>Yes</b>	1.70	.010	(1.13-2.53)

36

Table 3.2 presents the associations between depressive symptomology and the independent variables. Again, reference groups were determined based on review of the literature. The reference group for age was switched from the 80 and older group to the 20-39 year old group because younger persons are less likely to suffer from depression than older persons. The reference groups selected decreased the likelihood of experiencing depressive symptomology: being white, either living with a partner or being in a marriage, attaining a bachelor's degree or higher, younger age, a high income, and no alcohol misuse. Race was the only variable that yielded no association to depressive symptomology. However, income revealed the strongest association to depressive symptomology. Low-income males, \$0-\$19,000, had a 214% increased odds of experiencing depressive symptomology (OR= 3.14; CI= 1.64-6.04). The next strongest association was age. Males ages 40-59 had a 124% times increased odds of facing depressive symptoms (OR= 2.24; CI= 1.22-4.10) compared to the reference group. The lack of a high school diploma put veterans at a 116% increased odds of experiencing

symptoms (OR= 2.16; CI= 1.34-3.49) than veterans who were college graduates. Even those with some college background had a 71% increased odds of enduring depression symptoms (OR= 1.71 CI= 1.10-2.66) as compared to college graduates. Another factor that showed an increased risk among this population was having never been married or being separated, divorced, or widowed. Veterans with no history of being married were 75% more likely to encounter depressive symptomology (OR= 1.75; CI= 1.03-2.99). Similarly, widowers, divorcees, and separated veterans were almost 70% more likely to encounter depressive symptoms (OR= 1.69; CI= 1.20-2.38). Those misusing of alcohol were equally as likely to experience depressive

symptomology as widowers, divorcees, and separated veterans at 70% (OR= 1.70; CI= 1.13-2.53).

### 4.3 Multivariate Analyses

Among the independent variables, education level and income were moderately associated and significant,  $r(1135) = .388, p < .001$ . The significant Pearson's coefficient suggests an overlap in education and income. As a result of this relationship, education level was used in place of income as an indicator of socioeconomic status in the multivariate analyses.

Controlling for age, race, marital status, and educational attainment with respect to alcohol misuse, all were statistically significant except for race.

Table 4.1 Multivariate Analysis of Associated Variables and Alcohol Misuse

Variables	OR	P-Value	95% CI
<b>Age</b>			
<b>20-39</b>	71.42	< .001	(9.24-551.79)

<b>40-59</b>	39.04	< .001	(5.19-293.76)
<b>60-79</b>	10.62	.021	(1.42-79.54)
<b>80+</b>	1.00	< .001	Reference
<b>Race</b>			
<b>White</b>	1.00	.026	Reference
<b>Black</b>	0.49	.020	(0.27-0.90)
<b>Hispanic</b>	1.59	.145	(0.85-2.97)
<b>Other</b>	0.80	.748	(0.21-3.05)
<b>Marital Status</b>			
<b>Married/Living with Partner</b>	1.00	.011	Reference
<b>Widowed/Divorced/Separated</b>	1.87	.024	(1.09-3.20)
<b>Never Married</b>	2.33	.016	(1.17-4.61)
<b>Education Level</b>			
<b>&lt;High School</b>	3.85	.001	(1.68-8.82)
<b>HS/GED</b>	3.01	.003	(1.47-6.16)
<b>Some College</b>	1.73	.133	(0.85-3.55)
<b>College Graduate+</b>	1.00	.002	Reference

38

Table 4.1 displays the independent variables that were associated with alcohol misuse. Age was clearly significant for all categories. The strongest association was among the 20-39 year olds (OR= 71.42; CI= 9.24-551.79). Next, 40-59 year olds were at 3804% increased odds of misusing alcohol than veterans older than 80 (OR= 39.04; CI= 5.19-293.76). Last, senior citizens between the ages of 60 and 79 were 962% as likely to misuse alcohol compared to those over the age of 80 (OR= 10.62; CI= 1.42-79.54). As age increased, alcohol misuse risk decreased.

The only racial/ethnic group with any association with alcohol misuse is blacks. But within this group, being black serves as a protective factor against alcohol misuse (OR= 0.49; CI=0.27-0.90), with a 51% reduction in the odds of misusing alcohol.

Widowers, divorcees, and separated and those that have never been married had an elevated risk of alcohol misuse. Veterans who have never married had the highest risk at 133%

increased odds (OR= 2.33; CI= 1.17-4.61). The widowed, divorced, and separated were over 75% more likely to experience depressive symptomology as the reference group (OR= 1.87; CI= 1.09-3.20).

Veterans with a high school diploma or less shared very similar risks to alcohol misuse. The highest risk was seen among those without a high school diploma. Males within that group were at 285% increased odds of enduring alcohol misuse than those with a college degree (OR= 3.85; CI= 1.68-8.82). Comparably, persons with only a high school diploma or GED were at 201% increased odds of encountering alcohol misuse (OR= 3.01; CI= 1.47-6.16) as those with a college degree.

As shown in tables 4.1, age ( $p < .001$ ), race ( $p < .05$ ), marital status ( $p < .05$ ), and educational attainment ( $p < .01$ ) are the best predictors of alcohol misuse in the final model of the logistic regression.

Table 4.2 Multivariate Analysis with independent variables for Depression

<b>Variables</b>	<b>OR</b>	<b>P-Value</b>	<b>95% CI</b>
<b>Age</b>			
<b>20-39</b>	1.00	< .001	Reference
<b>40-59</b>	1.99	.039	(1.04-3.82)
<b>60-79</b>	0.68	.258	(0.35-1.33)
<b>80+</b>	0.79	.559	(0.35-1.76)
<b>Marital Status</b>			
<b>Married/Living with Partner</b>	1.00	.030	Reference
<b>Widowed/Divorced/Separated</b>	1.75	.015	(1.11-2.74)
<b>Never Married</b>	1.67	.134	(0.85-3.27)
<b>Education Level</b>			
<b>&lt;High School</b>	2.70	.003	(1.41-5.16)
<b>HS/GED</b>	1.47	.203	(0.81-2.66)
<b>Some College</b>	1.48	.172	(0.84-2.61)

<b>College Graduate+</b>	1.00	.025	Reference
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Table 4.2 exhibits the association between age and depressive symptomology. Age is associated with depressive symptomology, with those in the middle age group having increased odds compared to the reference group. This group was more than 90% as likely as the reference group to experience symptoms of depression (OR= 1.99; CI= 1.04-3.82).

Marital status was significantly associated to depressive symptomology, the same as alcohol misuse. Widowers, divorcees, and those separated were at a 75% increased odds of having depressive symptomology than those married or living with a partner (OR= 1.75; CI= 1.11-2.71).

40

On the other hand, those who never married were 67% more likely to experience depressive symptoms, but this was not statistically significant.

Only those without a high school diploma had a statistically significant relationship,  $p < .003$ . Non-completion of high school revealed a 170% increased odds of depressive symptomology than those with a degree (OR= 2.70; CI= 1.41-5.16). Those with some college experience and a high school diploma had elevated odds, but were not significantly different from the reference group.

Overall, age, marital status, and education are the best predictors of depressive symptomology. Based on the model, those aged 40-59, widowers, divorcees, those separated, and those without a high school diploma would have a higher predicted probability of being in the depressive symptomology group.

## **Chapter V**

### **Discussion and Conclusion**

#### **5.1 Discussion**

Both alcohol misuse and depression are major public health concerns domestically because of the co-morbidity associated with the conditions. Alone, these conditions can cause injury, impaired functioning, and even death (Hasin, et al., 2005; St John, et al., 2009). Although these conditions affect many different populations, veterans at greatest risk for alcohol misuse and depressive symptoms as a direct influence of the demands and culture of military life

(Fernandez, et al., 2006) and trauma experienced during times of war (Babic & Sinanovic, 2004; Koenen, et al., 2003). Despite the studies addressing alcohol misuse and depressive symptoms among active duty personnel and veterans, few have assessed these conditions among a nationally representative sample.

This study aimed to determine the association between alcohol misuse and depressive symptomology among males who have a history of serving in the United States Armed Forces. Several studies have examined alcohol-related problems and depression among the general population. However, despite the enormous amount of literature on these subjects, few studies have actually examined alcohol misuse and depressive symptomology among veterans. Of the existing studies, data were examined for VA samples or soldiers returning from deployment. Providing more information about alcohol misuse and depressive symptomology among veterans

42

and highlighting their plight can provide public health professionals with the critical tools needed to effectively combat alcohol misuse and manage depression among veterans through preventive interventions.

## **5.2 Alcohol Misuse and Depressive Symptomology**

In terms of the research question, this study shows that alcohol misuse and depressive symptomology are associated in males who have a history of serving in the Armed Forces. This study found a significant association between depressive symptoms and alcohol misuse in the univariate logistic regression analysis, but the relationship did not hold in the multivariate model. This finding could be explained by the demographic variables; race, age, marital status, and educational attainment, accounting for most of the variance in both the alcohol misuse group and those that suffered from depressive symptomology.

Educational attainment has been linked to alcohol misuse in early adulthood (Paschall, et al., 2000). Although risk was elevated for all age groups, the 20-39 years age group had the highest odds. A key difference in this study compared to the Paschall et al. (2000) study was that race played a determining factor in how alcohol misuse was influenced by educational attainment. Race was not stratified to determine its association between educational attainment and alcohol misuse. Therefore, this study finding suggests that lower educational attainment among male veterans is associated with increased odds of alcohol misuse.

### **5.2.1 Age**

In terms of age and its association with alcohol misuse and depressive symptomology, the results indicate that age, alcohol misuse, and depressive symptomology are associated in male veterans. Results from this study found age to increase male veterans' risk for misusing alcohol,  $p < .001$ , and for experiencing depressive symptomology,  $p < .001$ . Typically, the consensus

43

among studies is that veterans and men younger than age 30 have the highest risk for alcohol misuse (Hawkins, et al., 2010; Slone, et al., 2006). The expression of depressive symptoms could be a result of self-medication by alcohol (Watts, 2008). Additionally, the older age of the population could exacerbate depressive symptoms because of factors relating to aging, death of family and friends, and social isolation (Conner, et al., 2009). The fact that alcohol misuse was significant among older veterans is similar to what was found in Loukissa (2007). In fact, Loukissa highlighted the under diagnosis of alcohol misuse in this population.

Although this study population of veterans ages 20-39 had the highest association to alcohol misuse, misuse was also more likely for those ages 40-79 as well. The older age of this population may be a possible explanation for what is found in this study. Male veterans within the age group of 40-59 may have served in the Vietnam War. The combat exposure that they

experienced during Vietnam may have had a substantial impact on their risk for alcohol misuse. Combat exposure could not be assessed in this study because there were no questions assessing exposure to combat.

### **5.2.2 Race**

In terms of race and its association to alcohol misuse and depressive symptomology, race was associated with alcohol misuse, but not depressive symptomology among male veterans. It was found that race served as a protective factor for African Americans, decreasing their risk for alcohol misuse. Throughout the literature, being Hispanic or Native American was associated with higher rates of alcohol misuse (Office of Applied Studies, 2003; Slone, et al., 2006). The finding in this study is supported by previous work.

44

The lack of association between race and depressive symptomology is similar to what was found in Kessler et al. (2003). Race was determined to lack an association with MDD overall. African Americans had a lower prevalence of lifetime MDD compares to Caucasians. Race was not influential in determining prevalence of MDD, unlike other sociodemographic variables as income, employment status, and education.

### **5.4 Limitations**

This study has several limitations. First, this study was a cross-sectional study. Because of the nature of this study, there was no way to determine directionality of the association between alcohol misuse and depressive symptomology. Alcohol misuse may result from self-medicating for depressive symptoms (Watts, 2008). Likewise, misusing alcohol may influence

the onset of depressive symptoms (Watts, 2008). Additionally, it was not possible to determine the onset of depressive symptomology or alcohol misuse based on the nature of the questions.

Another limitation was the measurement of alcohol misuse and depressive symptomology in the study. Depressive symptomology was assessed through symptoms and not at a diagnostic level or through a specialized depression scale. Depressive symptoms were based on pre-existing questions from a secondary set, which is limiting. Alcohol misuse was not measured by Alcohol Use Disorder Identification Test (AUDIT) or any other alcohol-related interview scale. Misuse was determined based on questions in the NHANES questionnaire about alcohol consumption.

The NHANES sample was sub-sampled and consisted solely of male veterans who were mostly white and aged 60 and older. This may limit the generalizability of my findings to women, other racial/ethnic groups, younger individuals, and those without prior military service. Also, for the analysis the data was not weighted. This is a limitation because this may change the

45

representativeness of the data and the findings. Another limitation is that the responses of the participants may have been biased because the survey questions relied on self-report. As a result, alcohol misuse may have been under-reported because of the social desirability to underreport excessive alcohol use.

## **5.5 Recommendations**

Based on my study's findings a more solid definition should be determined for alcohol misuse in the DSM IV. Many times, alcohol misuse, alcohol abuse, and alcohol disorder are used interchangeably. As stated earlier, an association between alcohol consumption and depression is dependent upon how the two variables are measured (Graham, et al., 2007). Consistency in how alcohol related problems are measured will lead to more conclusive studies on the real

association between alcohol related problems and other issues. In public health, as in many other disciplines, an issue cannot be solved unless it is appropriately defined.

More research needs to be completed on the temporal relationship between alcohol misuse and depressive symptomology through a longitudinal study. Many of the studies conducted on alcohol-related problems and depression discussed the cyclical nature of the two problems, but was unable to address which condition developed first. Longitudinal studies aiming to find which condition precedes the other and the factors that greatly contributes to these conditions. Discovery of these items can lead to more solutions on how to adequately treat veterans who both misuse alcohol and suffer from depression.

In order to address alcohol misuse and depressive symptomology among male veterans, there should be more emphasis placed on educating, identifying, referring and screening veterans that may suffer from these conditions. Active duty soldiers and commanders alike should be

46

provided more training in identifying fellow soldiers that may suffer from alcohol misuse and depressive symptoms. Additionally, the VA has both outpatient and inpatient facilities for alcohol related-problems and depressive symptomology. Based on the findings from this study, preventive interventions should be targeted towards single veterans of all ages, who have a high school diploma or less. That demographic has the highest odds of suffering from alcohol misuse and depressive symptoms and would benefit the most from an intervention.

## **5.6 Conclusion**

Alcohol misuse and depressive symptomology are complex conditions that require special attention because of the co-morbidity and lack of temporality known about them. Compounding these two conditions are the unique demands placed upon soldiers that continue to

haunt them long after their military career ends. Public health professionals need to clearly establish standard scales for alcohol misuse and depressive symptoms. Furthermore, additional research is needed to determine the temporal relationship between depressive symptomology and alcohol misuse among veterans. Once established, more interventions can be implemented within the VA health system to target one condition from subsequently increasing the risk for the other condition among veterans.

47

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49

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