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**Alcohol Use Disorder and Major Depressive Episodes: Findings from the National Survey
on Drug Use and Health**

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A Clinical Research Project submitted to the faculty of the Clinical Psychology Department of
Augsburg University in partial fulfillment of the requirements for the degree of Doctor of
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Dedications

I became a mother to two incredible boys simultaneously to pursuing my doctoral degree in psychology. While the road was not an easy one, I could never have travelled it without the support of my husband. Braedon, you are my rock. You pushed me when I lacked motivation and slowed me down when I was going 1000 miles a minute. To my boys, Jonah, and Micah, all of the blood, sweat, and tears throughout this program were for you both. You boys are my light and continued reminder for why I started this program in the beginning. To my parents and siblings, thank you for listening to me ramble on about my research, even if it did not always make sense. Each and every one of you believed in me and walked with me down this road. Thank you.

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Abstract

Alcohol use disorder (AUD) is one of the leading causes of death and disability among individuals in the United States (Bergmann et al., 2013; Jung, 2019; Sliedrecht et al., 2019; Witkiewitz, 2019). A number of individuals reporting an AUD diagnosis also report difficulties related to numerous physical, social, and mental health consequences, most notably, major depression. Major depressive disorder (MDD) and AUD co-occur at high rates, and researchers have been investigating the negative consequences and outcomes related to these co-occurring illnesses (McHugh & Weiss, 2019; Tolliver & Anton, 2022). Using a large nationally representative sample of 18–36-year-olds, treatment completion within various treatment modalities (i.e., hospital settings; mental health settings; and family and community support settings) were examined among those diagnosed with a co-occurring AUD and a lifetime Major Depressive Episode (MDE), and with a single alcohol use diagnosis. Logistic regression analyses revealed individuals with a co-occurring AUD and MDE were six times more likely to drop out of treatment prematurely compared to individuals with a single AUD diagnosis. This study also revealed that men and women do not differ in treatment completion in general. However, a significant finding was observed among women receiving treatment in hospital and primary care settings: women with a single AUD diagnosis were more likely to leave treatment in these settings prematurely compared to men. The findings may be accounted for by the increased complexity and challenges associated with a co-occurring AUD and MDE and highlights the need for targeted mental health care within substance use treatment centers (Archie et al., 2012; Bazargan-Hejazi et al., 2016; Holma et al., 2020; McHugh & Weiss, 2019; Pavkovic et al., 2018).

Keywords: alcohol use disorder, major depressive episodes, treatment completion, co-occurring disorders.

Chapter One: Introduction

Alcohol use disorder and major depressive disorder co-occur at high rates, with significant negative consequences caused by or related to these dual diagnoses (Boden & Fergusson, 2011; Brière et al., 2014; DiPrete et al., 2019; Grant et al., 2004; Holma, Holma, & Isometsä, 2020; Hunt et al., 2020; McHugh & Weiss, 2019; Pavkovic et al., 2018; Tolliver & Anton, 2022). While clinicians and substance abuse treatment providers have learned significant information from the abundance of literature and research on these two co-occurring disorders, there still remains a perpetual cycle of depressive symptoms and excessive alcohol consumption, suggesting continued research for these two disorders is critical for public health (Onaemo, Fawehinmi, & D'Arcy, 2020). The literature regarding these co-occurring disorders has propelled the treatment of substance abuse toward a more comprehensive model using therapeutic techniques targeted at dual mental health and substance abuse (Morley et al., 2016). However, the efficacy of an integrated approach targeting alcohol use and co-occurring depressive disorder remains unclear. Multiple researchers (e.g., Morley et al., 2016; Riper et al., 2014) have detected little difference between integrated treatment and treatment as usual for reducing alcohol consumption and symptoms of major depression. Other literature has found integrated treatment superior compared to single-focused interventions at reducing alcohol consumption and symptoms of depression and found that men and women responded differently to the integrated care approach (Baker et al., 2010).

There continues to be inconsistent findings pertaining to treatment outcomes related to these dual diagnoses depending on who is studied (Riper et al., 2014; Tolliver & Anton, 2022). Some research has suggested treatment outcomes differ between men and women struggling with these co-occurring diagnoses, while others report no differences in gender and treatment

outcome (Brown et al., 2006; Hesse, 2009; Lydecker et al., 2010; Riper et al., 2014). Studies examining co-occurring problematic alcohol use and major depression have also struggled to generalize to larger populations by using small samples of participants in specific treatment modalities. As such, there is little evidence promoting the clinical utility of an integrated treatment in naturalistic clinical settings and when applied to a broad population. Therefore, additional research is needed to enhance knowledge of treatment completion among individuals with co-occurring AUD and MDE in a nationally representative sample.

The following literature review aims at succinctly summarizing the magnitude of research related to alcohol use disorder, major depression, associated negative consequences, as well as disproportionately affected populations. Additionally, this study compared the likelihood individuals with co-occurring AUD and a lifetime history of MDE complete various treatment modalities against a group of individuals with a single AUD diagnosis. Due to the high lifetime prevalence of co-occurring AUD and MDE in all types of treatment settings, additional research on which specific treatment settings are most successful at supporting an individual with co-occurring AUD and MDE complete treatment could provide immense clinical utility.

Further, this study aimed at investigating the difference in treatment completion between men and women with co-occurring AUD and MDE versus a single AUD diagnosis using a nationally representative sample of 18-36-year-olds from the National Survey of Drug Use and Health (NSDUH) 2019 survey year (Center for Behavioral Health Statistics and Quality, 2020). Due to the inconsistent literature on gender differences and treatment completion, comparing a large nationally representative sample of men and women who struggle with co-occurring AUD and a lifetime history of MDE will contribute to the literature in meaningful ways. First, by comparing gender differences between men and women, this study may aid in the development

of a specialized treatment program for men and/or women with co-occurring AUD and MDE.

Secondly, individuals 18 to 36 years old are in a critical period of development, which amplifies the clinical importance of targeting this age group and offering specialized treatment in an optimal treatment setting.

This study attempted to provide important information regarding the need for targeted mental health and substance abuse treatment among individuals suffering from the most common co-occurring mental health and substance abuse diagnoses. This study analyzed the rates at which individuals with a co-occurring AUD and MDE complete treatment compared to those with a single AUD diagnosis. These treatment completion rates will likely show the significance of targeted treatment for those presenting with co-occurring AUD and MDE in clinical settings.

Chapter Two: Literature Review

Alcohol Use Disorder

Alcohol abuse and alcohol dependence were classified as two separate disorders in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). The classification of alcohol use disorders as well as the overarching substance use disorders category within the DSM-IV underwent a large shift, from two separate criteria of abuse and dependence to one unidimensional model which encompasses severity on a continuous scale (Hasin et al., 2012; Robinson, & Adinoff, 2016). This change followed evidence which suggested the unidimensional model was a more appropriate fit for diagnosing a substance abuse disorder, including alcohol use disorder, rather than the categorization of abuse and dependence as separate constructs (Robinson, & Adinoff, 2016). Additionally, understanding the distinction between the two classification systems related to AUD becomes imperative for later discussion regarding the sample for the present study.

While most recent research uses the DSM-5 classification of AUD, the 2019 NSDUH used the DSM-IV classification system in their nationally representative survey. For an individual to meet DSM-IV criteria for an alcohol abuse disorder, one or more of the following criteria must have been met in the previous 12 months: 1) drinking alcohol or being sick from drinking, impaired role responsibilities within the home, family, job, or school, 2) engaged in risk taking behaviors that increased chances of injury, such as swimming, driving, using machinery, or unsafe sex on more than one occasion, 3) difficulties with legal system as a result of drinking alcohol, and or 4) continuing to drink with interpersonal relationship troubles. Moreover, for an individual to meet DSM-IV criteria for an alcohol dependence, three or more of the following criteria must be met within the previous 12 months: 1) increased tolerance of

alcohol, 2) symptoms of withdrawal after effects of alcohol dissipated, 3) drank for longer periods of time of more alcoholic beverages than intended, 4) tried to stop or cut down on alcohol with unsuccessful efforts, 5) spent a lot of time obtaining, using, and recovering from alcohol, 6) withdrew from activities that were previously important as a result of drinking alcohol, 7) continuing to drink while knowing the physical and mental harm it can cause the body. The American Psychiatric Association (n.d.) began the development of a new classification system in 2000 with numerous research groups that were formed to investigate psychiatric diagnoses and related gaps among the literature in regard to diagnoses. Among those diagnoses that were changed from the DSM-IV to the DSM-5 classification system, which was published in 2013, was alcohol use disorder (National Institute of Alcohol Abuse and Alcoholism, 2020).

In the fifth edition of the DSM classification system, AUD is defined as a pattern of problematic alcohol use that leads to clinically significant impairment and distress and at least two out of 11 criteria occurring within a 12-month period (American Psychiatric Association, 2013). According to the National Institute of Alcohol Abuse and Alcoholism (2020), among the major changes from the DSM-IV to the DSM-5 related to AUD was the combination of both alcohol dependence and alcohol abuse into a single diagnosis. In addition, severity specifiers were added to the DSM-5 AUD which are based on number of criteria met, with mild indicating two or three criteria, moderate indicating four or five criteria, and severe indicating six or more criteria. Lastly, the new classification system removed the criteria including legal problems related to alcohol use and added a criterion for craving or having strong urges to drink alcohol.

Due to the major changes that occurred between the DSM-IV and DSM-5, researchers have been interested in examining the differences in DSM-IV prevalence rates compared to

DSM-5 prevalence rates of AUD. Some concern existed among clinicians that a change in criteria between the DSM-IV and DSM-5 would create clinical challenges, in that some individuals would no longer meet criteria for an AUD, new individuals would meet criteria, or existing individuals with a diagnosis of AUD would see a change in severity rating (Dawson et al., 2013). Additionally, some researchers suggested the change in terminology and creation of a unidimensional construct would create confusion among differentiating core symptoms, such as abuse and dependence on alcohol, and problems secondary to the alcohol use disorder, such as hazardous use and failure to fulfil role obligations (Babor, 2011). Bartoli and colleagues (2015) conducted a meta-analysis of the scientific literature to determine prevalence rates of the DSM-5 classification system compared to the DSM-IV in both the general population and clinical samples. After applying inclusion criteria, which consisted of (1) only using peer-reviewed published studies and (2) studies must have researched prevalence rates of AUD between the two classification systems, Bartolli and colleagues ended with 12 studies to include in their meta-analysis. When the authors looked at studies that examined DSM-5 diagnostic criteria for AUD compared to the DSM-IV classification system, two of the 12 studies did not show a substantial difference in prevalence rates between DSM-IV and DSM-5, three studies reported a decrease in prevalence rates of AUD, and seven of 12 studies reported an increase in prevalence rates of AUD between DSM-IV and DSM-5, indicating prevalence rates of AUD increased when using the DSM-5 classification system (Bartolli et al., 2015).

Similar to the Bartolli and colleague's meta-analysis on prevalence rates, Slade and colleagues (2016) conducted a study aimed at investigating DSM-IV and DSM-5 symptom criteria overlap and distinguishing between previously subthreshold alcohol diagnoses in the DSM-IV to threshold alcohol diagnoses in the DSM-5 and vice versa. Slade and colleagues

(2016) compared data from lower-income and upper-income countries in a large World Mental Health Survey consisting of 44,341 participants and nine countries. The results indicated the prevalence of AUD in the DSM-5 classification was higher compared to the DSM-IV AUD in two out of the nine countries, prevalence of DSM-5 AUD was lower compared to DSM-IV AUD in six out of the nine countries, and AUD prevalence was equal in one country across the DSM-IV and DSM-5. Taken altogether, the change from the DSM-IV to the DSM-5 in relation to an alcohol use diagnosis has garnered contradictory findings of prevalence rates between the two classification symptoms. Even so, individuals who formerly met criteria for a DSM-IV AUD diagnosis but no longer meet DSM-5 AUD diagnostic criteria present with similar functional impairment and distress as an individual who meets criteria for a DSM-5 AUD diagnosis (Slade et al., 2016).

Excessive alcohol use, a symptom of AUD within both classification symptoms, is common among adults in the United States with one in four adults engaging in heavy consumption of 4+ alcoholic drinks for women and 5+ for men, on one or more occasions (Archie, Kazemi, & Akhtar-Danesh, 2012; Linden-Carmichael et al., 2017; Nolen-Hoeksema, 2004; Witkiewitz, Litten, & Leggio, 2019). Binge drinking is not the only problematic drinking behavior, with 66% of adults reporting problematic alcohol use within the last year (Mannes et al., 2020) and up to 80% of individuals from the general population reporting problematic alcohol use in their lifetime (Bergman et al., 2013).

Problematic alcohol use and individuals meeting criteria for an AUD have continued to rise across the United States in all age categories (Grant et al., 2017). Roughly 32.6 million people are diagnosed with an AUD in the United States within their lifetime (Sliedrecht et al., 2019). Alcohol consumption has been linked to a myriad of physical, social, cognitive, and

mental health related problems, with the most crucial focus of study on death related to alcohol use (Mannes et al., 2020; Bergmann et al., 2013).

Both short- and long-term physical health consequences have been associated with alcohol consumption (Bergmann et al., 2013; Jung, 2019; Sliedrecht et al., 2019; Witkiewitz, 2019). Among the general population, individuals who report heavy alcohol use are far more likely to also report a comorbid disease, such as liver disease, cancer, stomach problems, traumatic brain injury (TBI), heart and blood disease, and death due to alcohol related disease (Bergmann et al., 2013; Connor, 2017; Coomber et al., 2017; Jung, 2019; Weil, Corrigan & Karelina, 2018). Alcohol use contributes to three million deaths per year, making it one of the leading causes of preventable death worldwide (White, 2020; Witkiewitz, Litten, & Leggio, 2019). When alcohol related fatalities are investigated among individuals in the general population, men who drank greater amounts of alcohol were found to have higher rates of alcohol related cancers and other digestive diseases compared with men who drank light to moderate amounts of alcohol (Bergmann et al., 2013). Not surprisingly, a large percentage of individuals who consume alcohol are at greater risk of engaging in risky behavior resulting in accidents and possible brain trauma (Weil et al., 2018). Compared to individuals who do not consume alcohol, the lifetime prevalence of TBI among alcohol drinkers is four times higher (Weil et al., 2018). Short-term physical health consequences are often equally as deadly as long-term effects of alcohol use. Injuries resulting from motor vehicle accidents, bicycle and pedestrian accidents, falls, violence, and intentional self-harm are far more likely to occur after alcohol consumption (Coomber et al., 2017; Vanlaar et al., 2015) as well as accidental drownings (Hamilton et al., 2018), alcohol poisoning (Haas & Flores, 2012), and changes to executive functioning, such as decision making and working memory (Lechner et al., 2016).

In addition to numerous physical risk factors associated with alcohol consumption, psychosocial consequences, such as increased risk of suicides, sexual assault, poorer interpersonal relationships, and financial instability carry a heavy burden among individuals diagnosed with AUD. For people who die by suicide, AUD was the second most frequent mental illness, second to mood disorders (Kölves et al., 2017; Tang et al., 2021). Acute use of alcohol as well as alcohol use disorders are closely linked with both suicide fatalities and nonlethal suicide attempts (Borges et al., 2017). Alcohol lowers inhibitions, increases aggressiveness and impulsivity and inhibits capacity of executive functioning and problem solving during acute crises, leading to an increase in suicidal ideation (Borges et al., 2017). Further, alcohol consumption by both victim and perpetrator is associated with increased risk of sexual assault, specifically among young women aged 18-25 (Abbey et al., 2004; Gilmore et al., 2018). Among college age samples of men and women, approximately roughly 50% of female victims of sexual assault and 47% of male perpetrators reported drinking alcohol prior to the assault (Abbey et al., 2004).

Lastly, Solmi and colleagues (2020) were interested in both risk and protective factors related to development of AUD. They conducted a large umbrella review which involved gathering previously published meta-analyses, re-analyzing the data and running additional statistical tests to measure credibility of the data into convincing, highly suggestive, suggestive, weak, and non-significant categories. Among the final 12 meta-analyses used for re-analyzing the data into credibility categories, the risk factor with the highest amount of evidence involved parental supply of alcohol to adolescence (Solmi et al., 2020). The more accessible alcohol is to adolescents in the home, the greater risk for development of an AUD later in life. Conversely, authors posited that the more restrictive parenting in relation to exposure to alcohol within the

home creates a protective factor against development of an AUD later in life. Additional protective factors have also been identified among both men and women in relation to AUD, with greater levels of emotional management, social emotional awareness, higher emotional awareness, and healthy relationships decreasing the risk of developing AUD (Obeid et al., 2020). Furthermore, obtaining a higher degree in education and having more children were found to be protective factors against development of AUD (Obeid et al., 2020).

Alcohol Use Disorder and Young Adulthood

A steady decline in problematic drinking rates among young adults has been emerging over the last four years with significantly fewer young adults consuming alcohol (McCance-Katz, 2020). Rates of alcohol use in early developmental periods such as adolescence and early adulthood have been declining in recent years, with narrowing gender differences between men and women (McCance-Katz, 2020; White, 2020). Data from the NSDUH saw a decline from 2% of youth ages 12 to 17 in 2016 down to 1.7% of youth ages 12 to 17 in 2019 engaging in problematic alcohol use that would meet criteria of a DSM-IV AUD within the previous year (McCance-Katz, 2020). Similarly, for emerging adults aged 18-25, a significant decline was observed from 10.7% in 2016 to 9.3% in 2019 for young adults engaging in problematic alcohol use within the previous year (McCance-Katz, 2020). Furthermore, a noticeable decline among binge drinking behavior has also been observed in recent years with past month binge drinking episodes decreasing from 11% to 5% between 2002 and 2018 (White, 2020).

Young adults have higher prevalence rates of highly problematic alcohol use with greater adverse effects compared to older adults (Linden-Carmichael, Dziak, & Lanza, 2019). Independence from parental authority and new social factors can increase the likelihood an individual engages in heavy drinking behaviors. Among follow-up surveys from the Monitoring

the Future Survey, which followed and surveyed previous high school students who were either enrolled in a two- or four-year college or not enrolled in college, the authors found that among both noncollege and college young adults, rates of heavy consumption of alcohol and binge drinking behaviors were elevated across the two groups (Windle, 2003). Other studies have found a significant difference between prevalence of alcohol use disorder among college students (21%) compared to noncollege students (12%) and part-time college students (15%; Wu et al., 2007).

Young adulthood is a unique developmental period in an individual's life due to the influx of social experiences and role transitions from living in family homes under parental supervision to living independently or among similar age peers with increasing responsibility (Windle, 2003). Along with these role transitions, the possibility exists for increased use of alcohol to help cope, relieve stress from demanding pressures and responsibilities within these new roles, and/or increase alcohol consumption due to recurrent social events. Patrick and colleagues (2018) conducted a study which included a sample of 767 young adults ages 18 to 23 who resided in the community. The authors were interested in examining how both large and small role transitions co-occur with alcohol consumption, as well as the motivations behind increased alcohol use. Among the various role transitions investigated, starting a new job and ending a relationship elicited more frequent drinking within the past month (Patrick et al., 2018). Further, young adults who reported their peak level of alcohol consumption occurred during the months in which they reported two or more role transitions. Therefore, it appears increased alcohol consumption may be linked with role transitions among young adults who are already undergoing significant role changes due to the developmental period.

Alcohol use among young adults has significant consequences. Compared to a noncollege sample, college drinkers were more likely to engage in drinking after consuming alcohol (Hingson et al., 2002; Knight et al., 2002). In addition to negative consequences associated with drinking and driving, both college students and noncollege individuals ages 18 to 24 are at increased risk for being physically or sexually assaulted while intoxicated, injured during a state of intoxication, and engaged in risky sexual behavior, such as unprotected sex after drinking alcohol (Hingson et al., 2002; Knight et al., 2002).

Alcohol Use Disorder and Gender

Differences between men and women have been investigated in the literature related to prevalence, onset, psychosocial consequences of AUD as well as risk and protective factors associated with the development of AUD. For years, research has found men surpass women in consumption of alcohol, and men subsequently diagnosed with AUD at a greater rate than women (Diehl et al., 2007; Foster et al., 2015; Obeid et al., 2020; White, 2020). Using a nationally representative sample of men and women among the general population, Grant and colleagues (2015) found the prevalence of AUD was higher for men in both past year and lifetime prevalence rates at 17.6% (vs. 10.4% for women) and 36.0% (vs. 22.7% for women), respectively.

Research has evidenced differences in onset of alcohol use disorder among men and women. Among a sample of men and women in an inpatient hospital setting for the treatment of alcohol disorders, Diehl and colleagues (2007) found adult women develop AUD later in their life compared to adult men with an earlier age of onset. Commensurate with this finding, among a nationally representative sample of the general population, surveys have found adolescent males are more likely than adolescent females to begin consuming alcohol at younger ages (Buu

et al., 2014). Age at onset of drinking has steadily decreased and adolescents are drinking at earlier ages, but still with higher rates of boys engaging in drinking behaviors earlier than girls (White, 2020; Windle, 2003). Adolescent boys (19%) begin drinking before the age of 14, compared to 13% of girls; however, for girls who first drink prior to the age of 14, there is a shorter time period between first use and subsequent binge drinking behavior (White, 2020). The same relationship is not seen for those who report their first drinking experience at age 15 or later. Research indicates boys who report their first drinking experience at age 15 or later advance toward binge drinking behaviors at quicker rates compared to girls (White, 2020). Heavy alcohol use at earlier ages, specifically prior to 18 years old has been linked to increased risk of heavy alcohol use later in life, while first use of alcohol after the age of 21 has been linked to decreased risk of heavy alcohol use later in life (Liang & Chikritzhs, 2015; Windle, 2003).

Additionally, Buu and colleagues (2014) utilized a developmental approach to identify differences between onset of alcohol use between boys and girls from early adolescence (ages 10 to 14.99) to young adulthood (ages 18 and older). The authors found little observable differences and associated problems related to alcohol use between boys and girls in early adolescence. However, gender differences began to emerge related to onset of alcohol consumption and problems related to alcohol in late adolescence (ages 15-17.99) and young adulthood, with men reporting more frequent drinking days and problems related to alcohol consumption compared to women.

Gender differences are small, albeit noticeable among high school age youth and alcohol use behaviors (White, 2020; Windle, 2003). Boys ages 12 to 17 reported increased solitary drinking behaviors compared to girls (Creswell et al., 2014; Tucker et al., 2006; White, 2020).

Solitary drinking behaviors have been linked to not only increased risk for development of AUD in young adulthood and adulthood, but psychosocial consequences during adolescence, including, increased engagement in risk taking behavior, poorer grades, interpersonal conflict with peers, and higher negative emotional states compared to their social drinker counterparts (Creswell et al., 2014; Tucker et al., 2006). Moreover, adolescents who engaged in solitary drinking behaviors reported significantly worse physical health during young adulthood, were less likely to graduate college, and at increased risk for engaging in violence during young adulthood (Tucker et al., 2006). Solitary drinking behaviors aside, adolescents who engage in problematic drinking behaviors, such as binge drinking, are much more likely to drop out of school prematurely and abuse other substances than adolescents who do not engage in problematic drinking behaviors (White, 2020).

Contrasting other age groups, gender differences among young adults ages 18 to 25 have been narrowing and possibly reversed in recent years. Historically, men, on average have been documented to engage in more frequent alcohol consumption and binge drinking behaviors (Windle, 2020). However, results from The Monitoring the Future Study, a nationally representative survey which samples individuals ranging from 8th grade into adulthood, found 83.2% of women ages 19-30 reported drinking alcohol within the past year, whereas 81.5% of men reported drinking alcohol within the past year (Schulenberg et al., 2019). Conversely, 65.9% of women ages 19-30 and 69.2% of men engaged in problematic alcohol consumption within the past year (Schulenberg et al., 2019). Taken together, these findings show significant consequences exist related to alcohol consumption among youth and young adults. Additionally, while gender differences are observed among men and women related to onset and prevalence of

alcohol use, recent surveys are suggesting women are engaging in more frequent drinking behaviors compared to years prior.

Research indicates that although adult women consume fewer alcoholic beverages on average compared to men, they suffer larger psychosocial consequences linked to alcohol consumption (Diehl et al., 2007; Foster et al., 2015; Green et al., 2002; White, 2020). Among an inpatient treatment sample, women who were diagnosed with a DSM-IV AUD for a shorter period of time demonstrated deficits on a variety of cognitive performance measures as well as reported significantly more difficulties fulfilling their roles within social environments compared to men who had been diagnosed with an AUD for a longer period of time (Diehl et al., 2007; White, 2020). Moreover, significant health disparities exist between men and women, with women at increased risk for developing liver inflammation, alcohol related cancers, and cardiovascular diseases compared to men (White, 2020).

Gender has also been shown to influence risk factors related to the development of AUD. Several risk factors have been found to be associated with the risk of developing an AUD, including family adversity, internalizing or externalizing problems, academic problems, relationship status, and financial income (Foster et al., 2015). Foster and colleagues (2015) studied a community sample of male and female twins born between 1972 and 1979. The longitudinal study completed assessments at the ages of 17, 20, 24, and 29, with ages 17 and 29 being the focus of risk factors related to developing an AUD. Foster and colleagues (2015) found internalizing behaviors, including feeling sad, withdrawn, anxious, and lonely, at age 17 increased the risk of developing AUD in adulthood for women but not for men, suggesting it may be a significant predictor of risk for developing AUD for women only. Additionally, academic problems, other substance use, and unhealthy peer relationships at age 17 increased the

risk for developing AUD in both men and women at age 29; however, more significantly for women than for men (Foster et al., 2015). Furthermore, among a sample of 789 community-living, Lebanese participants, men who identified as widowed with a primary level of education had significantly higher risks of AUD compared to women (Obeid et al., 2020).

Alcohol Use Disorder Treatment

Treatment for problematic alcohol use and related AUD includes a wide range of effective interventions depending on severity of illness, ranging from pharmacological approaches to psychosocial and abstinence interventions (Tolliver & Anton, 2022; Witkiewitz et al., 2019). Treatment in primary care settings by a general practitioner has been shown to decrease alcohol consumption and improve symptoms, although the long-term efficacy of such interventions is dependent on continued use of motivational interviewing or cognitive behavioral techniques on the part of the general practitioner (Edlund et al., 2012; Witkiewitz et al., 2019). Motivational interviewing, which is a cognitive-behavioral technique, includes increasing awareness of high-risk alcohol situations, self-monitoring alcohol consumption, and increasing the individual's readiness to change alcohol related behaviors have been proven effective brief interventions for AUD (Witkiewitz et al., 2019). The goal of cognitive behavioral therapy (CBT) related to reducing alcohol consumption and problematic drinking behaviors is to help individuals develop awareness around maladaptive thoughts and old alcohol consumption habits in order to develop more helpful thoughts and skills for abstinence of alcohol. Furthermore, acceptance and mindfulness-based techniques have been shown to provide effective treatment to individuals suffering from an AUD (Witkiewitz et al., 2019). Techniques such as self-management of alcohol consumption, increased recognition of high-risk events, and facilitating

acceptance of present experiences have been shown effective in both group and individual contexts (Witkiewitz et al., 2019).

In the United States, the fundamental model for treating AUD and related problems has been attendance in a group-based, abstinence focused program, relying on the 12-step principles outlined in the Alcoholics Anonymous (AA) format (Bradley & Kivlahan, 2014; Kelly et al., 2020). AA involves a self-help format designed to attain abstinence and increase quality of life in a peer-to-peer support network (Kelly et al., 2020). Typically, members of AA groups participate in telling personal stories related to their alcohol use and road to recovery while eliciting help and feedback from peers to practice the steps outlined in the 12-step facilitation (TSF) program. Many interventions focused on the treatment of AUD and related problems have adopted principles of the TSF program and incorporated them into their treatments. Nonetheless, individuals with alcohol related problems more frequently seek self-help and non-medical AA only groups compared to inpatient or outpatient program settings (Kelly et al., 2020). They are also more aware of the AA treatment modality compared to other therapeutic interventions, such as individual therapy (Mellinger et al., 2018).

Treatment outcomes related to alcohol use disorder include a number of favorable outcomes ranging from treatment completion, to sustained abstinence from alcohol for any period of time after treatment completion. When examining treatment outcomes of the widely known and utilized AA and TSF programs, Kelly and colleagues (2020) conducted a large Cochrane review of randomized controlled trials and quasi-experiments comparing AA and TSF interventions to other interventions used to treat AUD, such as, CBT, and motivational enhancement therapy (MET). The authors found AA and TSF programs were superior in promoting remission and continued abstinence compared to other established AUD treatments.

Additionally, the AA and TSF programs were more cost efficient and promoted reduced intensity of drinking days compared to interventions such as CBT and MET. These important findings suggest the TSF program may be incorporated into treatments targeting AUD and propose these steps may be a more cost-effective way at reducing alcohol related problems and promote more successful treatment outcomes and reduce barriers to successful treatment completion.

A large factor that has been examined when looking at treatment outcomes for alcohol use disorder is related to motivation for treatment (Clair et al., 2011; Ilgen et al., 2006). Decreased rates for motivation to change alcohol consumption behaviors are especially prevalent among adolescent and young adult populations, specifically those involved in the criminal justice system (Clair et al., 2011). Higher motivation for change where an individual is ready to begin treatment and alter alcohol consumption behaviors has been linked to favorable treatment outcomes and longer periods of abstinence (Ilgen et al., 2006). Among a sample of outpatient participants involved in AUD treatment, treatment outcome data was sampled at six months post treatment and one year after treatment completion (Ilgen et al., 2006). The authors were interested in examining the impact of treatment motivation and therapeutic alliance on treatment outcomes and found the higher rates of reported motivation prior to treatment predicted lower rates of alcohol consumption at both six months and one year post treatment completion (Ilgen et al., 2006). Additionally, higher rates of client reported therapeutic alliance and higher rates of motivation were associated with more favorable treatment outcomes at six months, but not at one year follow-up. Motivation to change alcohol use has been linked with more favorable treatment outcomes, although studies that investigate treatment outcomes and differences across gender have led to inconsistent findings depending on treatment type (i.e., outpatient vs. inpatient) and sample population (i.e., young adults vs. older adults).

Barriers to successful treatment completion often involve perceived and social stigma related to being diagnosed with an AUD. Stigma has been linked with adverse consequences including decreased self-efficacy, increased distress, poor treatment adherence and nonadherence to treatment recommendations (Keyes et al., 2010). However, stigma can be both beneficial and harmful when it comes to treatment seeking among individuals diagnosed with an AUD and without. Individuals who do not abuse alcohol may be deterred from using due to societal and self-perceived stigma; however, individuals who do abuse alcohol are deterred from seeking treatment and have limited access due to stigma (Crapanzano et al., 2019; Keyes et al., 2010). In addition to perceived and social stigma causing significant barriers to treatment seeking and utilization among those diagnosed with an AUD, individuals who are struggling with alcohol related difficulties are much more likely to ignore symptoms of an AUD and report lower rates of perceived need for treatment (Edlund et al., 2009). A study conducted by Edlund and colleagues (2009) using two large nationally representative samples of adults who reported an AUD found that only 1 out of every 9 individuals diagnosed with an AUD reported perceiving a need for treatment. These authors suggested a major reason for the disconnect between high rates of alcohol related problems and treatment of alcohol related problems can, in part be explained by the individuals perceived need for treatment.

Integrated treatment modalities that incorporate both interventions focused on substance use specifically as well as interventions that address broader psychopathology issues are also widely available to individuals suffering from AUD. Integrated treatments for co-occurring AUD and MDE are discussed more specifically in the Co-occurring Alcohol Use Disorder and Major Depressive Disorder Intervention section below.

Gender and Treatment

Research demonstrates men and women differ significantly related to onset, prevalence, and consequences related to alcohol use disorder; however, research on treatment rates and outcomes vary when examining differences between gender (Diel et al., 2007; Green et al., 2002; Satre, Mertens, & Weisner, 2004; White, 2020). Men and women receive treatment for alcohol use disorder at approximately similar rates (White, 2020); however, on average, there is a shorter time period between onset of alcohol dependence and attendance at first substance abuse treatment for women compared to men (Diehl et al., 2007). Disparities in treatment seeking and referral for treatment exist between men and women, with women being referred by professionals for inpatient treatment at lower rates than males, and more frequently referred to outpatient treatment programs (Bazargan-Hejazi et al., 2016). Men and women seeking substance abuse treatment at similar rates was not observed in the literature just ten years ago, with women significantly less likely to seek treatment for drug or alcohol related issues (Green et al., 2002). Significant barriers to treatment existed more blatantly for women than for men, with greater concerns regarding childcare responsibilities, financial restraints, and inadequate health insurance, among others (Green et al., 2002). However, the literature suggests stigma is a barrier for men seeking treatment for alcohol use because men, on average, perceive more stigma related to participating in alcohol treatment compared to women (Keyes et al., 2010). While these barriers for substance abuse treatment are still prevalent in today's society, the gap between men and women experiencing barriers when seeking treatment and completing treatment for alcohol dependence, is shrinking.

Research investigating treatment outcomes and gender differences among those who are diagnosed with AUD are mixed. Some researchers have found no clinically meaningful

difference between gender and treatment initiation and completion among those diagnosed with an AUD (Green et al., 2002). Others have found older adult women have greater abstinence rates from alcohol after successful completion of treatment at six months follow up, (Satre, Mertens, & Weisner, 2004) and seven year follow up after successful completion of outpatient substance abuse treatment compared to men (Satre, Blow, Chi, & Weisner, 2007). While additional research suggests women complete treatment at lower rates than men, although this finding was not statically significant (Bazargan-Hejazi et al., 2016). Thus far in the literature review on AUD, clarification between the previous diagnostic classification system and current classification system have been discussed. Additionally, the research is clear regarding the association between AUD and a variety of negative health consequences, psychosocial consequences, as well as societal stigma and barriers to seeking substance abuse treatment. Different treatment interventions for AUD have been discussed and associated treatment outcomes. Lastly, various risk factors have been discussed in relation to onset and course of developing AUD and the differences observed between men and women. However, arguably one of the largest risk factors for the development, maintenance and course of AUD is suffering from a co-occurring psychiatric illness, specifically, major depressive disorder (MDE).

Co-Occurring Alcohol Use Disorder and Major Depressive Disorder

A co-occurring diagnosis is provided when an individual meets criterion for two or more diagnoses based on the most current classification system, the DSM-5. Within clinical practice, co-occurring diagnoses are more commonly seen than individuals who strictly meet criteria for a single diagnosis (Avery & Barnhill, 2017). Alcohol use disorder and major depression co-occur at high rates (Tolliver & Anton, 2022). A positive association exists between harmful alcohol consumption and severity of depressive symptoms, meaning, when individuals consume more

alcohol, the severity of reported depressive symptoms are higher (Boden & Fergusson, 2011; Brière et al., 2014; DiPrete et al., 2019; Grant et al., 2004; Holma, Holma, & Isometsä, 2020; McHugh & Weiss, 2019; Pavkovic et al., 2018). Among the general population, co-occurring AUD and MDD is reported at a rate greater than 11.7% per year (McCance-Katz, 2020). Among individuals in inpatient treatment, co-occurring AUD and MDD is more frequently diagnosed in men than women and these individuals were more likely to be younger and report less perceived social support than other co-occurring psychiatric disorders (Davis et al., 2010; Holma, Holma, & Isometsä, 2020). Among inpatient mental health settings, outpatient mental health settings, and substance abuse treatment services, major depression was the most prevalent mental health diagnosis and alcohol was the most common substance of abuse (Burns & Teeson, 2002; McHugh & Weiss, 2019; Pavkovic et al., 2018). Taken together, these studies indicate the clinical importance of treating AUD and MDD as co-occurring disorders in treatment settings.

The specific relationship between AUD and MDD and or MDE is often complex and needs to be carefully evaluated in light of the individual's history, psychosocial context, and treatment history (Tolliver & Anton, 2022). First, it is important to discuss the diagnostic criteria needed to make a diagnosis of major depressive disorder (MDD). MDD is characterized by the DSM-5 as depressed mood, lack of interest in previously enjoyed activities, as well as significant changes in weight, appetite, energy and feelings of worthlessness, hopelessness, and difficulty concentrating for most of the day for a period of at least two weeks (American Psychiatric Association, 2013). A MDE is characterized by five or more of the aforementioned symptoms in a two week period. Women are twice as likely to develop MDD in their lifetime compared to men and approximately six to seven percent of adults in the general population suffer from MDD within a given year with the highest reported prevalence among individuals 18 to 25 years old

(Brière et al., 2014; Kessler, 2003; Otte et al., 2016; National Institute of Mental Health, 2019). MDD is a highly prevalent mental illness alone, therefore, deserves special attention when discussing AUD and the factors related to these co-occurring diagnoses.

Not only do AUD and MDD co-occur at high rates, but the severity of consequences related to these comorbid illnesses deserves special attention. Among a sample of Canadian youth from the general population, Archie and colleagues were interested in understanding the relationship between binge drinking and suicidality among depressed youth ages 15 to 24. Compared to Canadian youth who did not report co-occurring binge drinking and symptoms of depression, youth who reported symptoms of depression and no binge drinking behaviors were five times more likely to report suicidal ideation, and youth who reported co-occurring binge drinking behaviors and symptoms of depression were six times more likely to endorse suicidal ideation (Archie, Kazemi, & Akhtar-Danesh, 2012). Further, in a sample of both inpatient and outpatient psychiatric patients, individuals with a co-occurring AUD and MDD diagnosis were more likely to stay in a major depressive episode longer, report more suicidal ideation and attempts, as well as increased severity of depression (Holma, Holma, & Isometsä, 2020). Taken together, these studies suggest the severity of consequences related to experiencing co-occurring AUD and MDD in both the general population as well as clinical samples.

In addition to the suicide risk associated with these commonly co-occurring illnesses, both AUD and MDD are associated with emotion regulation difficulties. Emotion regulation difficulties are defined by utilizing negative coping skills such as numbing emotion by drinking to cope due to the absence of healthy emotion coping, such as, problem solving (Bradizza et al., 2018). When compared to individuals who do not report co-occurring psychiatric illnesses, individuals who suffer from one or more co-occurring diagnoses report increased difficulties

regulating emotions (Bradizza et al., 2018). Individuals who have difficulty with emotion regulation are much more likely to experience more severe symptoms of psychiatric illnesses and lack of social support.

Inequalities exist among various racial and ethnic groups related to the development and severity of co-occurring AUD and MDD, and seeking and maintaining healthcare (Bailey, Mokonogho, & Kumar, 2019; Dunlop et al., 2003; McHugh & Weiss, 2019). Service utilization for major depression and substance use disorder also have stark contrasts when comparing a sample of White and Black individuals. However, a significant effect was found among Black individuals suffering from co-occurring AUD and MDD illnesses. Black individuals are less likely compared to Whites to utilize outpatient treatment services for the comorbid disorders (Hatzenbuehler et al., 2008; Nam, Matejkowski, & Lee, 2017). The same difference was not observed among inpatient samples, indicating Blacks and Whites with co-occurring AUD and MDD are seeking inpatient treatment at similar rates (Hatzenbuehler et al., 2008). The observed inequality between Black, Indigenous, and People of Color (BIPOC) individuals compared to Whites may be explained by the lack of economic resources available to those of minority status, including lower income, lack of private health insurance, employment, and less years of education (Dunlop et al., 2003). In addition to fewer economic resources, individuals of minority status also experience higher prevalence of life-threatening illnesses and with the aforementioned lack of economic resources and mental health availability, major depression is one of the most commonly reported mental health diagnosis among individuals of minority status (Bailey, Mokonogho, & Kumar, 2019; Dunlop et al., 2003). Whites were significantly more likely to utilize services for affective disorders (mood and anxiety) compared to Blacks; however,

differences between Whites and Blacks of service utilization for substance abuse alone was not observed (Hatzenbuehler et al., 2008; Nam, Matejkowski & Lee, 2017).

Women with significant mental health problems, such as psychiatric comorbidities, are much less likely to initiate substance abuse treatment for alcohol compared to other women (Green et al., 2002). When mental illness is added into substance use and stigma, an increase in self-stigma and blame for their mental health condition is observed creating an even larger gap for seeking and attending substance abuse treatment for both men and women (Bazargan-Hejazi et al., 2016; Crapanzano et al., 2019; Keyes et al., 2010). Additionally, among individuals who enter substance abuse treatment, women are more likely to report severe depressive symptoms compared to men who enter substance abuse treatment (Bazargan-Hejazi et al., 2016; Green et al., 2002).

Relationship Between Alcohol Use Disorder and Major Depressive Disorder

A variety of models have attempted to explain the relationship, development, maintenance, and progression of co-occurring AUD and MDD. Among the more researched models regarding the relationship between AUD and MDD is the self-medication model and the social learning model. The self-medication model posits that individuals will abuse alcohol to help cope with negative emotions (Khantzian, 1987). Specifically, among adolescent and young adult populations, they are more likely to report drinking alcohol after a negative emotional event. The social learning model suggests after exposure to alcohol by modeling from peers or family systems, adolescents are more likely to engage in alcohol use compared to other adolescents who have not been exposed to peer or family modeling of alcohol use (Akers et al., 1995).

A study conducted by Tomlinson and Brown (2012) aimed at comparing the applicability of the social learning model and self-medication model as applied to a sample of adolescents in 8th grade who abused alcohol, as well as the context in which they were drinking alcohol (i.e., solitary or socially). The results demonstrated a significant association between higher self-reported depressive symptoms and more frequent drinking, establishing support for the self-medication model. Further, the authors found that adolescents with advanced knowledge regarding the effects of alcohol on social performance were more likely to engage in problematic alcohol use compared to adolescents without prior knowledge regarding the effects of alcohol on socializing. The latter finding provides support for the social learning model of alcohol use, specifically in an adolescent sample. Interestingly, Mohr and colleagues (2001) conducted a study with interest in examining drinking behaviors in response to both negative and positive interpersonal experiences. Similar to Tomlinson and Brown's (2012) findings, adults were more likely to engage in solitary drinking behavior after reporting negative interpersonal experiences (Mohr et al., 2001). However, Mohr and colleagues (2001) also demonstrated individuals were just as likely to engage in social drinking after experiencing a positive interpersonal experience. Overall, Tomlinson and Brown (2012) demonstrated support for the self-medication model of alcohol use and depression with more significant depressive symptoms predicting more frequent drinking behaviors, while Mohr and colleagues (2001) also found support for the self-medication model and also suggested drinking behavior is an intricate idea with numerous potential antecedents.

When looking at the relationship between AUD and MDD in adult samples and the differences between men and women, women who are diagnosed with an alcohol dependence and long-term alcohol use are much more likely to also be diagnosed with MDD compared to

men (Khan et al., 2013; McHugh & Weiss, 2019; Prescott, Aggen, & Kendler, 2000).

Furthermore, young-adult women with a diagnosis of depression are much more likely to develop dependence on alcohol later in life, compared to men (Edwards et al., 2014; McHugh & Weiss, 2019). Additionally, self-medicating depressive symptoms with drugs and alcohol is commonly seen to increase substance use rates and often contribute to increased reports of depressive symptom severity.

Another way researchers have viewed the relationship between AUD and MDD is within a causal relationship, with one of the diagnoses preceding the other. There are three plausible pathways that have been examined by researchers to explain the causal relationship between AUD and MDD; 1) MDD precipitates AUD; 2) AUD precipitates MDD; and 3) there is a bidirectional relationship between AUD and MDD (Boden & Fergusson, 2011). Brière and colleagues (2014) conducted a longitudinal study in which the temporal ordering of the development of co-occurring AUD and MDD was assessed over four developmental periods. Among individuals diagnosed with co-occurring AUD and MDD at age 30, MDD developed before AUD in 57% of the cases compared to AUD developing first in 41% of the individuals studied. Conversely, other researchers have found evidence for a unidirectional pathway from AUD and MDD, where alcohol use disorder developed prior to MDD (Fergusson, Boden, & Horwood, 2009).

Gender differences have been observed when examining whether AUD or MDD occurs first, with some support for adolescent women with MDD more likely to abuse alcohol and develop subsequent AUD in adulthood (Edwards et al., 2014). Similarly, a bidirectional pathway was observed between onset of AUD and MDD among preadolescent females and not for males (Danzo, Connell, & Stormshak, 2017). Furthermore, Rosenthal and colleagues (2018) conducted

a prospective research design examining the relationship between alcohol use and related consequences among a female, college age sample and onset of depression. They found a greater risk for the onset of depression among women aged 18 to 20 in college, subject to experiences of negative consequences related to alcohol consumption even after controlling for amount of alcohol consumed and other confounding variables (not getting along with roommate and decreased social support; Rosenthal et al., 2018). Lastly, there is some research suggesting men develop an AUD before depression (Prescott, Aggen, & Kendler, 2000).

Taken together, these findings suggest the relationship between AUD and MDD is complex, offering multiple possible pathways for the development of co-occurring AUD and MDD, while suggesting these pathways are not mutually exclusive. For instance, research suggests individuals are more likely to engage in problematic drinking behavior after or during a negative emotional experience, providing support for the self-medication model (Mohr et al., 2001; Tomlinson & Brown, 2012). Research further suggests individuals with knowledge of the effects of alcohol on interpersonal situations are more likely to engage in increased drinking behaviors in social settings, suggesting support for the social learning model as well (Mohr et al., 2001). The relationship between AUD and MDD is further salient when the difference between men and women are discussed. Women are far likelier to be diagnosed with co-occurring AUD and MDD compared to men (Khan et al., 2013; McHugh & Weiss, 2019; Prescott, Aggen, & Kendler, 2000), while additional literature suggests women develop MDD earlier in their development and are diagnosed with AUD later in development compared to men (Edwards et al., 2014).

Alcohol Use Disorder and Major Depressive Disorder in Young Adulthood

As discussed thus far in the review, AUD and MDD are two of the most common co-occurring illnesses among the general population (McCance-Katz, 2020). Data from the NSDUH 2019 survey year have consistently shown that individuals from the general population who engage in problematic alcohol behaviors, such as binge drinking, are significantly more likely to report a co-occurring major depressive episode within the past year (McCance-Katz, 2020). For young adults ages 18 to 25, episodes of major depression continue to rise over the years with increased risk of suicidality (McCance-Katz, 2020). On average, college age individuals typically range from 18 to 24 years old, and among these individuals they have unique prevalence rates when it comes to meeting criteria for an AUD and/or co-occurring MDD (Capron et al., 2018). As high as 20% of college students in a large nationally representative sample met criteria for a DSM-IV AUD and among those who met criteria for an AUD, 19 % also met criteria for a major depressive diagnosis (Capron et al., 2018). As such, young adults are uniquely at risk for developing both an AUD and MDD compared to other age groups. Researchers have demonstrated a unique pattern of drinking behaviors among young adults (Lee et al., 2012) in which they engage in more frequent binge drinking behaviors compared to other age categories (Marczinski et al., 2005) and report higher symptoms of depression compared to other age groups (Mojtabai et al., 2016).

Co-occurring Alcohol Use Disorder and Major Depressive Disorder Intervention

Research that has investigated therapeutic interventions such as cognitive behavioral therapy (CBT; Baker et al., 2012; Magill & Ray, 2009), motivational interviewing (Baker et al., 2012; Vasilaki et al., 2006), and acceptance and commitment therapy (ACT; Byrne et al., 2019) have shown positive effects for the reduction of alcohol consumption. Further, research indicates reduction in depressive symptoms has been aided using CBT, motivational interview, ACT

(McHugh & Weiss, 2019; Riper et al., 2014), and neurobiologically based interventions such as repetitive transcranial magnetic stimulation (Tang et al., 2021). Therapeutic interventions that target co-occurring AUD and MDD conjointly have received less research attention (Brown et al., 2006; Hesse, 2009; Lydecker et al., 2010; Riper et al., 2014; Tang et al., 2021). Integrated interventions are designed to target co-occurring illness, such as AUD and MDD during the same course of treatment (Riper et al., 2014). One such integrated intervention proposed initially by Brown and colleagues (2006) and later adapted by Lydecker and colleagues (2014) involved integrated cognitive behavioral therapy (ICBT) with veterans who were diagnosed with a co-occurring substance disorder (66% alcohol dependent) and a major depressive episode within the past year. The ICBT consisted of interventions which targeted symptoms of depression and maladaptive thoughts and schemas focused on addiction (Lydecker et al., 2010). The authors compared ICBT to routine 12-step facilitation of the AA/NA model and found ICBT demonstrated better substance use outcomes at one year and 18 months post treatment completion (Lydecker et al., 2010). Additionally, ICBT participants consumed less alcohol in the year following treatment compared to a noticeable increase in alcohol consumption among participants following the 12-step facilitation therapy.

Using a different population focused on young people ages 15 to 25, Hides and colleagues (2010) were also interested in examining integrated CBT, specifically, “Self-Help for Alcohol/other Drug use and Depression for Young People” (SHADEY; Hides et al., 2007) for the treatment of depression and substance misuse. SHADEY used a combination of CBT, motivational interviewing, and mindfulness skills incorporated into a harm reduction framework (Hides et al., 2007). Hides and colleagues (2010) found significant reductions in symptoms of depression as measured by the Hamilton Depression Rating Scale (HAM-D; Dozois, 2003).

However, a reduction in consumption of alcohol after participating in the integrated CBT intervention did not yield significant results and alcohol consumption throughout treatment remained steady. Conversely, Cornelius and colleagues (2011) found adolescents who participated in integrated CBT and motivation enhancement therapy (MET), specifically targeted for co-occurring MDD and AUD, reported greater improvement in both alcohol related symptoms and depressive symptoms at a two year follow up.

When studying differences between integrated treatment interventions for AUD and MDD versus single-focus interventions, Riper and colleagues (2014) conducted a meta-analysis to investigate the effectiveness of integrating CBT and motivational interviewing (MI) interventions for young adults with co-occurring AUD and MDD diagnoses. The authors did not find a statistically significant difference in treatment outcomes between interventions that focused on specifically AUD or MDD and integrated interventions that focused on the co-occurring component. Although, a study conducted by Morley and colleagues (2016) who examined an outpatient sample of individuals reporting both AUD and MDD, found drinking outcomes (longer time to lapse, longer time to relapse, and higher percentage of days abstinent) were greater for the integrated care model of CBT compared to counseling as usual for AUD. However, the authors did not find significant results related to reduced symptoms of depression dependent on integrated care and care as usual (Morley et al., 2016).

Furthermore, Hunter and colleagues (2012) used a randomized controlled trial (RCT) to investigate whether using an integrated intervention (CBT combined with care as usual), or control (care as usual following 12-step approach), would reduce substance use among outpatient individuals reporting co-occurring AUD and MDD after treatment completion. The authors found participants in both the treatment intervention and control condition saw improvements

(statistically significant) in depressive symptoms (Hunter et al., 2012). Participants in both conditions also reported (significantly) less days with substance use. However, reduced number of drinks during a drinking day were reported by participants in the intervention condition (Hunter et al., 2012).

Some research suggests that individuals with a co-occurring AUD and MDD do not report worse MDD outcomes following treatment (Davis, et al., 2010; Mulder, 2006). Other researchers find individuals who were least likely to achieve remission from depression symptoms were those with the highest reported alcohol consumption risk compared to low risk and no risky alcohol use (DiPrete et al., 2019). Additionally, individuals who report co-occurring AUD and MDD at admission to a residential treatment program were comparable to individuals reporting AUD alone when examining time to first alcohol related relapse after treatment completion (Suter et al., 2011). Therefore, it appears treatment outcome depends on outcome of interest, whether remission in depressive symptoms is the main focus or abstinence of drinking behavior is the focus of treatment.

Therefore, it appears successful outcomes of integrated treatment for co-occurring AUD and MDD depend on type of interventions utilized and specific area of focus, whether that be MDD was more heavily emphasized, or AUD was more heavily emphasized during treatment. Altogether, meta-analyses that have examined integrated treatments for co-occurring AUD and MDD compared to treatment as usual, or single-focus interventions, integrated approaches have been found to be more effective at reducing depressive symptoms and problematic alcohol consumption compared to treatment as usual and single focus interventions (Hesse, 2009; Riper et al., 2014). When factoring in gender and treatment completion, little research has investigated the impact of gender differences in treatment completion when an individual is presenting with

co-occurring AUD and MDD. Therefore, additional research on gender differences and the rate of treatment completion depending on co-occurring AUD and MDD or single AUD diagnosis is needed to enhance the literature and promote additional evidence for the need of integrated treatment.

Rationale

When conducting a literature review search on google scholar using the key words ‘alcohol use’ and ‘major depression’, almost 2.5 million results appear within seconds. The amount of research on these co-occurring psychiatric illnesses is large. Rates of AUD within the last year have risen to 66% (Mannes et al., 2020) and up to 80% in individuals from the general population reported problematic alcohol use in their lifetime (Bergman et al., 2013). As discussed, AUD and a lifetime history of MDE significantly co-occur among the general population with rates as high as 11.7% (McCance-Katz, 2020). This rate does not account for individuals currently hospitalized or receiving treatment within an inpatient residential facility, indicating the rate of comorbidity between these disorders may be even more elevated. Furthermore, the literature has adequately conveyed that co-occurring AUD and a lifetime history of MDE disproportionately affect individuals of minority status, including women, Black, Indigenous and people of color (BIPOC; Bailey, Mokonogho, & Kumar, 2019; Dunlop et al., 2003; McHugh & Weiss, 2019).

Additionally, research has highlighted the negative consequences related to these co-occurring disorders. Individuals who report alcohol related problems, such as binge drinking, and major depressive symptoms are much more likely to experience suicidal ideation, frequent binge drinking behavior, increased time within a major depressive episode, report more suicidal attempts, increased severity of depression, and have greater difficulty with emotion regulation, at

a rate six times greater than individuals who do not report binge drinking and depressive symptoms (Archie, Kazemi, & Akhtar-Danesh, 2012; Bradizza et al., 2018; Holma, Holma, & Isometsä, 2020; Tang et al., 2021).

Although an abundance of literature exists on AUD and MDE regarding treatment outcomes, the research remains inconclusive depending on the outcome of interest or whether reduction in severity of depressive symptoms or sustained remission from alcohol use is the target of focus. Additionally, research that examines the need for integrated treatment for co-occurring AUD and MDE remains incomplete. Specifically, lingering questions remain as to whether integrated interventions are beneficial for men or women reporting these conditions, due to the lack of focus on gender and treatment completion research with co-occurring AUD and MDE. Therefore, additional research regarding treatment completion of various treatment types for individuals with co-occurring AUD and MDE may be beneficial to help add clarity to the ever-growing research literature on this topic.

It is important to note that for an individual to demonstrate improved outcomes following treatment, they must first complete treatment. When looking at intervention outcome studies, the data is often skewed due to eliminating participants who did not complete the treatment (Najavits, 2015). Throwing out participants who did not complete treatment makes treatment outcome studies less relevant to actual clinical practice where treatment drop out is common. Studies suggest treatment dropout is most common among younger individuals presenting with increased psychological distress (Andersson et al., 2018). As such, treatment completion is different than treatment efficacy, making treatment drop-out and completion relevant to study separately. This study focuses on treatment completion rates rather than treatment improvement due to vast differences between treatment modalities and what population they are geared toward

(Tuchman, 2010). For example, traditional outpatient substance abuse programs and self-help community type groups have been implementing male-oriented programs for years based on the magnitude of research on male substance abusers (Tuchman, 2010). Women who attended these programs were more likely to experience increased levels of shame and guilt and drop out of these programs at higher rates (Tuchman, 2010). Accordingly, this study aims to reveal which treatment modality has greater rates of completion between men and women.

Further, this research study aimed to raise awareness regarding the potential need for individualized treatment for the most common substance abused and co-occurring psychiatric illness. Two primary aims were examined using archival data from the 2019 National Survey on Drug Use and Health. The first aim of this study was to examine if individuals who report co-occurring DSM-IV alcohol abuse disorder and/or dependence, and lifetime history of a DSM-IV major depressive episode complete treatment at lower rates compared to individuals who report a single DSM-IV alcohol abuse and/or dependence disorder without a lifetime history of MDE. This writer hypothesized 1) young adults ages 18 to 36 who met criteria for DSM-IV alcohol dependence and/or alcohol abuse as well as acknowledged a history of MDE in their lifetime would have lower rates of successful treatment completion across all treatment modalities compared to individuals who only report alcohol dependence and or alcohol abuse symptoms and an absence of a history of MDE symptoms. This hypothesis was in line with a previous study that included a nationally representative sample of substance use treatment centers within the United States and found that individuals who endorsed a co-occurring psychiatric disorder and substance abuse disorder were more likely to leave substance abuse treatment prematurely compared to individuals who did not endorse a psychiatric comorbidity (Krawczyk et al., 2017). Other studies promote similar findings, suggesting individuals with a single AUD diagnosis are

more likely to complete treatment and have more successful outcomes without the presence of a co-occurring psychiatric illness (Schuckit, 2009).

This writer further hypothesized that 2) treatment modality will moderate the relationship between major depressive episodes/AUD and treatment completion. Specifically, for individuals who attend treatment programs with a mental health focus, the relationship between MDE status and treatment completion will be weaker. This hypothesis is based on research which suggests individuals who experience co-occurring psychiatric and substance use disorders and participate in more therapeutically based treatment conditions, such as rehabilitation or inpatient residential care, evidenced more treatment completion and improved outcomes compared to shorter term interventions, such as brief encounters in hospital or community settings (Baker et al., 2012; Schuckit, 2009; Torrens et al., 2012). Treatment facilities with a mental health focus, unlike brief treatment settings, such as hospital settings, typically have a greater number of resources and providers trained in dual diagnoses, and as such, individuals with co-occurring substance abuse and psychiatric diagnoses are more frequently provided in-depth integrated care creating a more conducive environment to treatment completion (Torrens et al., 2012).

The second aim of this study was to examine the differences between men and women who report alcohol abuse and dependence on treatment outcome. Based on previous literature which suggests that women with an AUD often face greater challenges (i.e., childcare responsibilities, trauma, greater physical health concerns, and co-occurring disorders) when accessing and completing treatment compared to men (McCaul et al., 2019), this writer hypothesized that 3) women will have lower rates of successful treatment completion across all treatment modalities compared to men. This writer further hypothesized that 4) treatment facility type will moderate the relationship between gender and treatment outcome. Specifically, in the

context of women who attended treatment at a facility with a mental health focus, the relationship between gender and treatment completion will be weaker. This hypothesis is based on research which suggests women, on average, stay in inpatient mental health treatment settings for longer periods leading to lower alcohol consumption following treatment (McCrary et al., 2020). Furthermore, women, on average, have higher prevalence rates of co-occurring AUD and mood disorders and present with more acute presentations and symptomology compared to women without a co-occurring presentation (McCrary et al., 2020). This suggests that women with an AUD may benefit more from a treatment program with a mental health focus compared to a hospital or community setting treatment program.

Chapter Three: Method

Participants

Data used for the current study pulled from the Substance Abuse and Mental Health Services Administration's (SAMHSA) 2019 NSDUH (N = 67,625), which included a nationally representative sample of individuals from all of the 50 states in the United States and the District of Columbia (Center for Behavioral Health Statistics and Quality, 2020). The original pool of participants included civilian individuals residing within homes, apartments, college dormitories, group homes, homeless shelters, and civilian homes on military bases. The survey excluded individuals who resided in institutionalized settings such as hospitals and prisons. Additionally, sample interviews were conducted in the larger states to support small area estimation and make more accurate state level estimations (California = 4,560 completed interviews; Florida, New York, and Texas = 3,300 completed interviews; Illinois, Michigan, Ohio, Pennsylvania = 2,400 completed interviews; Georgia, New Jersey, North Carolina, and Virginia = 1,500; Hawaii = 967; remaining 37 states and the District of Columbia = 960 completed interviews). Further, age ranges in the 2019 survey were collected to allocate for the general population and more accurate estimation of drug use and mental health (Youths aged 12 to 17 and Young Adults aged 18 to 25 equaled 25 percent of total sample; Adults aged 26 to 34 equaled 15 percent; Adults 35 to 49 equaled 20 percent; and Adults 50 and older equaled 15 percent of total sample).

The current study aimed at investigating major depressive disorder and problematic alcohol use using the DSM-IV alcohol abuse and alcohol dependence disorders among young adults ages 18 to 25. Due to the small sample size of young adults aged 18 to 25 who identified an alcohol abuse and/or dependence disorder in the 2019 NSDUH, individuals aged 26 to 34 were also included in the sample.

Procedures

Data from the 2019 NSDUH was cleaned up and coded to include only variables which included the recoded alcohol dependence and abuse disorder, age, treatment type, and treatment outcome.

Measures

The NSDUH survey measured prevalence of both substance use and mental health concerns among a nationally representative sample of non-institutionalized individuals in the United States (Center for Behavioral Health Statistics and Quality, 2020). The survey included abundant information regarding the use of alcohol, illicit drugs, tobacco and several supplemental components regarding mental health, including depression and other serious and persistent mental illnesses.

Establishing Alcohol Dependence or Abuse

All participants aged 18-25 and 26-34, who were classified as having a recoded alcohol abuse and/or alcohol dependence disorder on the NSDUH were included in the current study. Participants who did not report an alcohol abuse and/or alcohol dependence disorder were excluded and not used due to the focus on AUD.

Alcohol Dependence Disorder. The measure for a DSM-IV alcohol dependence disorder in the 2019 NSDUH survey included a recoded alcohol dependence variable designed to measure alcohol use dependence based on the criteria set forth in the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM IV; American Psychiatric Association, 1994; Center for Behavioral Health Statistics and Quality, 2020). A participant was classified as having an alcohol dependence if they answered yes to three or more of the following six dependence criteria: (1) “Spent a great deal of time over a period of a month

getting, using, or getting over the effects of the substance;” (2) “Unable to keep set limits on substance use or used more often than intended;” (3) “Needed to use substance more than before to get desired effects or noticed that using the same amount had less effect than before;” (4) “Unable to cut down or stop using the substance every time he or she tried or wanted to;” (5) “Continued to use substance even though it was causing problems with emotions, nerves, mental health, or physical problem;” (6) “Reduced or gave up participation in important activities due to substance use” (Center for Behavioral Health Statistics and Quality, 2020).

Alcohol Abuse Disorder. Additionally, the measure for DSM-IV alcohol abuse disorder included a recoded alcohol abuse variable designed to measure presence of a DSM-IV alcohol abuse disorder based on the criteria of the DSM-IV. The alcohol abuse disorder variable was coded in the NSDUH if a participant responded positively to one or more of the following four abuse criteria as outlined in the DSM-IV: (1) “Respondent reported having serious problems due to substance use at home, work or school;” (2) “Respondent reported using substance regularly and then did something where substance use might have put them in physical danger;” (3) “Respondent reported substance use causing actions that repeatedly got them in trouble with the law;” (4) “Respondent reported having problems caused by substance use with family or friends and continued to use substance even though it was thought to be causing problems with family and friends” (Center for Behavioral Health Statistics and Quality, 2020). In the 2019 NSDUH, the alcohol abuse and alcohol dependence disorder was combined as a recoded variable to account for all participants who endorsed either an alcohol abuse or dependence disorder. This recoded variable was used to determine whether an individual met criteria for either an alcohol abuse or dependence disorder.

Lifetime History of a Major Depressive Episode

Similar to variables involving alcohol dependence and abuse, the items of interest regarding major depressive symptoms are recoded variables that were constructed and compiled from raw data variables. A participant was coded as having a lifetime major depressive episode (MDE) if they responded ‘yes’ to at least five out of the nine criteria of an MDE in the DSM-IV. For a participant to meet criteria for a lifetime MDE, they must have responded ‘yes’ to either: (1) “Depressed mood;” or (2) “loss of interest or pleasure in daily activities” (Center for Behavioral Health Statistics and Quality, 2020), in addition to four other criteria. The lifetime MDE item used for the current study was coded as a “Yes/No” item based on how the participant responded to the raw variables including depression.

Treatment Type

To assess treatment type, the NSDUH asked participants the main drug for which they attended their last or current treatment, treatment type, and outcome of their last or current treatment. The primary focus of this study was alcohol abuse and/or dependence; therefore, focus was on alcohol as the primary drug for treatment. The various types of treatments the NSDUH included in the survey were: (1) “Hospital overnight as an inpatient;” (2) “A residential drug/alcohol rehab facility overnight;” (3) “A drug or alcohol rehab facility as an outpatient;” (4) “A mental health center or facility as an outpatient;” (5) “An emergency room;” (6) “A private doctors office;” (7) “A prison or jail;” (8) “Self-help group, AA/NA;” (9) “Some other place;” (40) “Home, family, friends;” (41) “School, college;” (42) “Church/religious/spiritual influence;” (45) “Rehab or intervention facility;” (48) “Counselor, therapist, psychologist, psychiatrist;” (49) “Court-mandated sponsored program;” (64) “Methadone clinic/program;” (65) “Name of facility or program given” (Center for Behavioral Health Statistics and Quality, 2020).

The treatment modality variables were grouped into three facility types: (1) hospital only (codes 1, 5, 6, and 64 were grouped within hospital only); (2) program with mental health focus (codes 2, 3, 4, 45, and 48 were grouped within mental health focus facility only); (3) family and community support only (codes 8, 9, 40, 41 and 42 were grouped within family and community support). These three groupings were made according to likeness in services provided and facility type. Additionally, this researcher conceptualized these groupings provide an accurate representation of the various ways in which substance abuse treatment services were provided and show meaningful differences between the groups due to the facility distinctions. Variables (7) “A prison or jail,” (49) “Court-mandated/sponsored program,” (65) “Name of facility or program given” were omitted from the aforementioned groupings due to their lack of cohesion among the three facility types.

Treatment Completion

To assess treatment completion, the NSDUH asks participants a variety of outcomes related to treatment completion or non-completion, including: (1) “You are still in treatment;” (2) “You successfully completed treatment;” (3) “you left because you had a problem with program;” (4) “you left because you couldn’t afford to continue;” (5) “you left because your family needed you;” (6) “your last treatment had some other outcome;” (7) “discontinued treatment, success unknown;” and (48) “Discontinued treatment, success unknown” (Center for Behavioral Health Statistics and Quality, 2020). The item of interest related to treatment outcome involves whether or not the participant completed treatment, therefore, item two was analyzed against the remaining items three, four, five, seven, and 48 as the participant did not complete treatment if he or she selected one of these response options. Participants who responded “yes” to item one were removed from the study as they were still in treatment at the

time they completed the survey. Therefore, the treatment completion variable was coded as Yes/No outcome for the current study.

Data Analysis

Research Design

First, frequency statistics were run to determine how many participants reported alcohol abuse or dependence, major depressive episodes, and how many participants completed or did not complete treatment.

Hypothesis 1

Young adults ages 18 to 25 and 26 to 34 who meet criteria for DSM-IV alcohol dependence and/or alcohol abuse as well as a history of MDE will have lower rates of successful treatment completion across all treatment modalities compared to individuals who only report alcohol dependence and or alcohol abuse symptoms and an absence of MDE symptoms. The independent variable of interest in this study, major depressive disorder, was coded as a dichotomous variable (yes or no). The dependent variable of interest was treatment outcome (participant completed treatment or did not complete treatment) which was also classified as a dichotomous variable.

Hypothesis 2

Treatment modality will moderate the relationship between major depressive disorder and treatment completion. Specifically, for individuals who attended facilities with a mental health focus, the relationship between a lifetime history of MDE and treatment completion will be weaker.

To investigate hypotheses one and two, a binary logistic regression statistical analysis was conducted. Major depression was included as an independent variable and treatment

outcome entered as dependent variable. A moderation analysis was run to investigate interactive effect of treatment type and depression on treatment outcome. Major depression was entered as the independent variable, and the interaction term of depression X treatment type was added to investigate moderation effect. A logistic regression analysis is a model for predicting categorical outcomes (dependent variable) from categorical (or continuous) variables (Field, 2009), and therefore was the most appropriate statistical analysis for the present research question.

Hypothesis 3

Women ages 18 to 36 with an alcohol use and or dependence disorder will have lower rates of successful treatment completion across all treatment modalities compared to men with a single AUD. In the 2019 NSDUH, gender was coded as either (1) male; or (2) female, therefore this variable was a binary or categorical variable.

Hypothesis 4

Treatment facility type will moderate the relationship between gender and treatment outcome. Specifically, for women who attended treatment within a rehabilitation setting, the relationship between gender and treatment completion will be weaker.

To investigate hypotheses three and four, a binary logistic regression was conducted to examine whether gender, alcohol abuse, alcohol dependence, and major depressive episodes, or lack thereof, predict treatment outcome. Specifically, a moderation analysis was run investigating the interactive effect of treatment facility type on gender and treatment outcome. Major depression and gender were entered as their own independent variable, and the interaction term of gender X treatment type was added to investigate moderation effect. Treatment outcome was entered as the dependent variable.

The assumptions of independence, absence of multicollinearity, and absence of outliers were assessed before completing the analyses. The assumption of independence in logistic regression states that the categories of the dependent variable are not related to each other. Multicollinearity was assessed by running correlations to determine if the independent variables were too highly correlated.

Power and Effect Size

G*Power computer software program (Erdfelder et al., 1996) was used to estimate the minimum sample size required to detect a medium size effect using a priori power analysis. Using the assumptions of two tails, $\alpha = 0.05$, and .80 power, we would need a sample of 55 participants to detect a medium effect size.

Software

Data was analyzed using IBM SPSS statistical software version 28.

Ethical Statements

Consent

During the field interview phase of data collection in the 2019 NSDUH, the interviewer obtained consent from participants prior to demographic screening and data collection. During the informed consent phase, the interviewer handed the participant a copy of the Study Description as seen in Appendix A which detailed the participants information was strictly confidential and participation was voluntary. After discussion of the study description, the field interviewer read either the adult informed consent (found in Appendix B) for participants ages 18 and older, or the parent permission to interview youth informed consent for participants aged 12 to 17. The combination of the informed consent and study description allowed the participants to

make an informed decision whether or not to participate in the survey. For the purpose of the current study, data will only be collected from participants aged 18 to 25.

Risk and Deception

There was no risk of physical, mental harm or of social discomfort to participants indicated in the current study, as the study was archival in nature. Additionally, there was no deception of participants involved due to the archival nature of the current study.

Confidentiality

To protect confidentiality of all participants, identifying information such as name, phone number, and address were removed from the public access data. In addition, geographical location such as, census region, state and other geographic identifiers were removed from the public access data as well as household link between participants of the same household was removed. To protect confidentiality throughout the course of the original study, the data collection and procedure were created to promote privacy of participants. Participants listened to prerecorded headphones during especially sensitive questions to limit the field interviewer knowing which item they were responding to.

Additional steps, such as combing through the data to ensure participants could not be identified by combining a number of variables at one time, this process was done in three steps: substitution, removal, and subsampling. Substitution involved substituting variables from a comparable donor record to make it more difficult to identify a single record from another participants. Removal included removing randomly chosen records to reduce the likelihood of finding or determining whether one participant was in the public use data set. Lastly, subsample introduces even more uncertainty that a particular participant was recorded in the database. Data

will be retained for five years after study completion and stored in a double locked encrypted file.

Information and Debriefing

An introductory letter was sent to each household prior to the beginning of field interviews and data collection for the original study. Debriefing information was not detailed in the original study methodology. In the current study, no deception of participants was noted, and identification of participants was unknown; therefore, the current study did not hold a debriefing session with participants.

Retention of Data

Data will be kept and confidentially stored on a double locked encrypted file for up to five years after submission of Clinical Research Project to IDUN. Data will only be accessible by primary researcher or committee chair. After five years, data will be destroyed.

Permissions

The Substance Abuse and Mental Health Data Archive offers a public-use data archive of the 2019 NSDUH study, requiring no user permission.

Chapter Four: Results

The total sample consisted of 79 participants, aged 18 to 36, who were classified as having an alcohol abuse and or dependence disorder. Out of the 79 total participants, 39% were also classified as having a lifetime history of at least one major depressive episode (MDE) and 61% were determined to not have a lifetime history of an MDE. The sample consisted of 38 males (48.1%). Over half of the sample was comprised of individuals identifying as White (55.7%), followed by 21.5% of individuals identifying as Hispanic, 8.9% identifying as Black, and 5.1% identifying as Biracial.

Prior to running the analyses, assumption testing was conducted to ensure the findings could be adequately generalized. The VIF and Tolerance values of the independent variable of the study (lifetime history of a major depressive episode) were within expected range, indicating that the assumption of no multicollinearity had been met. Further, the Durbin-Watson statistic for all variables, which indicates autocorrelation of residuals was within anticipated range, suggesting the assumption of no autocorrelation has been met. Lastly, to test for linearity and homoscedasticity, and ensure these assumptions have been met, a normal P-P plot of regression standardized residuals was examined; this plot showed the data gathered around the distribution line, thus the assumptions of linearity and homoscedasticity have been met.

Hypothesis One

This writer hypothesized that young adults ages 18 to 36 who met criteria for DSM-IV alcohol dependence and/or alcohol abuse as well as a lifetime MDE would have lower rates of successful treatment completion across all treatment modalities compared to individuals who only reported alcohol dependence and or alcohol abuse symptoms and an absence of MDE

symptoms. To test hypothesis one, a binary logistic regression was used to examine rates of treatment completion (DV) among individuals with a co-occurring alcohol abuse and/or dependence diagnosis and a major depressive disorder. All participants in the sample were classified as having an alcohol abuse and/or dependence disorder, therefore, the independent variable of interest was lifetime major depressive disorder. Table 1 depicts all participants who completed or did not complete treatment. The logistic regression model was statistically significant, as shown in Table 2, $b = 1.82$, $\text{Exp}(B) = 6.22$, $p = .005$. The model explained 17.9% (Nagelkerke R²) of the variance in treatment completion. Results of the first hypothesis indicated that individuals with a lifetime history of MDE and AUD were 6.2 times more likely to not complete treatment compared to individuals with a single AUD diagnosis.

Table 1

Crosstabulation including participants who completed or did not complete treatment with a lifetime major depressive episode.

	Completed Treatment		Total
	Yes	No	
Lifetime Major Depressive Episode			
Yes	19	11	30
No	43	4	47
Total	62	15	77

Table 2

Logistic regression analysis investigating the impact that a lifetime history of MDE has on treatment completion

	Exp(B)	SE	95% CI		p
			LL	UL	
Hypothesis 1					
Constant	.093	.523			<.001
Major Depressive Episode	6.224	.646	1.756	22.059	.005

Hypothesis Two

A moderation analysis was used to determine whether treatment modality (i.e., hospital setting, mental health focus facility, or family/community treatment setting) would moderate the relationship between a lifetime history of MDE and treatment completion. Table 3 illustrates the participants who completed or did not complete the various treatment facilities. Using Hayes' (2012) PROCESS software tool in SPSS, a simple moderation model was examined to determine the extent that treatment type impacted treatment outcome among individuals with co-occurring major depressive disorder. The results of the moderation analysis were insignificant as shown in Table 4, $b = .60$, 95% CI [-1.36, 2.57], $p = .548$. Treatment facility did not moderate the association between lifetime MDE and treatment completion. Consistent with hypothesis one, the moderation analysis demonstrates that the presence of a lifetime MDE remained significant in this model $b = 1.81$, 95% CI [.43, 3.19], $p = .010$, thus indicated major depressive episodes had a large influence on whether or not an individual completed treatment regardless of which treatment facility (i.e., hospital setting, treatment with a mental health focus, and family or community setting) they attended.

Table 3

Crosstabulation including participants with or without a lifetime major depressive episode who completed or did not complete treatment moderated by treatment facility type.

Completed Treatment			Lifetime Major Depressive Episode		Total	
			Yes	No		
Yes	Treatment Facility Type	Hospital/Primary Care	2	7	9	
		Mental Health	12	21		33
		Family/Community	4	11		15
		Total	18	39		57
No	Treatment Facility Type	Hospital/Primary Care	4	1	5	
		Mental Health	2	3	5	
		Family/Community	4	0	4	
		Total	10	4	14	

Table 4

Moderation analysis investigating major depressive episode X treatment type on treatment outcome

Effect	b	SE	95% CI		p
			LL	UL	
Constant	-6.410	.386	-2.441	-.930	.000
Major Depressive Episode	1.806	.704	.427	3.186	.010
Treatment Type	-.590	.550	-1.668	.488	.284
Major Depressive Episode X Treatment Type	.602	1.00	-1.365	2.569	.549

Hypothesis Three

A logistic regression analysis was run to test whether women with an AUD diagnosis would have lower rates of successful treatment completion across all treatment modalities compared to men. Table 5 shows the raw data of male and female participants who completed or did not complete treatment. The logistic regression model was non-significant, as shown in Table 6, $b = .88$, 95% CI [.75, 7.77], $\text{Exp}(b) = 2.42$, $p = .138$. As such, the relationship between gender and treatment completion was not significant. The model explained 4.6% (Nagelkerke R²) of the variance in treatment completion.

Table 5

Crosstabulation including male and female participants with a single AUD diagnosis who completed or did not complete treatment.

	Completed Treatment		Total
	Yes	No	
Gender			
Male	33	5	38
Female	30	11	41
Total	63	16	79

Table 6

Logistic regression analysis investigating treatment completion among men and women

	Exp(B)	SE	95% CI		p
			LL	UL	
Hypothesis 3					
Constant	.152	.480			<.001
Gender	2.420	.595	.753	7.774	.138

Hypothesis Four

For the final hypothesis, a moderation model analysis using Hayes (2012) PROCESS software was used to investigate how treatment facility type would moderate the strength of direction of the relationship between gender and treatment outcome. After initial analysis, the moderation analysis appeared marginally significant, as shown in Table 7, $b = 1.95$, 95% CI [-4.08, .17], $p = .072$.

Table 7

Moderation analysis investigating gender X treatment type on treatment outcome.

Effect	b	SE	95% CI		p
			LL	UL	
Constant	-6.410	2.925	-12.143	-.678	.028
Gender	3.176	1.547	.144	6.209	.040
Treatment Type	2.873	1.911	-.872	6.619	.133
Gender X Treatment Type	-1.952	1.085	-4.078	.173	.072

Further, inconsistent with findings from hypothesis three, gender was a statistically significant predictor in the moderation model, $b = 3.18$, 95% CI [.14, 6.20], $p = .040$. Given that the interaction was approaching significance, follow-up analyses were run to investigate which values of the moderator were statistically significant within the PROCESS software tool (Hayes, 2012), revealing a statistically significant finding as shown in Table 8. The moderation analysis revealed a statistically significant finding, $b = 3.18$, 95% CI [.14, 6.21], $p = .040$ indicating treatment facility type did moderate the relationship between gender and treatment completion within hospital and primary care settings. Individuals who identified as a female with an AUD diagnosis were less likely to complete treatment within hospital settings compared to individuals who identified as a male. In the other types of treatment facilities investigated (i.e., mental health treatment programs and family/community treatment programs), there were no observed differences between genders in treatment completion. Table 9 describes the raw data for male and female participants who did or did not complete treatment depending on the various treatment facilities.

Table 8*Conditional effects of the predictor at values of the moderator*

Treatment Type	b	SE	95% CI		p
			LL	UL	
Hospital Settings	3.176	1.547	.144	6.21	.040
Mental Health Settings	1.224	.792	-.328	2.776	.122
Family/Community Settings	-.729	1.101	-2.89	1.43	.508

Table 9

Crosstabulation including male and female participants with a single AUD diagnosis who completed or did not complete treatment depending on treatment facility.

Completed Treatment			Gender		Total
			Male	Female	
Yes	Treatment Facility Type	Hospital/Primary Care	5	4	9
		Mental Health	16	18	34
		Family/Community	9	6	15
		Total	30	28	58
No	Treatment Facility Type	Hospital/Primary Care	0	6	6
		Mental Health	2	3	5
		Family/Community	2	2	4
		Total	4	11	15

Chapter Five: Discussion

The purpose of the current study was to examine how treatment completion was or was not affected by co-occurring AUD and a lifetime major depressive episode (MDE). The primary aim of the study explored two hypotheses related to treatment completion among individuals with a co-occurring AUD and MDE. The secondary aim of this study was to examine gender differences between men and women with a single AUD diagnosis and treatment completion. Using a nationally representative sample of young adults aged 18-36 from the 2019 National Survey on Drug Use and Health with an alcohol abuse and or dependence disorder, the sample consisted of 79 total participants, 39% of which were classified as having a lifetime history of at least one MDE. Thirty-eight males (48.1%) participated in the survey and over half of the sample was comprised of individuals identifying as White (55.7%), followed by 21.5% Hispanic individuals, 8.9% Black individuals, and 5.1% identifying as Biracial.

The first hypothesis, that young individuals aged 18-36 with a co-occurring AUD and MDE would complete treatment at lower rates than participants with a single AUD diagnosis, was confirmed. That is, participants with a co-occurring AUD and MDE were more than six times more likely to drop out of treatment prematurely compared to participants with a single AUD diagnosis. The second hypothesis included treatment facility type as a moderating variable between a co-occurring AUD and MDE and treatment completion. This hypothesis was disconfirmed, although further confirmed the first hypothesis suggesting that having a co-occurring AUD and a lifetime history of an MDE have detrimental effects on treatment completion.

This finding was in line with previous research which found that among a nationally representative sample of individuals in treatment for substance use, those identified as suffering

from a psychiatric and substance abuse comorbidity were more likely to not complete treatment compared to those without an identified psychiatric comorbidity (Krawczyk et al., 2017). Additionally, the present findings align with research completed by Coriale and colleagues (2019) who found that individuals with an AUD diagnosis and any psychiatric comorbidity faced increased probability of treatment dropout compared to individuals with a single AUD diagnosis. While the aforementioned studies did not focus solely on the AUD and MDE comorbidity, as the present study did, those with an identified alcohol use disorder and psychiatric comorbidity were more likely than individuals with other substance use diagnoses to leave treatment prematurely (Coriale et al., 2019; Krawczyk et al., 2017). Of note, the current study was not examining major depressive disorder, but rather, a lifetime history of MDE. As such, the participants in this study may or may not have had an active MDD diagnosis at the time they received treatment. Therefore, we may draw conclusions that individuals who have struggled with even just one major depressive episode in their lifetime see enduring impairments, such as completing treatment.

The increased likelihood of treatment incompleteness among individuals with AUD and a lifetime history of MDE may be accounted for by the severity of depressive symptoms and negative problems associated with the comorbidity, such as increased prevalence of suicidal ideation, increased time spent in a major depressive episode, overall increased symptom severity, and overall decreased quality of life (Archie et al., 2012; Holma et al., 2020; McHugh & Weiss, 2019; Pavkovic et al., 2018). Additionally, individuals presenting with an AUD and lifetime history of MDE face substantially more challenges and barriers in accessing and completing treatment compared to individuals with a single substance use diagnosis due to the increased

societal stigma, self-stigma, and blame associated with mental illness (Bazargan-Hejazi et al., 2016; Crapanzano et al., 2019; Keyes et al., 2010).

The finding that individuals with a co-occurring AUD and MDE complete treatment at lower rates compared to individuals with a single AUD diagnosis indicate the need for programs with greater emphasis on integration of care between mental health services and substance use treatment services (Drake et al., 2004; Krawczyk et al., 2017). Targeting co-occurring AUD and MDE within any treatment setting is essential, due to its high prevalence among individuals seeking treatment, as well as for individuals in the general population who suffer from this comorbidity (Burns & Teeson, 2002; McHugh & Weiss, 2019; Pavkovic et al., 2018).

Additionally, targeting individuals in treatment who have experienced a lifetime history of major depressive episodes, who may not be in a current episode, may benefit from discussions of treatment strategies for prevention of a future MDE. Previous research has shown efficacy in reduction of depressive symptomology and reduction in alcohol consumption, when integration of mental health programming such as CBT techniques (i.e., mindfulness skills, identification of maladaptive thoughts and schemas) and a focus on addiction and harm reduction were used (Hides et al., 2007; Lydecker et al., 2010). While this previous research emphasizes the benefits of integrating mental health treatment within a substance use framework, the outcomes of interest still varied (i.e., reduction of depressive symptoms versus reduction in alcohol consumption). Hides and colleagues (2007) found participants reported improved depressive symptomology following receiving integrated care, while Lydecker and colleagues (2010) discovered participants reported decreased alcohol consumption following receiving integrated care. As such, future research may investigate both reduction in depressive symptomology and alcohol consumption as outcome of interests simultaneously following participation in an

integrated treatment program. Investigating reduction in alcohol consumption and depressive symptomology concurrently would extend the literature by examining what areas of integrated treatment programs are successful or unsuccessful at reducing not only alcohol consumption, but the mental health component as well.

The third hypothesis was disconfirmed, which postulated that women would have lower rates of treatment completion compared to men. This researcher hypothesized that women would leave treatment prematurely at higher rates compared to men due to previous research that suggests women face greater challenges in treatment seeking and during treatment episodes compared to men (Brienza & Stein, 2002). These barriers, such as societal stigma, fear of loss of parental rights, greater physical health concerns, lack of childcare, greater co-occurring psychiatric illnesses, financial instability, and fear of abandonment by partner for treatment seeking (Brienza & Stein, 2002; McCaul et al., 2019; McHugh et al., 2018), may all contribute to premature treatment drop-out amongst women. Although some previous reviews on gender differences and treatment retention have found similar non-differences in treatment retention (e.g., McHugh et al., 2018), as this study found, Holzhauer and colleagues (2020) found that gender and retention data are still mixed depending on the substance of interest, with many studies not focusing specifically on AUD. Additional research has revealed trends in which women with an AUD diagnosis complete treatment at lower rates compared to their male counterparts (Bazargan-Hejazi et al., 2016). There remains a large gap in the literature regarding the various moderators impacting treatment completion amongst men and women with alcohol use disorder. The current study revealed one potential moderator between gender and treatment completion: treatment facility type.

Additionally, previous research that has reviewed the effectiveness of various treatment modalities on alcohol-related problems, indicates that men and women fare equally well after receiving brief interventions for alcohol use in a primary healthcare setting (Heather et al., 2006). It is important to recognize the difference in research between treatment outcomes and treatment completion. While the review indicates men and women receive equally favorable outcomes following brief interventions in healthcare settings, it fails to discuss the differences between who is actually completing the treatment within these identified settings.

The fourth hypothesis was partially confirmed: this hypothesis explored how various treatment facility types will moderate the relationship between men and women with a single AUD diagnosis and treatment completion. A marginally statistically significant finding initiated follow-up analyses, which revealed that women who participate in hospital or primary care treatment settings will have lower rates of treatment completion compared to men in those same treatment settings.

The present research finding may be accounted for, in part, by service utilization differences between men and women. Previous research has found that men, on average, seek services from hospital and emergency room settings for alcohol-related problems more frequently compared to women (Chen et al., 2013). More broadly, previous reviews suggest that men were more likely to seek treatment for a substance-related problem, compared to women (McHugh et al., 2018). Furthermore, when investigating gender differences between the various substances abused (i.e., alcohol, methamphetamine, cocaine, heroin, etc.) and treatment utilization, women struggling with alcohol-related issues specifically were far less likely to receive the necessary treatment compared to all other substances abused and compared to men with alcohol-related problems (McHugh et al., 2018). Previous research indicates that women are

not utilizing treatment services at comparable rates to men. Similarly, the present findings indicate that women, specifically in hospital or primary care treatment settings, deserve special attention in future research to further investigate the reasons for treatment utilization and completion.

In addition, the present finding that women complete treatment at lower rates compared to their male counterparts in hospital settings may reflect an underlying and ongoing gender bias in healthcare. Women, on average, are at greater advantage for receiving routine medical care from their primary care or gynecological provider due to the routine basis at which women require care (i.e., annual exams, mammogram screenings, family planning services, and birth control consultations; Hetteema et al., 2015). However, obstetrician-gynecologists (OB/GYN) are not routinely assessing and screening for alcohol-related problems, and when they do conduct an alcohol-related screening, they often not go beyond questions related to consumption (i.e., discussing consequences, hazardous drinking, and providing treatment referrals; Friedmann et al., 2000). Moreover, women's health providers, such as OB/GYN's were even less likely to provide screenings and offer treatment referrals for patients presenting with alcohol-related problems compared to family medicine providers, internal medicine providers, and psychiatrists (Friedmann et al., 2000). Additionally, women struggling with alcohol-related difficulties often present to their primary care provider with concerns related to generic health complaints that are more often viewed by their medical provider as a "cry for help" (Brienza & Stein, 2002). As such, these women are not being screened for alcohol use and are often misdiagnosed with a psychiatric condition (Brienza & Stein, 2002). This previous research which suggests that problematic drinking patterns exhibited by women may not be viewed by their medical providers

as severe compared to men, may account for the increased rate of early treatment termination in healthcare settings compared to men, as found in this study.

Furthermore, when investigating screening, brief intervention, and referral of women receiving medical care in women's health settings, Hetteema and colleagues (2015) found that patients were open to discussing alcohol-related concerns with their providers, specifically as they related to health concerns. Additionally, patients in their study who were identified as high risk for alcohol exposed pregnancies, were offered treatment referrals or brief intervention in the medical office at rates similar to those who were not identified as high risk (Hetteema et al., 2015). Detection of a potential AUD or alcohol-related problems in primary healthcare settings is crucial to prevent the myriad of negative consequences as result of hazardous drinking in women. Additionally, early detection and proper screening is essential for necessary treatment referrals or brief intervention for women with alcohol-related problems. Previous research indicates that women who do receive treatment referrals from their primary care providers have better treatment outcomes compared to women who do not receive treatment referrals (Brienza & Stein, 2002). While it is clear that women fare better after completion of treatment, drop-out rates of women in treatment for an AUD, as examined in the current study, are rarely studied. As such, the current study broadens our understanding of how women are not completing treatment in hospital or primary care settings at rates equal to men, in spite of the documented benefits of treatment for women in healthcare settings.

The present finding that women in hospital and primary care settings leave treatment prematurely indicates there is still a gap in these treatment settings for targeting women who present with an alcohol use disorder. Given this information, providers in medical treatment facilities may choose to utilize interventions used within other treatment facilities, such as an

integration of substance abuse treatment and mental health treatment. Further, providers and treatment programs in medical treatment facilities may benefit from targeting the specialized needs of women who face unique challenges and barriers to successfully completing treatment. These specialized programs may involve integration of parenting and substance use treatment, programs which include childcare components, and continued integration of mental health and substance use treatment programming.

Limitations and Future Directions

The current study has several limitations. First, the results come from a survey; thus, participants self-reported their behavior and symptomology of alcohol-related problems and major depression rather than using objectively identified criteria of an AUD and MDE. While the National Survey on Drug Use and Health itemizes the diagnostic criteria and recodes variables which place participants into an AUD and/or MDE category, it is likely participants may not have fully endorsed the severity of their symptoms. Researchers Johnson and Fendrich, (2005) found that individuals participating in self-report survey measures for recreational drug use were more likely to under-report substance use due to social desirability factors. Further, this researcher is aware of the possibility that participants misclassify the depressant effects of alcohol. There is a considerably high overlap between depressive symptomology and alcohol related effects, which can make distinguishing between the diagnoses difficult (McHugh & Weiss, 2019; Tolliver & Anton, 2022). As such, it remains unclear whether the sample consisted of accurate rates of MDE, meaning more or less participants may have experienced a lifetime history of MDE or misclassified the depressant effects of alcohol as a MDE.

Additionally, there was potential for participants to experience multiple psychiatric comorbidities given the high prevalence of meeting criteria for more than two psychiatric

diagnoses. The National Survey on Drug Use and Health only asked participants to report on depressive symptomology and did not include other psychiatric diagnoses in the survey. As such, confounding variables such as participants with multiple psychiatric comorbidities were unable to be filtered out of the data set and therefore it is unknown the effect multiple comorbidities have on treatment completion.

Secondly, this study investigated treatment completion differences among men and women within and across treatment modalities, and these specific analyses did not include the co-occurring MDE component. This was determined, in part, due to the relatively limited sample size of individuals aged 18-36 who endorsed a co-occurring AUD and MDE diagnosis during the 2019 survey on drug use and health. Calculating the sample size needed to detect power using three predictors of treatment completion (gender, presence of AUD, and treatment modality) in the logistic regression model would not be sufficient to detect any significant effect, regardless of if there was in fact, a significant finding. Previous research indicates that women with a co-occurring MDE and AUD are at much greater risk for encountering more severe physical health challenges, more severe psychiatric symptoms, are at increased risk for exposure to violence and trauma and encounter greater challenges in accessing treatment at higher rates compared to men (McCaul et al., 2019; Pavkovic et al., 2018). Given the reported high prevalence of co-occurring AUD and MDE seen among women (Bradizza et al., 2006) compared to men, and the significant problems associated with co-occurring psychiatric, and substance use diagnoses (Krawczyk et al., 2017), future research is needed to determine the impact of having a co-occurring AUD and MDE diagnosis has on treatment completion for women compared to men.

While there is literature which suggests men and women see generally equally improved outcomes (i.e., reduction in alcohol consumption and symptoms of psychiatric diagnoses)

following treatment completion in hospital or primary care settings, it is likely the previous research is failing to account for attrition, and at what rate are men and women actually completing the study of interest. Future research is needed to broaden the current study's findings related to the observed differences between men and women in healthcare settings to better understand why women are dropping out of treatment at higher rates compared to men. Future research may also broaden the scope of investigation to include more methods of treatment delivery that was beyond the scope and availability of the present study.

Additionally, using a larger sample size, future research may benefit from continued investigation into the gender differences between not only men and women, but individuals identifying as non-binary, gender fluid, androgynous, and transgender when examining treatment completion. Due to the limited research on gender and substance use treatment beyond the stereotypical male and female, future research would benefit by giving focus to these special populations and how co-occurring psychiatric illnesses and substance use disorders impact treatment.

This research also highlights the importance of answering the question: why do certain people respond better to one type of treatment approach compared to another? Future research may examine various personality level characteristics when investigating treatment completion and thus treatment outcomes depending on the type of treatment a participant is receiving. Understanding who, on average, responds best to which type of treatment approach will better enhance clinical practice in the field of substance use treatment programming as well as dual diagnostic programming.

Despite these limitations, the current study provided meaningful contributions to the literature and clinical field regarding the impact of struggling with AUD and a lifetime history of

MDE has on treatment completion. Additionally, an interesting finding was highlighted when treatment completion differences were studied between men and women at various treatment facilities. Women were more likely than men to not complete treatment when treatment was offered at a hospital or primary care clinic. Using the findings from this study, clinicians, medical providers, and alcohol and drug counselors may develop targeted interventions toward women in these settings to help assist in lengthening their stay in treatment. Further this research provided critical future directions for investigating what role gender bias and/or ineffective alcohol screening plays on treatment completion within hospital and primary care settings. Exploring effective alcohol abuse assessment, specifically for women, will likely benefit treatment attendance and subsequent treatment completion.

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Appendix A

Study Description

Your address is one of several in this area randomly chosen for the 20XX National Survey on Drug Use and Health. This study, sponsored by the U.S. Department of Health and Human Services, collects information for research and program planning by asking about:

- tobacco, alcohol, and drug use or non-use,
- knowledge and attitudes about drugs,
- mental health, and
- other health issues.

You cannot be identified through any information you give us. Your name and address will never be connected to your answers. Also, federal law requires us to keep all of your answers confidential. Any data that you provide will only be used by authorized personnel for statistical purposes according to the Confidential Information Protection and Statistical Efficiency Act of 2002.

The screening questions take just a few minutes. If anyone is chosen, the interview will take about an hour. You can refuse to answer any questions, and you can quit at any time. **Each person who is chosen and completes the interview will receive \$30 in cash.**

If you have questions about the study, call the Project Representative at _____. If you have questions about your rights as a study participant, call RTI's Office

of Research Protection at (a toll-free number). You can also visit our project website: <https://nsduhweb.rti.org/> for more information.

Thank you for your cooperation and time.

Project Officer
Center for Behavioral Health Statistics and Quality
Substance Abuse and Mental Health Services Administration (SAMHSA) U.S.
Department of Health and Human Services

Your confidentiality is protected by the Confidential Information Protection and Statistical Efficiency Act of 2002 (CIPSEA, PL 107-347). Any project staff or authorized data user who violates CIPSEA may be subject to a jail term of up to 5 years, a fine of up to \$250,000, or both.

NOTICE: Public reporting burden for this collection of information is estimated to average 60 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection

of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to SAMHSA Reports.

Appendix B

Introduction and Informed Consent 18 or Older

INTRODUCTION AND INFORMED CONSENT FOR INTERVIEW RESPONDENTS AGE 18+

INTRODUCE YOURSELF AND STUDY AS NECESSARY: Hello, I'm _____, and I'm working on a nationwide study sponsored by the U.S. Department of Health and Human Services. You should have received a letter about this study. (SHOW LEAD LETTER, IF NECESSARY .)

READ THE BOXED INFORMATION BELOW BEFORE STARTING EVERY INTERVIEW

This year, we are interviewing about 70,000 people across the nation. You have been randomly chosen to take part. You will represent over 4,500 other people who are similar to you. You may choose not to take part in this study, but no one else can take your place. We will give you \$30 when you finish the interview.

GIVE STUDY DESCRIPTION TO R IF YOU HAVE NOT ALREADY DONE SO.

This study asks about tobacco, alcohol, and drug use or non-use, knowledge and attitudes about drugs, mental health, and other health issues. It takes about an hour. You will answer most of the questions on the computer, so I will not see your answers. We are only interested in the combined responses from all 70,000 people, not just one person's answers. This is why we do not ask for your name and we keep your answers separate from your address. RTI may contact you by phone or mail to ask a few questions about the quality of my work. This is why we ask for your phone number and current address at the end of the interview.

While the interview has some personal questions, federal law keeps your answers private. We hope that protecting your privacy will help you to give accurate answers. You can quit the interview at any time and you can refuse to answer any questions.

If it is all right with you, let's get started.
(Can we find a private place to complete the interview?)