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Heavy alcohol use and mental health treatment among adults experiencing depression of different ages

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By

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An abstract of the thesis submitted to the Faculty of the
Rollins School of Public Health
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Abstract

Background: This study examined the relationship between heavy alcohol use and mental health treatment utilization among adults who have experienced a major depressive episode in the last year. Additionally, this study examined how this relationship differed based on age group.

Methods: Data were from adults 18-64 who participated in the 2019 National Survey on Drug Use and Health who met criteria for a major depressive episode in the last year (n=4335). We conducted descriptive bivariate analyses and multivariable logistic regression analyses.

Results: Among participants with major depressive episodes, the impact of comorbid heavy alcohol use on their odds of receiving mental health treatment in the past year differed significantly by age group. In the multivariable logistic regression model, after adjusting for sociodemographic variables, adults ages 50-64 with no heavy alcohol use had 4.0 times the odds of receiving mental health treatment than those reporting heavy alcohol use.

Conclusion: Our results show that it is important to consider age when understanding the complex relationship between depression, alcohol use, and mental health treatment. For older adults, comorbid depression and heavy alcohol are associated with lower mental health treatment utilization. Given the number of aging adults in the United States and high levels of heavy alcohol abuse in older adults, it is important to continue to this research in older adults, with a focus on screening, diagnosis, and reducing barriers to treatment.

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Glossary

Alcohol use disorder (AUD): According to the *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5), the presence of at least two of 11 symptoms indicates the presence of alcohol use disorder over the past year. These symptoms include drinking more or longer than intended; wanting to cut down or stop drinking and not being able to more than once; spending a lot of time drinking and/or getting over after-effects; feeling a strong craving or urge to drink alcohol; developing a tolerance to alcohol so more is needed to have the same effect; and experiencing withdrawal symptoms. Other symptoms relate to the consequences of alcohol use including failing to fulfill obligations at work, school, or home; continuing to drink even when it's causing problems in various domains of life; cutting down on important activities to drink; continuing to drink even though it was causing depression, anxiety, or worsening another health problem; and getting into unsafe situations while or after drinking alcohol. AUD can be classified as mild (2-3 symptoms), moderate (4-5 symptoms), or severe (6 or more symptoms) (American Psychiatric Association, 2013).

Binge drinking: According to DSM-5 criteria, binge alcohol use is defined as drinking five or more drinks (for males) or four or more drinks (for females) on the same occasion on at least 1 day in the past 30 days (American Psychiatric Association, 2013).

Comorbidity: Comorbidity, in general, refers to the concurrence of two or more conditions. In the context of mental health disorders, there are two types of comorbidities that are frequently discussed: One, comorbidity with substance use disorders, is called co-occurring disorders or dual diagnosis. Second, comorbidity with chronic medical conditions, called medical comorbidity are often discussed (Walker & Druss, 2018). This study will refer to the co-occurrence of major depression with heavy alcohol use as comorbidities.

Co-occurring disorders: The Substance Abuse and Mental Health Services Administration SAMHSA defines co-occurring disorders as "the coexistence of both a mental illness and a substance use disorder" (Substance Abuse and Mental Health Services Administration, n.d.), also called dual diagnosis. Since this study focuses on heavy alcohol use, rather than alcohol use disorder, language of co-occurring disorders will not be used.

Dual diagnosis: The co-occurrence of mental health and substance use disorders, also referred to as co-occurring disorders. Again, since this study focuses on heavy alcohol use, rather than alcohol use disorder, language of co-occurring disorders will not be used.

Heavy alcohol use: Heavy Alcohol Use is binge drinking on the same occasion on 5 or more days in the past 30 days (American Psychiatric Association, 2013).

National Survey on Drug Use and Health (NSDUH): The National Survey on Drug Use and Health is an annual survey conducted by SAMHSA within the U.S. Department of Health and Human Services (HHS). It provides "nationally representative data on use of tobacco, alcohol, and illicit drugs; substance use disorders (SUDs); receipt of substance use treatment; mental health issues; and use of mental health services among the civilian, noninstitutionalized population aged 12 or older in the United States." (Substance Abuse and Mental Health Services Administration, 2021)

Major depressive episode (MDE): According to the DSM-5, an individual meets criterion for an MDE if they had a two-week week period when for most of the day nearly every day, they felt depressed, or lost interest or pleasure in daily activities (American Psychiatric Association, 2013). An individual must also have had five or more symptoms during that same two-week period such as problems with sleeping, eating, energy, concentration, self-worth, or recurrent thoughts of death or recurrent suicidal ideation (American Psychiatric Association, 2013).

Mental illness: According to Healthy People 2020, mental disorders are "alterations in thinking, mood, or behavior (or some combination thereof), which are associated with distress and/or impaired functioning and spawn a host of human problems that may include disability, pain, or death". Mental illness includes all diagnosable mental disorders (Healthy People 2020, 2022).

Mental health treatment: Mental health treatment includes any type of services received for mental or emotional problems. Individuals can receive psychiatric medications, counseling, and/or other types of services. These services can be provided in inpatient, outpatient, and/or telehealth settings. NSDUH questions about mental health services do not include treatment for substances (Substance Abuse and Mental Health Services Administration, 2021).

Substance use disorders: Substance use disorders include the recurrent use of alcohol or other substances and can lead to health problems, disability, and failure to meet major responsibilities at work, school, or home (Substance Abuse and Mental Health Services Administration, 2021). The DSM-5 requires at least 2 symptoms in the past year out of 11 possible symptoms (American Psychiatric Association, 2013).

Chapter I: Introduction

Problem definition:

The relationship between mental health, substance use, and treatment is complex. Since depression and alcohol use are some of the most common mental health disorders and substance use, respectively, this paper focuses on their intersection. To provide background information, we will first review the definition of, prevalence of, and treatment for depression on its own and different levels of alcohol use. Looking individually at both depression and heavy alcohol use provides context to discuss comorbid depression and heavy alcohol use. Lastly, we will review what is known about mental health treatment for comorbid depression and heavy alcohol use, and how this relationship differs by age.

Depression is one of the most common mental health disorders in the United States. Based on the most recent National Survey on Drug Use and Health (NSDUH), in 2020, 8.4% of the United States adult population ages 18 and older experienced a major depressive episode (MDE) in the past year (Substance Abuse and Mental Health Services Administration, 2021). According to the NDSUH, of the 21 million adults in 2020 who experienced a MDE in the past-year, 66% received treatment for depression in the past year (Substance Abuse and Mental Health Services Administration, 2021). Treatment for depression could include antidepressant medications, psychotherapy, and/or other services in an inpatient, outpatient, or telehealth setting. These treatments for depression are effective—reducing depressive symptoms and increasing wellbeing in the short- and long-term (Cuijpers et al., 2008; Karyotaki, Smit, de Beurs, et al., 2016).

Alcohol is the most commonly used substance in the United States, with 2018 data showing that 66.3% of adults consumed alcohol in the past-year (Boersma, 2020). According to Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) criteria, binge alcohol use is defined as drinking five or more drinks (for males) or four or more drinks (for females) on the same occasion on at least 1 day in the past 30 days (American Psychiatric Association, 2013). Heavy Alcohol Use is binge drinking on the same occasion on 5 or more days in the past 30 days (American Psychiatric Association, 2013). Data from the 2020 NSDUH estimate that 6.4% of Americans aged 12 or older, or an estimated 17.7 million people, reported heavy alcohol use in the last month (Substance Abuse and Mental Health Services Administration, 2021). Despite the prevalence of heavy alcohol use, treatment for alcohol use is rare. Only 8% of individuals with alcohol use disorders (AUDs) reported past-year AUD treatment (Edlund et al., 2012). Among individuals with an AUD, receiving psychiatric treatment was more common than receiving treatment for the AUD (Edlund et al., 2012).

Depression and alcohol use disorders are common comorbidities. A meta-analysis on the relationship concluded that the presence of either disorder doubles the risk of the other disorder (Boden & Fergusson, 2011). Among people with Major Depressive Disorder, 16.5% have an Alcohol Use Disorder (Quello et al., 2005). Individuals diagnosed with Alcohol Use Disorder are 2.3 times more likely to have major depressive disorder in the past year (Grant et al., 2004). The combination of depression and alcohol problems can worsen an individual's outcomes.

There is a mismatch between the prevalence of heavy drinking and rates of treatment, based on age. Young adults ages 18 to 25 show higher past month binge drinking (31.4% vs 22.9%) compared to adults over 25 (Substance Abuse and Mental Health Services Administration, 2021). Young adults ages 18 to 25 also have the highest reported prevalence of

depressive symptoms over the past two weeks (Villarroel & Terlizzi, 2020). However, young adults with a past-year MDE were less likely to receive treatment for depression than older adults (Substance Abuse and Mental Health Services Administration, 2021).

Contribution of the current study

Although there is previous research on the relationship between concurrent mental illness and substance use and increased rates of mental health treatment, there are several gaps in the literature. First, previous studies have often combined all substance use, rather than differentiating alcohol and other categories of substances. Second, other previous work has not clearly defined substance use versus substance misuse versus substance dependence. Third, past studies have also combined mental health service usage with substance use service usage. Additionally, there is a lack of information about how the relationship between heavy alcohol use and mental health treatment differs by age. Therefore, this study looks to clarify the relationship between heavy alcohol use and mental health treatment among those who have experienced an MDE in the last year. Specifically, among individuals who have experienced an MDE in the past year, what is the relationship between heavy alcohol use and mental health treatment utilization?

Depression and heavy alcohol use are common comorbidities in the U.S. (Boden & Fergusson, 2011; Grant et al., 2004; Quello et al., 2005; Sullivan et al., 2005). Given the effectiveness of mental health treatment, it is critical to ensure that any individual who needs help can access care. Examining predisposing factors and enabling factors, based on Andersen's healthcare utilization model (1995), can help better understand who is more likely to currently receive mental health treatment and how the system can better reach those who are not getting treatment. Enhanced understanding of the relationship between heavy alcohol use and mental

health treatment can inform policies and interventions to make treatments more accessible and reduce disparities in service utilization.

Theoretical framework:

The relationship among mental health, substance use, and receiving mental health treatment is complex. Andersen's healthcare utilization model (1995) can be applied to predict and explain use of the mental health services. There are three key constructs which are used to predict or explain an individual's health behavior: predisposing characteristics, enabling factors, and perceived need. Predisposing characteristics include factors like gender, age, race, education, and marital status (Babitsch et al., 2012). For individuals who have experienced a major depressive episode in the past year, heavy alcohol use can be considered a predisposing factor. Enabling factors act at multiple levels of the Social Ecological model and include factors such as available and accessible health services, access to health insurance, reliable transportation, social relationships, having a regular source of care, and others (Babitsch et al., 2012). Of adults who had a mental illness and perceived an unmet need for services, the most common reason for not receiving services was they could not afford the cost of care (44.9 %) (Substance Abuse and Mental Health Services Administration, 2021).

Perceived need for healthcare includes both the physical symptom severity and the social component of how people perceive their symptoms. Increased severity of depressive symptoms was a significant predictor of mental health service use (McCracken et al., 2006) and increased severity of AUD was associated with an increased likelihood of receiving treatment for AUD (Edlund et al., 2012). Perceived need for treatment seems to be the strongest predictor of receiving treatment for depressed Australian adults (Graham et al., 2017), older adults (Choi et al., 2013), adolescents (Frojd et al., 2007), and primary care patients (Herrman et al., 2002).

Using a theoretical framework can help better guide quantitative data analysis and inform which variables should be included in modeling. Specifically, theory will a priori inform the choice of covariates to be included in the model and which variables will be considered as possible confounders or effect modifiers. Theory will also inform the decision of which variables are mediators between the relationship between heavy alcohol use and mental health treatment and should therefore be excluded. It is important to develop an a priori analysis plan that is theory-driven before conducting analyses (Haardörfer, 2019). While additional analyses can be conducted based on the results from this analysis plan, it is important to note which analyses were conducted first and which were added later (Haardörfer, 2019).

Chapter II: Literature Review

Major Depression in the United States

Major depressive disorder (MDD) is one of the most common mental health disorders in the United States. The definition of a major depressive episode (MDE) is based on the *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5) (American Psychiatric Association, 2013). An individual meets criterion for an MDE if they had a two-week period when for most of the day nearly every day, they felt depressed, or lost interest or pleasure in daily activities (American Psychiatric Association, 2013). An individual must also have had five or more symptoms during that same two-week period such as problems with sleeping, eating, energy, concentration, self-worth, or having recurrent thoughts of death or recurrent suicidal ideation (American Psychiatric Association, 2013). To calculate estimates of the prevalence of major depression, the National Survey on Drug Use and Health (NSDUH) asks individuals to self-report if they have an experienced each of the possible DSM-5 symptoms of depression over a period of at least two weeks in the last year (Substance Abuse and Mental Health Services Administration, 2021). Based on the most recent NSDUH data, from 2020, an estimated 8.4% of the United States adult population ages 18 and older, or 21 million people, experienced an MDE in the past year (Substance Abuse and Mental Health Services Administration, 2021). Between 10 and 15% of the United States adult population will have at least one MDE in their lifetime (Hasin et al., 2005). Further, depression is a recurrent disorder (Burcusa & Iacono, 2007). Individuals who experienced MDD reported an average of 4.7 episodes (SD=0.22) in their lifetimes (Hasin et al., 2005).

The prevalence of major depression differs by gender. In a meta-analysis synthesizing data from over 1.7 million people from 90 countries, women were almost twice as likely to have

a diagnosis of major depression compared to men, OR=1.95, 95% CI [1.88, 2.03] (Salk et al., 2017). Additionally, women are more likely to report any symptoms of depression, even if these symptoms did not meet full criteria for major depression, based on number of symptoms or symptom duration. According to the 2019 National Health Interview Survey, women were more likely than men to report experiencing mild, moderate, or severe symptoms of depression in the past two weeks (21.8% of women vs 15% of men) (Villarroel & Terlizzi, 2020). This difference in prevalence of major depression by gender is present across the lifespan, starting from adolescence. By age 12, young women are 2.37 times more likely to have Major Depression, 95% CI [1.68, 3.37] (Salk et al., 2017). Overall, women are more likely to have experienced both a diagnosis of major depression and any symptoms of depression, across the lifespan starting from adolescence.

Not only is depression one of the most common mental health disorders; its burden can also be severe. Neuropsychiatric disorders, including depression are the leading causes of disability in the United States (Healthy People 2020, 2022). In the past year, an estimated 6% of the United States adult population experienced a MDE that severely impaired their ability to manage at home or work, have relationships with others, or have a social life (Substance Abuse and Mental Health Services Administration, 2021). The economic burden of depression can be measured as direct costs for medical treatment, workplace-related costs due to days missed from work and decreased productivity, and suicide-related costs of loss of household earnings (Greenberg et al., 2015). In 2010, the economic burden of depression in the U.S. from these three categories of costs was estimated to be $210.5 billion (Greenberg et al., 2015).

Major Depression Differences by Age

The prevalence of major depression differs by age. The prevalence of a past-year MDE was highest among young adults, ages 18 to 25: In 2020, 17% of adults 18-25 experienced an MDE in the past-year MDE (Substance Abuse and Mental Health Services Administration, 2021). Additionally, adults ages 18 to 29 were the most likely to have experienced any symptoms of depression (mild, moderate, or severe) in the last two weeks compared to adults of other ages (Villarroel & Terlizzi, 2020). Specifically, 21% of adults ages 18-29 had experienced any symptoms of depression, compared to 16.8% of adults ages 30-44 and 18.4% of adults ages 45 and older (Villarroel & Terlizzi, 2020). Nationally representative surveys of adults suggest that most individuals who will experience MDD do so by early adulthood, given that the median age of onset of depression is 25-32 years (Kessler et al., 2005). Rohde and colleagues (2013) found an even earlier age of first incidence, with 24% of their sample experiencing first-onset of depression during emerging adulthood, a higher rate of first incidence than any other period of development.

The developmental and social context in which young adults live puts them at unique risk of depression. Jeffrey Arnett (2000) conceptualized the distinct developmental period of emerging adulthood, typically defined between ages 18 and 25. In industrialized countries like the United States, where the individuals become legal adults at age 18, but the average age of marriage has increased, there is a distinct developmental stage. Emerging adulthood is characterized by five unique features: identity exploration, trying out possibilities in love and work, instability, self-focus, and feeling in between adolescence and adulthood (Arnett, 2000). There are significant stressors during this period, including uncertainty, instability, movement, and insecure economic conditions, that may explain part of the high rates of depression among this group (Rohde et al., 2013). Additionally, neural development continues until age 25 (Casey

et al., 2008), further distinguishing the age range of 18-25 from adulthood as a unique period of development.

Additionally, there are several contextual factors that are unique to the world in which young adults live today and have been linked to depression, including social media usage, heavy usage of smart phones, and climate change. Social media usage has been linked to increased rates of depression among young adults (Lin et al., 2016). Heavy usage of smart phones, to the point of addiction or other problematic behaviors is common and associated with worse mental health outcomes (Sohn et al., 2019; Wacks & Weinstein, 2021). Both high usage and problematic usage of mobile phones were associated with depression in young adults, cross-sectionally and longitudinally (Coyne et al., 2019; Sohn et al., 2019; Thomée et al., 2011). Lastly, climate change is a real factor affecting the mental health of young adults. Following disasters, which climate change is already bringing about more frequently, research has documented both short-term distress reactions, such as changes in sleep and irritability, and longer-term psychological disorders, including depression (Morganstein & Ursano, 2020). Beyond the direct effects of climate-related disorders, worries and fears about climate change, called climate anxiety, is particularly common among young adults and is associated with stress, generalized anxiety, depression, and impaired overall functioning (Clayton, 2020; Clayton & Karazsia, 2020; Majeed & Lee, 2017). These factors are several ways in which the causes and symptoms of depression can manifest differently in young people.

While young adults have the highest rates of MDD, depression is still common among middle aged adults (those older than 25, but younger than 65). Based on the National Epidemiologic Survey of Alcoholism and Related Conditions, 5.52% of adults ages 30-44 met criteria for MDD in the past year (Hasin et al., 2005). This percentage was similar for adults 45-

64: 5.62% met criteria for MDD in the past year (Hasin et al., 2005). Across the life course, stressful life events are associated with depression (Bromberger et al., 2009; Kendler et al., 1999). However, there are unique stressors during these ages, especially for women. For women, depression can include perinatal and postpartum depression. Among healthy mothers without a history of depression, postpartum depression affected 17.1% (Shorey et al., 2018). Additionally, depressive symptoms increased during the transition to menopause (Freeman et al., 2004).

Prevalence rates for depression tend to be lower for adults over the age of 65, compared to adults in their midlife (ages 30-44 or 45-64) (Fiske et al., 2009). Large epidemiological studies have found the prevalence of major depression in adults ages 65 and older to range from 1% to 5% (Fiske et al., 2009; Hasin et al., 2005) When older adults do report depression, the symptoms they describe are different than those reported by younger adults. Older adults are less likely to endorse symptoms of anhedonia, the inability to feel pleasure, or dysphoria (Gallo et al., 1994), and are more likely to endorse cognitive and somatic symptoms (Christensen et al., 1999; Fiske et al., 2009; Hegeman et al., 2012). Somatic symptoms that older adults were more likely to report included sleep disturbance, insomnia, fatigue, psychomotor retardation, gastrointestinal symptoms, and general pain (Christensen et al., 1999; Fiske et al., 2009; Hegeman et al., 2012). In older age, depression is more closely linked with medical comorbidities, such as cardiovascular disease, dementia, and other chronic conditions (Fiske et al., 2009; Hegeman et al., 2012). In terms of cognitive symptoms, Christensen and colleagues (1999) demonstrated that loss of interest in living and hopelessness about the future were more common in late-life depression than in depression in younger or middle-aged adults. Overall, while adults over age 65 experience depression at much lower rates, the symptoms they experience tend to be different and much more somatic than those experienced by younger adults.

Treatment for Major Depression

According to the NDSUH, of the 21 million adults in 2020 who experienced a MDE in the past-year, 66% received treatment for depression in the past year (Substance Abuse and Mental Health Services Administration, 2021). However, self-reports of past service utilization generally underestimate the actual use of services (Petrou et al., 2002), so actual rates of service utilization may be higher.

Treatment for depression takes several forms and could include antidepressant medications, individual psychotherapy, group therapy, and/or other services in an inpatient, outpatient, or telehealth setting. Current guidelines from the American Psychological Association (2019) recommend that adults ages 18 to 60 experiencing depression should be offered psychotherapy or anti-depressant treatment for initial treatment. Both main categories of treatment for depression (anti-depressant pharmacotherapy and psychotherapy) are effective for most patients, reducing symptoms of depression and increasing wellbeing following treatment (Cuijpers et al., 2008; De Maat et al., 2006; Karyotaki, Smit, de Beurs, et al., 2016).

Specifically, anti-depressants improved symptoms within six to eight weeks in an extra 20% of people, compared to those who received a placebo (Institute for Quality and Efficiency in Health Care, 2020). This means that about 40-60% of people taking an antidepressant showed improvement in six to eight weeks, whereas about 20-40% of people who took a placebo improved in six to eight weeks (Institute for Quality and Efficiency in Health Care, 2020). The Sequenced Treatment Alternatives to Relieve Depression (STAR*D) study looked at the effects of antidepressant treatment in a more real-life setting, at both primary and specialty care sites, where patients could choose where they wanted to receive care (Gaynes et al., 2009). Roughly one in three patients who took just one anti-depressant for 12 to 14 weeks achieved remission, meaning they had no symptoms. If a first treatment with one anti-depressant failed, about one in

four people who switched to another medication improved. However, even after four different types of medication treatment and different strategies of increasing dosage, changing medications, or combining medications, about 30% of patients did not achieve remission with no symptoms (Gaynes et al., 2009). Despite many studies showing the clinical effectiveness of anti-depressants (Cuijpers et al., 2008; De Maat et al., 2006; Karyotaki, Smit, de Beurs, et al., 2016), an estimated 10-30% of patients receiving anti-depressant treatment do not reach full remission of symptoms (Baghai et al., 2011; Dodd et al., 2021; Gaynes et al., 2009).

Multiple types of psychotherapy, including cognitive behavioral therapy, behavioral activation, behavioral therapies, and others are all effective in treating depression (American Pyschological Association, 2019; Cuijpers et al., 2008). Seven types of psychotherapies for adult depression were found to have comparable benefits (Barth et al., 2013). One meta-analysis found that after 12-20 weeks of psychotherapy, depending on the individual study, 62% of patients no longer met criteria for MDD (Cuijpers et al., 2014). Other data show that 59% of patients assigned to counseling achieved symptom remission at two months compared with 45% of patients assigned to antidepressants (Menchetti et al., 2014). Results from psychotherapies are long-lasting, with patients still showing symptom reduction at six months and 12 months following treatment (Karyotaki, Smit, de Beurs, et al., 2016). Additionally, psychotherapy can be successfully combined with anti-depressant treatment. Patients who receive both types of treatment have better symptom reduction outcomes at 1-month, 6-months, and 12-months post-treatment than patients who received either treatment alone (Cuijpers et al., 2014; Karyotaki, Smit, Holdt Henningsen, et al., 2016).

Both anti-depressants and psychotherapies are effective treatments for most patients with depression. However, the results from psychotherapy seem to last longer (at least six to 12

months) after treatment ends, compared with higher rates of relapse after discontinuation of antidepressants (Cuijpers, 2013; De Maat et al., 2006; Karyotaki, Smit, de Beurs, et al., 2016; Karyotaki, Smit, Holdt Henningsen, et al., 2016). Specifically, relapse occurred in 57% of patients receiving pharmacotherapy, compared to in 27% of patients receiving psychotherapy (De Maat et al., 2006).

There is strong evidence about the effectiveness of various types of treatments for depression; however, there remains an unmet need for treatment in many individuals. The most recent NSDUH estimates that of adults in the United States with any mental illness, 30.5% perceived an unmet need for mental health services in the past year (Substance Abuse and Mental Health Services Administration, 2021). While the most recent NSDUH data looked at unmet need among adults with any mental illness, an older study used 2005 and 2006 NSDUH data to provide estimates specifically for adults with depression. Of the participants who reported an MDE in the past year, 31.9% reported an unmet need for treatment (Mojtabai, 2009). These numbers suggest that there remains a significant need for treatment in many people experiencing depression.

Comorbid Substance Use Disorders and the Need to Focus on Alcohol Use

Mental illness and substance use disorders often go together. The co-existence of both types of disorders is called co-occurring disorders or dual diagnosis. Based on the 2020 NSDUH, an estimated 6.7% of the US population had co-occurring disorders in the last year (Substance Abuse and Mental Health Services Administration, 2020) and 2.2 % of the population had both a serious mental illness and a substance use disorder (Substance Abuse and Mental Health Services Administration, 2021). Looking at combined NSDUH data from 2008 to 2014, Han and colleagues (2017) estimate that 3.3% of the U.S. population, or 7.7 million adults, had co-

occurring disorders in the previous year. Of individuals experiencing Major Depressive Disorder in their lifetime, approximately 18% had a substance use disorder at some point in their life (Quello et al., 2005).

However, these statistics combine all substance use, including marijuana, cocaine, opioids, methamphetamine, hallucinogens, and alcohol use, to name a few. Alcohol is the most commonly-used substance in the United States, with 2018 data showing that 66.3% of adults consumed alcohol in the past-year (Boersma, 2020). 2020 data from the NSUDH showed that 50% of people ages 12 and older had drank alcohol in the past month (Substance Abuse and Mental Health Services Administration, 2021). Because alcohol is legalized in the U.S. and drinking is normalized in most social settings, alcohol use is much more common than usage of other substances. There are different levels of alcohol use, ranging from none to moderate use to more concerning levels. Just because an individual consumes alcohol does not mean this usage is problematic or constitutes a disorder.

According to DSM-5 criteria, binge alcohol use is defined as drinking five or more drinks (for males) or four or more drinks (for females) on the same occasion on at least 1 day in the past 30 days (American Psychiatric Association, 2013). Men are almost twice as likely to report binge drinking as women (Wilsnack et al., 2018). There are different definitions of heavy alcohol use. The definition that NSUDH, and therefore this paper, uses is that heavy Alcohol Use is binge drinking on the same occasion on 5 or more days in the past 30 days (American Psychiatric Association, 2013). However, the National Institute on Alcohol Abuse and Alcoholism defines heavy alcohol use more strictly and by gender. For men, heavy alcohol use is defined as consuming more than 4 drinks on any day or more than 14 drinks per week (National Institute on Alcohol Abuse and Alcoholism, n.d.). For women, they define heavy alcohol use as consuming

more than 3 drinks on any day or more than 7 drinks per week (National Institute on Alcohol Abuse and Alcoholism, n.d.). Heavy alcohol use simply refers to the amount of alcohol consumed, whereas AUD is a clinical diagnosis based on symptoms, including the consequences of alcohol use.

Alcohol Use Disorder (AUD) is defined, similarly to other substance use disorders, according to the DSM-5 by the presence of at least two out of 11 symptoms (American Psychiatric Association, 2013). These symptoms include drinking more or longer than intended; wanting to cut down or stop drinking and not being able to more than once; spending a lot of time drinking and/or getting over after-effects; feeling a strong craving or urge to drink alcohol; developing a tolerance to alcohol so more is needed to have the same effect; and experiencing withdrawal symptoms. Other symptoms relate to the consequences of alcohol use including failing to fulfill obligations at work, school, or home; continuing to drink even when it is causing problems in various domains of life; cutting down on important activities to drink; continuing to drink even though it was causing depression, anxiety, or worsening another health problem; and getting into unsafe situations while or after drinking alcohol. Depending on the number of symptoms experienced, AUD can be classified as mild, moderate, or severe. It is possible for an individual to have a month with heavy alcohol use without experiencing at least two of the 11 symptoms needed to meet DSM-5 criteria for AUD. However, binge drinking and heavy alcohol use over time increase the risk of an AUD (Addolorato et al., 2018; National Institute on Alcohol Abuse and Alcoholism, 2020).

Based on 2020 data from the NSDUH, the most common substance use disorder in the United States was alcohol use disorder (Substance Abuse and Mental Health Services Administration, 2021). Among the estimated 40.3 million adults estimated to have a substance

use disorder, 28.3 million (70.22%) had an alcohol use disorder. Alcohol Use Disorder was more common in people aged 12 and older (10.2%) than illicit drug use disorders (6.6%) in 2020 (Substance Abuse and Mental Health Services Administration, 2021).

Studying the effects of substances, such as alcohol, individually can provide more detail about who is most at risk for substance use disorders. Despite commonalities in DSM-5 criteria for all types of substance use disorders, there are genetic and environmental factors that lead individuals to prefer one type of substance over others (Shmulewitz et al., 2015). Variations in ADH and ALDH, the genes which encode the primary enzymes which break down alcohol, affect risk for heavy alcohol use (Edenberg, 2007). Specifically, individuals of Chinese, Japanese, or Korean descent, who carry the ALDH2*2 allele and show an alcohol flush reaction are less likely to develop AUD (Edenberg, 2007; Peng et al., 2002). An individual's biological response to a substance, especially someone's response when they try alcohol for the first time, can influence future use and use disorders (de Wit & Phillips, 2012; Shmulewitz et al., 2015). Specifically, individuals who experience greater stimulating and rewarding effects from alcohol, such as liking the feeling and wanting more, and lower sedative effects, are more likely to develop AUD (King et al., 2014).

Sussman and colleagues (2011) propose a framework for "addiction specificity" whereby a combination of factors explain why one pattern of addictive behaviors is acquired. In addition to the biological factors discussed above, which Sussman (2011) describe as "Attraction" and "Expectation" factors, there are social and environmental factors that can explain choice of substance. Specifically, Sussman et al. (2011) highlight pragmatic factors, such as availability of supply, awareness of supply, acquisition skills, and means of exchange that can explain how individuals access certain substances. Sociodemographic characteristics are associated with

choice of substance. Data from the National Epidemiologic on Alcohol and Related Conditions found that individuals with only an alcohol-use disorder were more likely to be White, ages 30-64, and of higher socioeconomic status compared to groups with only an illicit substance use disorder or comorbid alcohol and other drug use disorders (Stinson et al., 2005). Similarly, participants in a community corrections program were more likely to identify alcohol as their drug of choice were more likely to be older, white, male, and have private health insurance (Clark et al., 2012).

Alcohol Use Across Age Groups

Alcohol use peaks for most people during young adulthood, a period of life often associated with partying and social drinking in college and other settings. A longitudinal study in England found that for both men and women average volume of alcohol consumption was highest at around 25 years (Britton et al., 2015). As individuals enter middle and later life, the quantity of alcohol consumed predictably decreases (Brennan et al., 2011).

As the United States population ages, there has been an increasing focus on substance use, specifically alcohol use in older adults. Older adults tend to prefer alcohol over other substances (Arndt et al., 2011; Chaput et al., 2011; Wang & Andrade, 2013) and many "career" users of other substances switch to alcohol and/or tranquilizers as they age (Levy & Anderson, 2009). In one study of psychiatric emergency service patients, 93% of older adults with a substance use disorder primarily used alcohol in contrast with 42% of adults aged 18-64 (Chaput et al., 2011). Additionally, older adults experience higher blood alcohol concentrations, higher levels of impairment, and more alcohol-related problems than young or middle-aged adults due to biological changes in body mass, body water content, and liver function (Kuerbis et al., 2014).

Many researchers document that substance use declines with age (Britton et al., 2015; Kerfoot et al., 2011; Moos et al., 1995; Prigerson et al., 2001). However, other research shows high rates of binge drinking, alcohol abuse, and substance use treatment among older adults (Arndt et al., 2011; Blazer & Wu, 2011; Cummings et al., 2013). Data combined from the 2005 to 2007 NSDUH shows that 11% of adults 50-64 (which would include many baby boomers) reported alcohol abuse, dependence, and/or subthreshold dependence (Blazer & Wu, 2011). Longitudinal data suggestion that drinking frequently, including every day, becomes more common in mid-life and older age, especially among men (Britton et al., 2015). However, abilities to document a prevalence of heavy alcohol use among older adults are hampered by issues of under-reporting, under-screening, and under-diagnosis.

There are significant issues of under-reporting and under-diagnosis of substance use problems, so much so that older adults with substance use problems have been referred to as a "hidden population" (Crome et al., 2011). Many providers believe that there is no need to assess for substance use, since they assume that people either "mature out" of their use or die from medical complications (Beynon et al., 2007; Crome et al., 2011). Additionally, there is the false attribution of consequences of substance use, such as falls or confusion to medical comorbidities (Blixen et al., 1997). Older adults rarely bring up alcohol use with providers of any type and in studies of drinking among older adults, few report having discussed their alcohol use with a provider or receiving treatment (Cummings et al., 2013). However, many long-time substance users continue using substances, even as they age, including taking actions to ensure they can continue to use (Levy & Anderson, 2009). One small study of older adults found that almost all of the older adults who had been drinking had been drinking for longer than 15 years (Blixen et al., 1997).

Given the large number of baby boomers aging, even a small proportion of older adults with heavy alcohol use, could mean many individuals at risk and in need of services (Wu & Blazer, 2011). In a review on concurrent mental illness and substance use in older adults, Searby and colleagues (2015) anticipate increasing demand for mental health and substance use services. Given the differences, especially between older adults and the rest of the adult population, it is important to study alcohol use by age group.

Comorbid Depression and Alcohol Use

Depression and alcohol problems are common comorbidities. Most of the research focuses on Alcohol Use Disorder; however, as noted above, binge drinking, and heavy alcohol use are alcohol problems that may not meet clinical criteria for AUD. A meta-analysis on the relationship between depression and alcohol use disorders concluded that the presence of either disorder doubles the risk of the other disorder (Boden & Fergusson, 2011). Both current and lifetime alcohol problems are more common in patients with depression than in the general population (Sullivan et al., 2005). Among individuals with Major Depressive Disorder, 16.5% have an Alcohol Use Disorder (Quello et al., 2005). Among people with an alcohol use disorder, major depressive disorder is the most common psychiatric comorbidity (Grant et al., 2004). Individuals diagnosed with Alcohol Use Disorder are 2.3 times more likely to have major depressive disorder in the past year (Grant et al., 2004). More severe depressive symptoms are associated with an increased risk for alcohol use compared to individuals with less severe depressive symptoms (Rudenstine et al., 2020).

These comorbidities seem to be more pronounced in men. In 2015-2018 NSDUH data of individuals who screened positive for depression, men had disproportionate odds of suicidality

and alcohol use disorder comorbidities, and binge drinking and active suicidal ideation than women (Kelly et al., 2021).

There is a need to further examine the comorbid relationship between depression and heavy alcohol use by age. Indeed, Pedrelli and colleagues (2016) summarized the literature on young adults and conclude that there are inconsistent findings about the relationship between MDD and heavy alcohol use in young adults. In older adults, depression and heavy alcohol use are common concurrent disorders (Kuerbis et al., 2014; Searby et al., 2015).

The severity and outcomes of depression and alcohol problems can vary depending on the patient and other factors. Some research has linked comorbid depression and alcohol problems with worse outcomes. Specifically, a 2005 systematic review found that alcohol problems in patients with depression was associated with a range of worse outcomes, including increased risk of relapse for depression, decreased likelihood of recovery from depression, increased risk of suicide, and worsened social functioning (Sullivan et al., 2005). Other research has found that binge drinking can worsen psychiatric problems, including depression and anxiety. Among outpatient psychiatry patients, binge drinking was associated with worse depression and anxiety symptoms while reductions in binge drinking improved symptoms (Bahorik et al., 2016). For those seeking treatment, there is some evidence that comorbid depression and alcohol problems can hurt recovery (Boschloo, Vogelzangs, et al., 2012; Burns et al., 2005). In a prospective study of patients entering alcohol treatment, patients with comorbid depression or anxiety disorders had greater functional impairment and drank more heavily than patients without comorbidities both at the beginning of treatment and after three months of treatment (Burns et al., 2005). Some research shows that both depression and problematic alcohol use act together to worsen symptoms and recovery for patients.

However, there are also results in the literature which fail to demonstrate an association between comorbid alcohol use disorder and depression and poorer outcomes. Sullivan and colleagues (2005) conclude that alcohol problems are associated with an increased risk of relapse for depression and a decreased likelihood of recovery from depression. However, only two out of the six studies they looked at found evidence that alcohol problems were associated with more hospital readmissions for depression (Cook et al., 1991) and decreased likelihood of recovery from depression over 10 years (Mueller et al., 1994). Three studies Sullivan and colleagues (2005) cite show no association between alcohol problems and relapse or recurrent episodes of depression (Hirschfeld et al., 1989; Labbate & Doyle, 1997; Melartin et al., 2002). All these papers cited are dated and rely only on observational study designs. In a more recent review, McHugh & Weiss (2019) describe the prognosis of co-occurring AUD and depression to be highly variable.

Pathways leading to Comorbidity of Depression and Heavy Alcohol Use

The pathways leading to comorbidity of depression and heavy alcohol use are complex and not completely understood (Boschloo, van den Brink, et al., 2012; McHugh & Weiss, 2019). Depression and heavy alcohol use may share common risk factors, depression may lead to heavy alcohol use, and/or heavy alcohol use may place a person at risk for depression.

Shared genetic and environmental risk factors may independently cause the onset of alcohol problems and depressive disorders (Kendler et al., 1993; Kuo et al., 2006; Langbehn et al., 2006; Lyons et al., 2006; Prescott et al., 2000). More recent work provides some evidence that AUD and depression share some genetic susceptibility (Andersen et al., 2017; Zhou et al., 2017). However even after controlling for shared risk factors, there is still an association between depression and alcohol use (Fergusson et al., 2009; Kendler et al., 1993; Kuo et al., 2006; Lyons

et al., 2006; Prescott et al., 2000). Therefore, depression and alcohol use appear to be related in a causal way or share common causes (Boden & Fergusson, 2011; Fergusson et al., 2009).

One hypothesis, which is more strongly supported by the literature, is that alcohol use disorder is a risk factor for depression (Boden & Fergusson, 2011; Falk et al., 2008). Alcohol use disorder severity, based on number of DSM-IV symptoms endorsed, predicted first incident depressive disorders over a three-year follow-up period (Boschloo, van den Brink, et al., 2012). A large prospective study in Canada found that frequent heavy alcohol use may be a causal factor for major depression in women (Wang & Patten, 2002). Other prospective studies found that heavy drinking (Pedrelli et al., 2016), AUDs (Pedrelli et al., 2016; Rohde et al., 2001), and alcohol dependence (Marmorstein et al., 2010) in adolescence predicted the presence of major depressive disorder in young adulthood. Binge drinking was associated with slower improvement of depression and anxiety symptoms, while reduction in binge drinking was associated with improvements in psychiatry symptoms (Bahorik et al., 2016). In a large study of former alcohol users, prior alcohol dependence increased the risk of current major depressive disorder by more than 4 times (Hasin & Grant, 2002). While most of these studies focused on AUD, binge drinking and specifically the frequency of hangovers, has been linked to depressive symptoms (Paljarvi et al., 2009).

There are several mechanisms that have been proposed to explain the causal link between AUD and depression (Boden & Fergusson, 2011; Fergusson et al., 2009). One possible explanation is that since AUD causes problems in an individual's family, social, economic, employment, and/or legal situation, these difficulties could be the link to depression (Boden & Fergusson, 2011). However, the link between AUD and depression persists, even in studies that have controlled for these life circumstance variables (Fergusson et al., 2009; Paljarvi et al., 2009;

Sihvola et al., 2008). Alcohol intoxication or withdrawal may cause acute, substance-induced depressive symptoms (Fergusson et al., 2009; Schuckit et al., 1997). Alcohol use and depression may be linked via genetic factors which impact neurotransmitter functioning (Boden & Fergusson, 2011; Fergusson et al., 2009; Langbehn et al., 2006; Luo et al., 2005; Wang et al., 2004). Another possible mechanism is that alcohol use may trigger metabolic changes, including circadian rhythms, which can increase risk for depression (McEachin et al., 2008; Sjoholm et al., 2010). Regardless of the mechanism, there is significant evidence linking alcohol use as a risk factor for depression.

The contrasting causal hypothesis, which is less supported by the literature, is that depression tends to come before alcohol use. Data from the National Epidemiologic Survey on Alcohol and Related Conditions suggest that a large majority of mood and anxiety disorders that occur in the context of substance use are not substance induced (Grant et al., 2004). Numerous older studies support this self-medication hypothesis and have found that depression precedes alcohol use (Abraham & Fava, 1999; Grant & Harford, 1995; Wang & Patten, 2001). This hypothesis explains several prospective studies that have failed to find a link between alcohol use and depression. The National Epidemiologic Survey on Alcohol and Related Conditions, a large prospective study in the U.S. (Grant et al., 2009), a large incident survey in the Netherlands (De Graaf et al., 2002), and an 18-month Psychiatric Comorbidity study from the U.K. (Haynes et al., 2005) failed to find alcohol use disorder as a predictor of first incident depression. History of alcohol use disorder was not a significant predictor of incident major depressive disorder in mid-life women (Bromberger et al., 2009). The proposed mechanism is based on the self-medication hypothesis that individuals with a diagnosis of depression turn to alcohol and/or other substances as a coping mechanism (Holahan et al., 2003). Holahan and colleagues (2003) propose that

drinking specifically to cope explained the relationship between depressive symptoms and overall drinking behavior. This relationship appears to be gender-specific: females with AUD were more likely to drink in negative emotional situations than males with AUD (Karpyak et al., 2016). Based on this hypothesis, proper treatment of depression, including individuals developing healthy coping mechanisms, can help prevent problematic drinking (Wang & Patten, 2001).

In conclusion, depression and heavy alcohol use are common comorbidities. While the relationship between the two conditions is highly complex and depends on both individual and systematic factors, the current literature supports the idea that alcohol use disorders tend to precede, and therefore be a risk factor for, depression.

Treatment for Comorbid Depression and Heavy Alcohol Use

Despite the prevalence of heavy alcohol use, treatment for alcohol use is rare. Based on estimates from two national surveys (both the National Survey on Drug Use and Health and the National Epidemiologic Survey on Alcohol and Related Conditions), fewer than one in nine individuals with an AUD perceived a need for treatment (Edlund et al., 2009).

For individuals with comorbid depression and heavy alcohol use, the standard of care is integrated treatment, where the same provider or treatment team addresses both problems together, regardless of whether they enter mental health or alcohol use treatment first (Drake et al., 1998; Yule & Kelly, 2019). Often, integrated care means both mental health and substance use treatment are located at the same physical location and providers work together. However, in practice, integrated care is rare. Data from the 2019 NSDUH show that among those adults with co-occurring substance use and mental health disorders, 48.6% received either mental health or substance use disorder treatment, but only 7.8% received both substance use services at a

specialty facility and mental health services (Substance Abuse and Mental Health Services Administration, 2020).

Several studies indicate that patients with comorbid mental illness and substance use disorders have greater unmet needs for treatment that patients with either disorder alone (Chen, Crum, et al., 2013; Manuel et al., 2018; Sareen et al., 2007; Urbanoski et al., 2007). One national estimate, although dated, found that over 70% of the U.S. adult population with co-occurring mental health and substance use disorders did not receive any treatment at all (Watkins et al., 2001). More recent numbers from the 2019 NSDUH show that 51.4% of adults with co-occurring disorders did not receive any treatment in the last year (Substance Abuse and Mental Health Services Administration, 2020). In the work of Chen and colleagues (2013), which combined NSUDH data from 2005-2010, of individuals who experienced a major depressive episode and had alcohol dependence comorbidity, 43% perceived a need for, but did not receive mental health care. Of those with comorbidities who do receive treatment, mental health treatment is more common than substance use treatment (Watkins et al., 2001). Only 8% of individuals with AUDs reported past-year AUD treatment (Edlund et al., 2012). Among individuals with an AUD, receiving psychiatric treatment was more common than receiving treatment for the AUD (Edlund et al., 2012).

Most results from the literature show that psychiatric comorbidity with substance use is associated with greater likelihood of getting treatment for either disorder (Chen, Crum, et al., 2013; Harris & Edlund, 2005; Kerfoot et al., 2011; Mojtabai et al., 2014; Prigerson et al., 2001; Urbanoski et al., 2007). This could be because use of mental health services can lead to substance use services through referral and/or that individuals who use substance use disorder treatments are more aware of mood symptoms (Chen, Crum, et al., 2013). However, other

studies have found that co-occurring substance disorders was not associated with increased

mental health treatment (Harris & Edlund, 2005). The studies that do exist have often combined

alcohol use with the use of other substances and/or have not clearly differentiated between

substance use and substance dependence. Past studies have also combined mental health service

usage with substance use service usage.

There is a mismatch between the prevalence of heavy drinking and rates of treatment,

based on age. Young adults ages 18 to 25 show higher past month binge drinking (31.4%)

compared to adults over 25 (22.9%) (Substance Abuse and Mental Health Services

Administration, 2021). Young adults ages 18 to 25 also have the highest reported prevalence of

depressive symptoms over the past two weeks (Villarroel & Terlizzi, 2020). However, young

adults with a past-year MDE were less likely to receive treatment for depression than older

adults (Substance Abuse and Mental Health Services Administration, 2021). While 75.3% of

adults 50 or older with a past-year MDE received treatment for depression, only 57.6% of young

adults (ages 18 to 25) received treatment for depression (Substance Abuse and Mental Health

Services Administration, 2021). This discrepancy may partially be because younger adults had

less positive help-seeking attitudes and less positive treatment beliefs about the effectiveness of

mental health treatments, compared to a sample of older baby boomers (Mackenzie et al., 2008)

There is a lack of information about how the relationship between heavy alcohol use and

mental health treatment differs by age. Previous research has looked at all adults (Chen, Crum, et

al., 2013), young adults (Smith et al., 2017), older adults (Fairman & Early, 2020), and adults

older than 26 years old (Choi et al., 2014). Choi et al. (2015) compared baby boomers (ages 50-

64) with those greater than 65. Other papers have conducted age-group comparisons, but have

created age-groups at arbitrary cut-points: Edlund et al. (2012) had three age groups, one of

which lumped everyone over age 35 together. There is a need to examine this relationship in more detail comparing across age groups.

Research Question

Previous research has shown a consistent relationship between comorbid mental health and substance use and increased rates of treatment. However, past studies have not focused on alcohol use specifically and have not clearly defined alcohol usage vs alcohol use disorder vs alcohol dependence. Past studies have also combined mental health service usage with substance use service usage; however, usage of mental health services is much more common among those with co-occurring disorders. Therefore, this study looks to clarify the relationship between heavy alcohol use and mental health treatment among individuals who have experienced an MDE in the last year. Specifically, among individuals who have experienced an MDE in the past year, what is the relationship between heavy alcohol use and mental health treatment utilization? Does this relationship differ based on age group? This quantitative study uses logistic regression on data from the National Survey on Drug Use and Health (NSDUH).

Theoretical framework

The relationship among mental health, substance use, and receiving mental health treatment is complex. Therefore, using a theoretical framework can help better guide quantitative data analysis and inform which variables should be included in modeling. Andersen's Healthcare Utilization Model (1995) can be applied to predict and explain use of the mental health services. There are three key constructs which are used to predict or explain an individual's health behavior: predisposing characteristics, enabling factors, and perceived need for healthcare.

Predisposing characteristics include factors like gender, race, age, and education (Babitsch et al., 2012). Consistent with the higher prevalence of depression in females in general (Hasin et al.,

2005), females with AUD were more likely to have comorbid depression than males (Karpyak et al., 2016). There are conflicting results on whether there appear to be gender differences in treatment too. Chen and colleagues (2013) report no gender differences in mental health treatment for individuals with a comorbid major depressive episode and substance use disorder. However, Manuel and colleagues (2018) found that women with co-occurring mental health and substance use disorders reporting more treatment than men. Additionally, there appear to be gender differences in types of services received and providers accessed, with women being more likely to consult only a primary care provider for depression treatment (Gagné et al., 2014) and men with comorbid mental health and substance use disorders being more likely to use emergency room visits and inpatient services than women (Chen, Strain, et al., 2013).

Unmet need for mental health treatment is greater in Black, Hispanic/Latino, and Asian populations compared to non-Latino Whites (Alegría et al., 2008; Wang et al., 2005). Nam and colleagues (2017) studied the impact of race and ethnicity on treatment for comorbid mental health and substance use disorders. Black and Latino individuals were less likely to receive contemporaneous treatment for both mental health and substance use (Nam et al., 2017; Ojeda & McGuire, 2006). It is not predisposing factors alone, such as race or ethnicity, which lead to these disparities in treatment outcomes, but their intersection with enabling factors, including societal experiences of discrimination. For example, Ojeda and McGuire (2006) found that Black and Latino individuals were less likely to receive treatment than Whites and were more influenced by financial and social barriers, including distrust of medical providers and fear of adverse consequences due to treatment.

Additionally, as discussed earlier, age is an important variable that affects heavy alcohol use, depressive symptoms, and mental health treatment. Lastly, education is associated with

treatment-seeking behavior for depression. A review of studies using Andersen's model for healthcare utilization found six studies supporting a relationship between higher levels of education and greater healthcare utilization in general (Babitsch et al., 2012). In a systematic review of factors associated with help seeking for major depression, more years of education and a higher degree was associated with more help-seeking behavior for depression (Katz et al., 1998; Magaard et al., 2017).

Enabling factors act at both the individual and community levels and include factors such as available and accessible health services, access to health insurance, income, reliable transportation, social relationships, and having a regular source of care (Babitsch et al., 2012). Specifically, having health insurance is a strong correlate of mental health treatment use (Walker et al., 2015). However, compared to participants who had experienced a major depressive episode but had no substance dependence comorbidity, those with alcohol dependence comorbidity were less likely to report lack of insurance as a barrier (Chen, Crum, et al., 2013). Of adults who had a mental illness and perceived an unmet need for services, the most common reason for not receiving services was they could not afford the cost of care (44.9 %) (Substance Abuse and Mental Health Services Administration, 2021). Individuals with higher family incomes relative to the federal poverty threshold are more likely to have the financial resources to pay for mental health treatment. The second most common reason for not receiving services was not knowing where to go for services, also a type of enabling factor (Substance Abuse and Mental Health Services Administration, 2021). These reasons for not seeking treatment did not differ significantly based on whether participants had an alcohol use comorbidity, substance use comorbidity, or only depression (Chen, Crum, et al., 2013).

Social connection is an important enabling factor. Past research has found an association between increased social support and increased access of mental health services (Andersson et al., 2013; Frojd et al., 2007; McCracken et al., 2006). However, there is also research to the contrary. Tate and colleagues (2011) compared two types of group therapy for substance use and found that participants with low social support attended more sessions than those with high social support. Graham and colleagues (2017) found that weak social connections at home and weak social relationships were associated with increased mental health need and increased mental health service use.

Marital status is another type of social support, which could also be considered a predisposing factor within Andersen's model (Babitsch et al., 2012). Compared to those who are single, widowed, separated, or divorced, married people have lower rates of depression (Bebbington, 1987; Bulloch et al., 2009; Bulloch et al., 2017; Jang et al., 2009; LaPierre, 2009). Marital status is associated with use of healthcare services in general (Babitsch et al., 2012). Married couples might support each other to seek treatment if one partner does experience depression. Once in treatment, married people have better prognoses and fewer depressive symptoms than patients who were single or previously married (Buckman et al., 2021).

Perceived need for healthcare includes the symptom severity that accounts for seeking services and, more importantly, the social component of how people view their health and how they perceive their symptoms. Increased severity of depressive symptoms was a significant predictor of mental health service use (McCracken et al., 2006) and increased severity of AUD was associated with an increased likelihood of receiving treatment for AUD (Edlund et al., 2012). However, not recognizing an alcohol problem is a hallmark of alcohol use disorder and only one in ten patients with an AUD perceives a need for treatment (Edlund et al., 2009). Of

adults who reported any mental illness and endorsed a perceived unmet need for mental health treatment, 29.7% of participants said they did not receive treatment because they believed they could handle the problem on their own (Substance Abuse and Mental Health Services Administration, 2021). Additionally, individuals who had experienced an acute health event in the three months before treatment attended 20% more group substance use treatment sessions (Tate et al., 2011). This result concurs with previous research that individuals have greater motivation to change their drinking after more severe injuries (Barnett et al., 2002). Perceived need for treatment seems to be the strongest predictor of receiving treatment for depressed Australian adults (Graham et al., 2017), older adults (Choi et al., 2013), adolescents (Frojd et al., 2007), and primary care patients (Herrman et al., 2002).

Additionally, an individual's physical health can influence mental health symptom severity and perceived need for treatment. Many symptoms of depression and heavy alcohol use can be physical in nature, such as fatigue, problems with sleeping, problems with eating, and alcohol withdrawal (American Psychiatric Association, 2013). Additionally, depression is often associated with other medical comorbidities (Walker & Druss, 2018). Physical health has been linked to intensity of mental health care treatment utilization (Lindsay Nour et al., 2009).

Limited past research exists specifically tying Andersen's behavioral model to mental health treatment. The research that does exist applies Andersen's model to all mental health treatment (Dhingra et al., 2010), treatment for depression (Carragher et al., 2010; Choi et al., 2013; Cook et al., 2014; Gagné et al., 2014; Graham et al., 2017), and treatment for AUD (Edlund et al., 2012). Two studies focused on comorbid depression and substance use disorders (Nam et al., 2017; Tate et al., 2011), however Tate and colleagues (2011) focused on substance use treatment, rather than mental health treatment. While there are similarities between many

types of mental health treatments, and the group substance use treatments examined by Tate and colleagues (2011), there are could be important differences between the two types of treatment, especially in terms of individuals' perceived need for treatment.

In the context of individuals who have experienced a major depressive episode in the past year, heavy alcohol use can be considered a predisposing factor. While some research suggests that psychiatric comorbidity with substance use is associated with greater likelihood of getting substance use treatment (Chen, Crum, et al., 2013; Harris & Edlund, 2005; Mojtabai et al., 2014), this study will investigate the impacts of heavy alcohol use on mental health treatment.

Chapter III: Methodology

Sample

The National Survey on Drug Use and Health (NSDUH) is conducted annually to provide nationally representative estimates of illicit drug, alcohol, and tobacco usage and mental health in the U.S. civilian, noninstitutionalized population ages 12 and older (Substance Abuse and Mental Health Services Administration, 2020). The survey excludes individuals with no fixed address, military personnel on active duty, and residents of institutions like jails, nursing homes, mental institutions, and long-term care hospitals. The survey uses a stratified multistage area probability sample, which is designed to be representative of the United States as a whole and each of the 50 states and the District of Columbia.

Data are collected in-person at an individual's dwelling. First, the interviewer completes a screening with an adult resident of the sampled household to determine the number of eligible participants in the house. Once interviewer inputs a list of the eligible residents at the household, the computer selects the people to be interviewed based on parameters specified for that area segment and a random number specified for that address. Next, the interview is conducted via audio computer-assisted self-interviewing and computer-assisted personal interviewing. There was an overall response rate of 45.8% for people ages 12 and older (Substance Abuse and Mental Health Services Administration, 2020). Data collected for 2019 is based on 67,625 completed interviews.

Even though 2020 data are currently available, the methodology of the NSDUH changed significantly. In Quarter 1 of 2020, data were collected in-person, as described. Due to the COVID-19 pandemic, data collection was paused during Quarters 2 and 3 and when it resumed in Quarter 4, data collection was conducted primarily via the web. Because of these differences in data collection procedures, it does not make sense to combine data from Quarters 1 and 4 of

2020 and the publicly available 2020 data set does not permit the separation of data by quarter. Therefore, 2019 data was used, as the most recent full year of data available.

We restricted our sample to adult participants aged 18 to 64 (n=38,332) who met the criteria for a major depressive episode within the last year (n=4335). We excluded adolescents (ages 12-17) because NSDUH assessed major depressive episodes, mental health service use, and substance use service use with different questions for adults compared to adolescents.

Older adults aged 65 and older were also excluded from the sample, since they are a distinct population from other age groups and due to issues of sparse cell counts. Adults 65 and older, who receive Medicare at age 65 in the United States, may not face the same barriers as younger adults in seeking mental health treatment. Specifically, adults 65 and older were less likely than younger adults to report cost and stigma/confidentiality barriers to mental health treatment (Choi et al., 2014). Additionally, the 65 and older group appeared distinct in terms of treatment use, perceived need and barriers to mental health and substance use treatment, while the 50-65 age group was more like younger adults (Choi et al., 2014). Speer (1990) identified numerous issues in comparing comorbid mental health and substance use disorders in adults 65 and older compared to the general adult population including differences in substances consumed, polysubstance use, and isolation and antisocial behavior. Older adults with mental disorders have significantly more medical comorbidities, including cognitive impairments, than adults of other ages, which also posits them as a conceptually distinct group to seek and receive mental health treatment (Chapman & Perry, 2008; Speer, 1990).

Further, heavy alcohol use was rare in older adults aged 65 and older in the NSDUH. In the sample of adults over 18 who had experienced a major depressive episode in the past year, there were only five adults 65 or older who also reported heavy alcohol use (one of whom

received mental health treatment). Research by Choi and colleagues (2015) and others (Fairman

& Early, 2020) has specifically focused on understanding mental health and substance use

comorbidities in older adults, using data sets with stronger representation of older adults.

Measures

Major depressive episode was a binary variable assessed using questions based on DSM-5

criteria. Respondents were asked if they had at least one period of 2 weeks or longer in the past

year when for most of the day nearly every day, they felt depressed, or lost interest or pleasure in

daily activities; and they also had problems with sleeping, eating, energy, concentration, self-

worth, or having recurrent thoughts of death or recurrent suicidal ideation (Substance Abuse and

Mental Health Services Administration, 2020). According to DSM-5 criteria, respondents must

endorse at least five out of the nine symptoms to meet criteria for a major depressive episode.

Heavy alcohol use was assessed using questions based on DSM-5 criteria for binge drinking and

heavy alcohol use. Binge drinking is defined as five or more drinks on one occasion on the same

day for men and four or more drinks on one occasion for women. Heavy alcohol use was a

dichotomous variable, defined by 5 or more days of binge drinking in the past 30 days.

Mental health treatment was assessed by asking participants who had experienced a major

depressive episode in the past year whether they received any mental health treatment in the past

12 months (outpatient, inpatient or medication treatment for mental health reasons). Outpatient

care settings included outpatient mental health clinic, the office of a private therapist, a non-

clinic doctor's office, a medical clinic, and a partial day hospital or day treatment program.

Sociodemographic variables included:

- Gender (female, male)

- age group (18-25, 26-34, 35-49, and 50-64)

- racial or ethnic group (non-Hispanic White, non-Hispanic Black/African American, non-Hispanic Native American/Alaska Native, non-Hispanic native Hawaiian/other Pacific Islander, non-Hispanic Asian, non-Hispanic more than one race, and Hispanic)

- marital status (married, widowed, divorced, or separated, and never been married)

- highest level of education (less than high school, high school graduate, some college/associate degree, college graduate)

- household income relative to U.S. Census Bureau poverty thresholds (family income less than the federal poverty threshold, income up to two times the federal poverty threshold, and income more than two times the federal poverty threshold). The federal poverty threshold individual is based an individual's age, family size, the number of children in the household, and total family income. Since NSDUH only collects family income as a range of values the midpoint of each range was assigned as the effective family income for each level of income.

- insurance status (Yes or No answering the question "was there a time in the past year when the respondent did not have any kind of health insurance or coverage?")

- self-rated overall health (excellent, very good, good, fair/poor)

Data analysis

First, univariate summary statistics and Pearson chi-squared tests were conducted for the entire analytic sample to understand the demographic characteristics of the population, and frequencies of heavy alcohol use and mental health treatment. Next, bivariate analyses were conducted using Chi-Square Tests and logistic regression to look at the differences between those who received mental health treatment and those who did not in the past year. A crude, unadjusted odds ratio was calculated. A bivariate analysis was conducted to compare young

adults ages 18-25 and adults older than 25 years old. Chi-Square Tests and logistic regressions were run to compare the demographics of the two groups and if the effects of heavy alcohol use on mental health treatment varied.

Finally, a multivariable logistic regression was run adjusting the bivariate model for demographic variables. Based on the literature review and theoretical framework, sociodemographic variables were considered potential confounders or effect modifiers (in the case of age) since they influenced both heavy alcohol use and mental health treatment. Therefore, these demographic variables were controlled for in the final model. The model was run overall, then stratified by age-subgroups (those 18-25 and those over 25 years old), and then with an interaction term (mental health interaction by age group).

Because of the complex survey design of the NSDUH, all analyses were adjusted for sampling weights, clustering, and stratification of the data. Data analysis was conducted in SAS 9.4. Significance level was 5%.

At each step, cell counts were sufficient to run logistic regression. Cases with missing data were excluded. Due to missing data on covariates, 3.2% of the cases from the crude model were excluded from the adjusted model. Specifically, data was missing on mental health treatment in the past year for 0.18% of the sample; 0.90% of the sample was missing data on insurance status; 2.10% of the sample was missing data for household income relative to U.S. Census Bureau poverty thresholds, 0.02% of the sample was missing data for overall health. Data was complete for heavy alcohol use, age category, gender, marital status, race and ethnicity, and highest level of education variables. No adjustments were made for missing data.

Chapter IV: Results

Demographic Characteristics

  A total of 4335 out of 38,332 adult NSDUH participants aged 18 to 64 years old met criteria for a major depressive episode in the last year. Among them, 63.26% were female and 68.36% identified as Non-Hispanic White. The NSDUH public use file does not report exact age, only age by category. As shown in Table 1, 28.83% of the sample was 18 to 25 years old, 24.36% was 25 to 34 years old, 26.22% was 35 to 49 years old, and 20.58% was 50 to 64 years old. Young adults aged 18-25 are overrepresented in this sample (28.83%) compared to the 15.02% of the population aged 18-24 out of the general population ages 18-64 in 2019 (U.S. Census Bureau, 2020). Other demographic characteristics are shown in Table 1. The percentage of the sample having completed a college degree was 28.69%, which is lower than in the overall U.S. population; however, the sample overrepresented young adults aged 18-25 who may be in the process of completing a degree.

  Among study participants, 58.34% received any type of mental health treatment; 41.13% reported an unmet need for mental treatment. The most common reasons for not receiving treatment were not being able to afford the cost, thinking they could handle the problem without treatment, and not knowing where to go. An estimated 34.19% of adults experiencing a MDE in the past year reported binge alcohol use in the past month, compared to 29.90% of all adults ages 18 to 64. Of those who reported binge drinking, they engaged in binge drinking an average of 2.63 days in the past month. Heavy alcohol use, or five or more days of binge drinking in the past month, was reported by 9.73% of all participants in the sample. Among those participants who reported heavy alcohol use in addition to depression, 53.15% received mental health treatment.

Bivariate Results: Those who did receive mental health treatment vs those who did not

Bivariate analyses show that women had significantly greater odds of receiving treatment (OR=1.71, 95% CI 1.41-2.08) than men. Compared to Non-Hispanic Whites, Non-Hispanic Black or African American adults had significantly lower odds of receiving treatment. (OR=0.42, 95% CI 0.32-0.56). Non-Hispanic Asian adults had significantly lower odds of receiving treatment as well (OR=0.49, 95% CI 0.29-0.84). Hispanic adults also had significantly lower odds of receiving mental health treatment (OR=0.49, 95% CI 0.37-0.64) compared to Non-Hispanic Whites. Compared to Non-Hispanic Whites, Native Hawaiian and other Pacific Islanders had significantly lower odds of treatment (OR=0.03, 95% CI 0.004, 0.18). Compared to young adults ages 18-25, all other age groups had significantly higher odds of receiving treatment: 26 to 34 years old (OR=1.5, 95% CI 1.25-1.80); adults 35-49 years old (OR=2.2, 95% CI 1.82-2.71); and adults ages 50-64 (OR=2.30, 95% CI 1.78-2.96).

Adults with less than a high school education had significantly lower odds of receiving mental health treatment (OR=0.64, 95% CI 0.48-0.85), compared to college graduates. Similarly, high school graduates (OR=0.56, 95% CI 0.45-0.70) and adults who completed some college or an associate degree (OR=0.64, 0.53-0.77) had significantly lower odds of receiving mental health treatment than college graduates. Adults with health insurance during the past 12 months had significantly greater odds of receiving mental health treatment (OR=1.85, 95% CI 1.47-2.33) compared to those without health insurance. Adults reporting that their overall health was fair or poor had significantly almost twice the odds of receiving mental health treatment compared to those with excellent overall health (OR=2.08, 95% CI 1.43-3.03). Surprisingly, there were no significant differences in receipt of mental health treatment based on income level as a percentage of the Federal Poverty Threshold.

Interaction Analyses

In the crude, unadjusted logistic regression model, there was a significant interaction between receiving mental health treatment in the past year and age category. Specifically, we found significant results for those aged 50-64. Adults ages 50-64 reporting heavy alcohol use had 0.24 times the odds of receiving mental health treatment in the past year compared to adults 50-64 who did not report heavy alcohol use (95% CI 0.09, 0.65). In other words, adults 50-64 with no heavy alcohol use had 4.2 times the odds of receiving mental health treatment than those with heavy alcohol use. Results for the other age groups were not statistically significant, with wide confidence intervals. Table 2 presents strata-specific results, by age category for the crude and adjusted models.

In the multivariable logistic regression model, adjusted for sociodemographic variables, including gender, age category, racial and ethnic group, marital status, highest level of education, household income relative to the U.S. Census Bureau poverty threshold, insurance status, and self-rated overall health, very similar results were found. Specifically, adults ages 50-64 reporting heavy alcohol use had 0.25 times the odds of receiving mental health treatment in the past year compared to adults 50-64 who did not report heavy alcohol use (95% CI 0.10, 0.60). This means that adults ages 50-64 with no heavy alcohol use had 4.0 times the odds of receiving mental health treatment than those reporting heavy alcohol use.

Chapter V: Discussion

The current study examined the relationship between heavy alcohol use and mental health treatment among adults aged 18-64 who have experienced an MDE in the last year, by age group. Young adults ages 18-25 were overrepresented in this sample of adults experiencing depression compared to the general population, supporting previous research that young adults are the most likely to have experienced depressive symptoms in the last two weeks (Villarroel & Terlizzi, 2020). Around 60% of the sample of adults 18-64 who experienced a depressive episode in the last year received treatment, which is similar to previous results, showing a significant unmet need for mental health treatment (Mojtabai, 2009; Substance Abuse and Mental Health Services Administration, 2021), with cost as a principal barrier.

Results showed that adults experiencing depression in the last year were more likely to report binge drinking than adults who did not experience depression. These results support research by Sullivan (2005) and Quello (2005) that lifetime alcohol problems are more common in those people experiencing depression. However, because the NSDUH is a cross-sectional survey, the observed association does not provide information about the timing of when the major depressive episode occurred relative to binge drinking and heavy alcohol use in the last month.

Individuals with both heavy alcohol use and depression were even less likely to receive treatment than those with only depression. These results support previous research documenting low treatment utilization among those with comorbid mental health and substance use disorders (Chen, Crum, et al., 2013; Harris & Edlund, 2005; Manuel et al., 2018; Sareen et al., 2007; Urbanoski et al., 2007; Watkins et al., 2001).

This study found that the relationship between heavy alcohol use and mental health treatment among those experiencing depression differs by age, even after controlling for

predisposing and enabling factors including gender, race/ethnicity, marital status, highest level of education, income relative to the Federal Poverty Threshold, and overall health. Specifically, adults aged 50-64 who had experienced a major depressive episode in the last year who did not report heavy alcohol use had over 4 times the odds of receiving mental health treatment than those who did report heavy alcohol use. The population of adults ages 50-64 in the 2019 NSDUH sample includes those born between 1955 and 1969, which includes the later end of baby boomers, those born between 1946 and 1964. While baby boomers in general have reported more positive attitudes toward seeking help for mental health than older generations (Mackenzie et al., 2008), they have also had higher lifetime rates of substance use than previous generations and more permissive attitude toward alcohol with alcohol use (Babatunde et al., 2014; Blow & Barry, 2012; B. H. Han et al., 2017; Wu & Blazer, 2011).

One possible explanation for our results is that adults ages 50-64 who report heavy alcohol use in the last month have had a strong history of alcohol use throughout their lifetime and do not recognize it as a problem, are reluctant to make a change, or have tried in the past to change their drinking and have been unsuccessful. This hypothesis is supported by research documenting the chronic course of alcohol problems among older adults whose heavy alcohol use started earlier in their lives, called early-onset alcoholism in the elderly, as coined by Liberto and Oslin (1995). In a 25-year cohort study of White men and their alcohol use, 63.6% of those men who developed an alcohol use disorder during the study continued to have a chronic alcohol use disorder over the 25-year follow-up (Schuckit & Smith, 2011). From that same cohort study, of those who had previously met criteria for an alcohol use disorder between ages 20 and 50, 74% of adults ages 50-55 reported continued heavy alcohol use or still met criteria for alcohol use disorder (Goncalves et al., 2017). Among community-dwelling older adults who reported

both mental health and substance use disorders, the majority had at least a 15-year history of drinking (Blixen et al., 1997). Additionally, Levy and Anderson (2009) have documented that individuals with a "career" of substance use, continue to use substances, even as they age, and modify their behaviors to keep drinking. Indeed, lack of insight into psychological or drinking problems and beliefs that they can handle these problems alone are common individual-level barriers to mental health services (Borok et al., 2013; Byers et al., 2012; Mackenzie et al., 2010). Therefore, it is possible that adults with a lifetime of frequent and heavy alcohol use are not ready to change this behavior or have tried in the past to change but have been unsuccessful. However, given that the NSDUH only asks about heavy alcohol use in the past month, it is impossible to know an individual's true, lifetime pattern of alcohol use, whether the last month of alcohol use is an anomaly or not, and what social factors impact heavy alcohol use.

For adults between the ages of 18 and 49, those who reported a double burden of heavy alcohol use and depression were equally likely to receive mental health treatment compared to adults with depression alone. These results are contrary to the results of numerous studies, documenting a link between comorbid mental illness and substance use disorders and increased rates of mental health treatment (Chen, Crum, et al., 2013; Kerfoot et al., 2011; Prigerson et al., 2001; Urbanoski et al., 2007). However, our results are similar work by Harris and Edlund (2005), who found that among individuals with mental health problems, those with co-occurring substance use disorder were about as likely to receive mental health treatment as those with mental health problems alone. Harris and Edlund (2005) propose that this result may be because individuals with both mental health and substance use disorders lack financial resources, may experience stigma associated with mental health care, and/or may assume that mental health providers would require them to stop using substances.

While other studies have found that individuals with comorbid mental health and substance disorders are more likely to report mental health treatment (Chen, Crum, et al., 2013; Kerfoot et al., 2011; Prigerson et al., 2001; Urbanoski et al., 2007), our results fit with some of the interpretations and understanding of these patterns. While Urbanoski and colleagues (2007) found that those with comorbid substance use and mental health disorders were more likely to seek mental health treatment than those with only mental health disorders, they also found that mental health experiences were more likely to lead individuals to seek help in the form of mental health treatment, rather than the experience of substance problems on help seeking. While Chen and colleagues (2013) found that participants with major depressive episodes and alcohol dependence comorbidity were more likely to use all types of mental health services, they also reported that individuals with both depression and alcohol dependence face similar barriers to mental health care as those with depression online, namely, financial barriers. Our results could fit with these possible explanations, since not being able to afford the cost was the single largest barrier to mental health treatment in this sample. However, none of these mechanisms propose why the impact of comorbid heavy alcohol use on mental health treatment may act differently in adults under 50 compared to adults ages 50-64.

Bivariate analyses comparing which groups were more likely to receive mental health treatment, found that adults who were women, White, adults ages 50-64, college graduates, with health insurance, and in fair or poor health had greater odds of receiving mental health treatment. These results mostly support previous literature documenting predisposing and enabling factors to receiving mental health treatment (Alegría et al., 2008; Lindsay Nour et al., 2009; Mackenzie et al., 2012; Magaard et al., 2017; Nam et al., 2017; Walker et al., 2015; Wang et al., 2005).

This study found that women had almost twice the odds of receiving mental health treatment than men, supporting previous literature that women are more likely to seek mental health treatment than men (Mackenzie et al., 2012; Wang et al., 2005). Additionally, this study found that Non-Hispanic White people who had experienced an MDE had the greatest odds of receiving mental health treatment. Black, Asian, and Hispanic adults all had significantly lower odds of receiving treatment compared to White adults. This supports previous work of Nam and colleagues (2017) that Black and Latino/a individuals were less likely to receive treatment for both mental health and substance use disorders and previous research documenting higher unmet need for mental health treatment in Black, Latino, and Asian groups compared to non-Hispanic Whites (Alegría et al., 2008; Wang et al., 2005). Additionally, compared to Non-Hispanic Whites, Native Hawaiian and other Pacific Islanders had significantly lower odds of treatment with a very low odds ratio. However, there was no significant difference between Native Americans and Alaska Natives and Whites in the likelihood of receiving treatment. Since these results were based on a small sample size and with questions framing mental health from a Western perspective, future research lead by indigenous groups should verify these results and focus on culturally-relevant ways to support and treatment mental health.

In contrast to the overrepresentation of young adults in the population of adults with depression and previous research that young adults are the most likely to have experienced depressive symptoms in the last two weeks (Villarroel & Terlizzi, 2020), young adults had the lowest odds of receiving treatment. All other age groups had higher odds of receiving treatment than young adults. Specifically, adults ages 35-49 and 50-64 had more than twice the odds of receiving mental health treatment than young adults. These results are consistent with other data from the 2019 NSDUH on mental health treatment: while 76.5% of adults 50 and older with

depression received treatment for it in the past year, only 50.9% of young adults 18-25 did

(Substance Abuse and Mental Health Services Administration, 2020). Other research has

documented similar patterns (Alang, 2015; Walker et al., 2015). Young adults with unmet need

for depression treatment (along with the entire adult population of all ages) reported that cost

was the main barrier. However, young adults are often in school and/or in the process of

establishing a career and report the highest level of poverty compared to any other age group

(Hawkins, 2019).

Our results found that individuals with a college degree experiencing depression had

greater odds of receiving mental health treatment than those with lower levels of education,

supporting the results of a previous systematic review (Magaard et al., 2017). Surprisingly,

income level as a percentage of the Federal Poverty Threshold was not a significant predictor of

treatment utilization, despite results from the NSDUH that the most common self-reported

reason for unmet treatment need was not being able to afford the cost. While cost is certainly an

important factor in service utilization, it may be that income compared to the Federal Poverty

Threshold, as measured by NSDUH (below the Federal Poverty Threshold, income between 1x

and 2x Federal Poverty Threshold, or income greater than 2x the Federal Poverty Threshold), is

not a useful way of measuring the true financial barriers across vastly different groups of people.

This threshold has been criticized as antiquated and does not include important categories of

expenses such as childcare and healthcare (Kolesnikova & Liu, 2012; Roosa et al., 2005).

Individuals receiving mental health treatment had almost twice the odds of having had

health insurance in the past year, supporting previous work that having health insurance is a

strong correlate of mental health treatment use (Walker et al., 2015). However, it is important to

keep in mind that there can be additional financial barriers to receiving treatment even for those

who have insurance. Of participants who reported an unmet need for mental health treatment in the past year, almost 15% stated that they were unable to access treatment because their insurance would not pay enough.

Lastly, those in fair or poor self-reported health had over twice the odds of receiving mental health treatment compared to those in excellent health. This supports previous results showing that poor physical health has been linked to greater number of mental health visits from multiple providers (Lindsay Nour et al., 2009). It is possible that individuals in worse physical health are more likely to seek medical treatment for their physical health conditions and thus be screened, diagnosed, and referred for mental health treatment. While screening and diagnosis rates for depression in primary care are not perfect, patients with greater numbers of primary care clinic visits were more likely to be diagnosed as depressed (Bertakis et al., 2001).

Together, these bivariate analyses show the utility of applying Andersen's Behavioral Model (1995) to explain usage of mental health treatment for depression. While previous research has focused on perceived need for treatment as a strong predictor of receiving treatment (Choi et al., 2013; Frojd et al., 2007; Graham et al., 2017; Herrman et al., 2002), our results affirm that predisposing characteristics and enabling factors are strong predictors of receiving treatment.

Limitations and Strengths

There were several limitations to this study: One, data on alcohol use was self-reported and cannot be verified. Even though alcohol use is more socially acceptable than use of other substances, it is likely that participants could have felt social desirability bias to underreport their actual alcohol consumption. Second, the measure of heavy alcohol use only asked about consumption in the past 30 days, which may not be representative of a person's typical habits. It

is possible that someone had a month of heavy alcohol use due to other factors, like social events, unrelated to their mental health or mental health treatment. Third, relatedly, since this data was collected cross-sectionally, it is difficult to fully understand the temporal and causal relationship between mental health, heavy alcohol use, and mental health treatment. Given that questions about major depressive episode and mental health treatment asked about the past year, there is no way to know the timing of the major depressive or mental health treatment compared to the past month of heavy alcohol use. Fourth, the NSDUH does not include many measures of social determinants of heavy alcohol use, including social support. This makes it impossible to understand the complex factors that lead to such patterns of use.

Other limitations relate to the measurement of mental health treatment. The NSDUH measurement of mental health treatment is not specific to treatment for depression. NSDUH only asks specifically about symptoms of depression in the past year, not about other types of mental health disorders, and then only those individuals who meet criteria for an MDE are asked if they received treatment. This measure assumes that the only people who receive mental health treatment are those experiencing an MDE. Many people receive mental health treatment for disorders other than depression and even if someone did experience an MDE in the past year, they may seek treatment primarily due to another mental health disorder other than treatment.

Additionally, this study looked only at mental health treatment, not substance use treatment or integrated treatment programs. Many treatment programs for alcohol use include some component of counseling or psychotherapy and there is often overlap between alcohol use treatment and mental health treatment. Additionally, research has shown that people with comorbid mental health and substance use disorders are more likely to receive mental health treatment (Edlund et al., 2012) and that it is the mental health diagnosis, rather than the

substance use disorder, that primarily drives help-seeking behavior (Urbanoski et al., 2007). However, by only focusing on mental health treatment, this study excludes some people who have been receiving mental health treatment from a substance use, or integrated care provider.

Lastly, other limitations relate to sample size. While there were enough respondents ages 50-64 for them to be included in the model, the sample size was low, especially of those adults aged 50-64 who reported heavy alcohol use and mental health treatment. Additionally, there was a small number of adults ages 65+ who reported heavy alcohol use in the past month, which prevented their inclusion in the model. Other studies have combined multiple years of NSDUH data to be sufficiently powered to test hypotheses about these age groups (Choi et al., 2015).

Despite its limitations, this study has several strengths. This study was the first to specifically look at the relationship between heavy alcohol use and mental health treatment by age among those experiencing depression. Previous studies had only looked at comorbid mental health disorders and substance use disorders as entire categories and hadn't considered how these relationships would differ by type of substance and by participant age group. Additionally, this study used a strong theoretical framework (Andersen's Behavioral Model) to create an a priori data analysis plan and to inform which variables were included in the model. Because the NSDUH provides a nationally representative sample, there was enough statistical power to study the relationship between heavy alcohol use and mental health treatment by age group.

Implications and Recommendations

Our results show that it is important to consider age when understanding the complex relationship between depression, alcohol use, and mental health treatment. Given the number of aging adults in the United States and substance use in older adults as an "emerging public health concern" (Wu & Blazer, 2011), it is important to continue to research the complexities between

mental health, substance use, and treatment in older adults, with a focus on screening, diagnosis, and reducing barriers to treatment. Because this sample had a small sample size of adults aged 50-64 with heavy alcohol use and had to exclude older adults older than 65 altogether, further research is needed to replicate these results with a representative sample of older adults and investigate the effects of comorbid depression and heavy alcohol use on both mental health treatment, substance use treatment, and integrated treatment programs. Further research should use evidence-based screening instruments that have been validated in older adults (DiBartolo & Jarosinski, 2017).

While national-level, cross-sectional data like the NSDUH can provide a picture of overall trends and the statistical power to study subgroup differences, such as by age, it cannot propose explanations for these results or help explain the timing of when mental health problems occur relative to heavy alcohol use relative to treatment received. Further research should consider qualitative methods, such as in-depth interviews or focus groups, with adults ages 50-64 reporting heavy alcohol use to understand why or why not they did not access mental health treatment in the past year.

The overall goal of research focused on mental health service utilization is for individuals with comorbid depression and heavy alcohol use to receive the help they need. Given that costs were the most common barrier to accessing mental health treatment across all age groups, it is important to push for policies, including mental health parity, Medicaid expansion, and Medicare for all, which increase insurance coverage and reduce out-of-pocket costs for mental health and substance use treatment. Policy changes are especially needed to reduce cost barriers for young adults, who face the highest rates of financial hardship and lowest rates of mental health treatment. However, results from our bivariate analyses should that there continue to be

inequities by race and ethnicity in accessing mental health treatment. Specifically, Black, Asian, and Hispanic adults all had less than half the odds of receiving treatment compared to White adults. While policies to improve universal access to behavioral healthcare are important, interventions targeted to these Black, Asian, and Hispanic groups are needed to reduce disparities in access (Alegría et al., 2016). Alegría and colleagues (2016) discuss several strategies to reduce disparities in access to care including increased outreach through mobile clinics, explicitly addressing barriers to services, expanding telehealth services, listening to patients about what they need, adapting evidence-based practices to different cultures, and expanding the behavioral health workforce. Additional work is needed to bring these strategies to practice to reduce inequities in access to mental health services.

Conclusions

This study explored the relationship between heavy alcohol use and mental health treatment among adults 18-64 experiencing a major depressive episode. Results revealed that this complex relationship between mental health, comorbid alcohol use, and mental health treatment varies significantly by age. Older adults 50 and older with comorbid heavy alcohol use and depression were significantly less likely to have received mental health treatment than those with only depression.

Table 1

Socio-demographic characteristics of adults ages 18 and older who experienced a major depressive episode in the last year and bivariate statistics of those who received mental health treatment and those who did not, from 2019 NSDUH (n=4335)

Variable		Overall (N=4335) Estimate (95% CI)	Received Mental Health Treatment (N=2340) Estimate (95% CI)	Did not Receive Mental Health Treatment (N=1987) Estimate (95% CI)	OR (CI)-- unadjusted estimate for entire sample Estimate (95% CI)	p
Received Any Mental Health Treatment in the Past Year		58.34 % (56.49%, 60.19%)				
Needed Mental Health Treatment but didn't get it in the last 12 months		41.13% (38.98%, 43.29%)				
Severe Role Impairment due to Depression	Yes	68.27% (66.00%, 70.53%)	75.46% (72.61%, 78.31%)	58.21% (54.98%, 61.45%)	2.21 (1.82, 2.68)	<.0001
	No	31.73% (29.47%, 34.00%)	24.54% (21.69%, 27.39%)	41.79% (38.55%, 45.02%)	1	

Variable		Overall (N=4335) Estimate (95% CI)	**Received Mental Health Treatment (N=2340)** Estimate (95% CI)	**Did not Receive Mental Health Treatment (N=1987)** Estimate (95% CI)	**OR (CI)--unadjusted estimate for entire sample** Estimate (95% CI)	**p**
Number of Days of Binge Drinking in the Past 30 Days (mean, 95% CI)		2.63 (2.37, 2.90)	2.38 (2.07, 2.70)	2.96 (2.52, 3.39)	0.98 (0.96, 1.00)	.03
Heavy Alcohol Use in the past month (>5 days of binge drinking)		9.73% (8.34%, 11.11%)	8.86% (6.95%, 10.77%)	10.94% (8.77%, 13.11%)	0.79 (0.57, 1.11)	.17
Gender	Male	36.74% (34.84%, 38.65%)	31.51% (28.90%, 34.12%)	44.07% (40.71%, 47.43%)	1	
	Female	63.26% (61.35%, 65.16%)	68.49% (65.88%, 71.10%)	55.93% (52.57%, 59.29%)	1.71 (1.41, 2.08)	<.0001
Age Category	18-25 Years Old	28.83% (27.27%, 30.40%)	23.06% (21.44%, 24.68%)	36.92% (34.46%, 39.39%)	1	
	26-34 Years Old	24.36% (22.55%, 26.17%)	23.70% (21.49%, 25.92%)	25.28% (22.32%, 28.24%)	1.50 (1.25, 1.80)	<.0001
	35-49 Years Old	26.22% (24.41%, 28.04%)	29.68% (27.36%, 32.00%)	21.38% (18.25%, 24.51%)	2.22 (1.82, 2.71)	<.0001
	50-64 Years Old	20.58% (18.76%, 22.40%)	23.56% (21.14%, 25.97%)	16.41% (13.64%, 19.18%)	2.30 (1.78, 2.96)	<.0001

Variable		Overall (N=4335) Estimate (95% CI)	Received Mental Health Treatment (N=2340) Estimate (95% CI)	Did not Receive Mental Health Treatment (N=1987) Estimate (95% CI)	OR (CI)--unadjusted estimate for entire sample Estimate (95% CI)	p
Race and Ethnicity	Hispanic	14.42% (12.59%, 16.25%)	11.46% (9.52%, 13.40%)	18.57% (15.26%, 21.88%)	0.49 (0.37, 0.64)	<.0001
	Non-Hispanic Asian	3.65% (2.70%, 4.60%)	2.91% (1.81%, 4.00%)	4.68% (2.99%, 6.37%)	0.49 (0.29, 0.84)	.01
	Non-Hispanic Black/African American	9.52% (8.11%, 10.94%)	6.99% (5.46%, 8.51%)	13.07% (10.71%, 15.44%)	0.42 (0.32, 0.56)	<.0001
	Non-Hispanic More than one race	3.15% (2.48%, 3.82%)	3.05% (2.16%, 3.93%)	3.30% (2.25%, 4.35%)	0.73 (0.46, 1.14)	.16
	Non-Hispanic Native American/AK Native	0.69% (0.34%, 1.03%)	0.55% (0.21%, 0.89%)	0.88% (0.22%, 1.54%)	0.50 (0.19, 1.30)	.15
	Non-Hispanic Native HI/Other Pacific Islander	0.20% (0.04%, 0.36%)	0.02% (0.00%, 0.04%)	0.46% (0.08%, 0.84%)	0.03 (0.004, 0.18)	.0003
	Non-Hispanic White	68.36% (66.05%, 70.67%)	75.02% (72.47%, 77.58%)	59.04% (56.00%, 62.08%)	1	

Variable		Overall (N=4335) Estimate (95% CI)	Received Mental Health Treatment (N=2340) Estimate (95% CI)	Did not Receive Mental Health Treatment (N=1987) Estimate (95% CI)	OR (CI)-- unadjusted estimate for entire sample Estimate (95% CI)	p
No Health Insurance at any point in the last 12 months	Yes	21.37% (19.27%, 23.47%)	17.00% (14.60%, 19.41%)	27.52% (23.92%, 31.11%)	0.54 (0.43, 0.68)	<.0001
	No	78.63% (76.53%, 80.73%)	83.00% (80.59%, 85.40%)	72.48% (68.89%, 76.08%)	1	
Marital Status	Married	30.75% (28.27%, 33.24%)	32.79% (29.83%, 35.75%)	27.91% (24.78%, 31.04%)	1	
	Widowed	2.79% (2.00%, 3.59%)	3.52% (2.29%, 4.75%)	1.77% (0.77%, 2.78%)	1.69 (0.83, 3.43)	.15
	Divorced or Separated	16.41% (14.75%, 18.07%)	18.53% (15.99%, 21.08%)	13.44% (11.53%, 15.35%)	1.17 (0.91, 1.51)	.20
	Never been married	50.04% (47.65%, 52.44%)	45.16% (42.31%, 48.01%)	56.88% (53.13%, 60.62%)	0.68 (0.56, 0.81)	<.0001
Highest level of education	Less than high school	7.88% (6.80%, 8.96%)	7.57% (6.32%, 8.83%)	8.31% (6.65%, 9.98%)	0.64 (0.48, 0.85)	.002
	High school grad	21.80% (19.97%, 23.64%)	19.70% (17.08%, 22.32%)	24.75% (22.29%, 27.21%)	0.56 (0.45, 0.70)	<.0001
	Some college/associate degree	41.62% (39.66%, 43.58%)	39.95% (37.06%, 42.85%)	43.95% (41.00%, 46.90%)	0.64 (0.53, 0.77)	<.0001
	College graduate	28.69% (26.49%, 30.90%)	32.77% (29.93%, 35.61%)	22.98% (20.52%, 25.45%)	1	

Variable		Overall (N=4335) Estimate (95% CI)	Received Mental Health Treatment (N=2340) Estimate (95% CI)	Did not Receive Mental Health Treatment (N=1987) Estimate (95% CI)	OR (CI)--unadjusted estimate for entire sample Estimate (95% CI)	p
% of US Census Poverty Threshold	Income at or below the Federal Poverty Threshold	18.44% (16.58%, 20.30%)	19.54% (16.76%, 22.32%)	16.89% (14.61%, 19.17%)	1.17 (0.92, 1.50)	.20
	Income between 1x and 2x Federal Poverty Threshold	22.81% (20.81%, 24.81%)	22.08% (19.32%, 24.83%)	23.84% (21.34%, 26.35%)	0.94 (0.77, 1.15)	.55
	Income more than 2x Federal Poverty Threshold	58.75% (56.51%, 60.99%)	58.38% (55.08%, 61.69%)	59.27% (56.60%, 61.93%)	1	
Overall Health	Fair/Poor	22.62% (20.92%, 24.31%)	25.62% (23.07%, 28.17%)	18.42% (15.93%, 20.90%)	2.08 (1.43, 3.03)	.0003
	Good	32.95% (30.58%, 35.31%)	32.85% (29.46%, 36.24%)	33.09% (29.85%, 36.32%)	1.49 (1.08, 2.04)	.02
	Very Good	33.55% (31.31%, 35.79%)	32.51% (29.68%, 35.35%)	35.00% (32.09%, 37.91%)	1.39 (1.00, 1.93)	.05
	Excellent	10.89% (9.56%, 12.21%)	9.02% (7.24%, 10.81%)	13.49% (11.26%, 15.73%)	1	

Table 2

Unadjusted and adjusted logistic regression of heavy alcohol use associated with mental health treatment in the past year, stratified by age category (n=4335)

		18-25 OR (95% CI)	26-34 OR (95% CI)	35-49 OR (95% CI)	50-64 OR (95% CI)
Unadjusted					
	No	Ref	Ref	Ref	Ref
	Yes	1.22 (0.90, 1.67)	0.91 (0.49, 1.69)	1.16 (0.66, 2.03)	0.24 (0.09, 0.65)
Adjusted					
	No	Ref	Ref	Ref	Ref
	Yes	1.04 (0.72, 1.49)	1.02 (0.54, 1.94)	1.20 (0.67, 2.15)	0.25 (0.10, 0.60)

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