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Trends in Alcohol Use Disorder Treatment Utilization and Location from 2008 to 2017

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Abstract

Trends in Alcohol Use Disorder Treatment Utilization and Location from 2008 to 2017
By: Aidan Larsen

Alcohol Use Disorder (AUD) is the most common substance use disorder in the United States, and causes more deaths per year than opioid overdoses, but the vast majority of those with AUD do not receive treatment. The Mental Health Parity and Addiction Equity Act (MHPAEA) of 2008 and the Affordable Care Act (ACA) of 2010 contained several provisions that aimed to increase treatment rates for substance use disorders, including AUD. Though prior research has studied the trends in treatment for mental health and overall SUD care, no known study has specifically examined trends in treatment for AUD in recent years using nationally representative data. Additionally, no study of AUD has tested whether the location in which treatment for AUD is received has changed since MHPAEA and ACA passage. This study investigated the national trend in the treatment rate of AUD before, during, and after the MHPAEA and ACA went into effect and the trends in alcohol treatment location. Survey data from 10 years of the National Survey of Drug Use and Health (NSDUH) were used to estimate logistic regression models to test whether treatment rates for AUD increased in 2011-2014 and 2015-2017 compared to 2008-2010, whether treatment in medical locations increased during those same time frames, and whether gains in insurance coverage were responsible for this increase. In adjusted analyses, the probability of receiving any alcohol treatment declined by 1.1 percentage points in 2011-2014 (95% CI = 0.1, 2.1) and 1.9 percentage points (95% CI = 0.7, 3.1) in 2015-2017 compared to 2008-2010. The probability of receiving treatment in any medical location declined by 1.1 percentage points (95% CI = 0.2, 1.9) in 2011-2014 and 1.2 percentage points in 2015-2017 (95% CI = 0.2, 2.1) compared to 2008-2010, while the probability of receiving self-help only treatment declined by 0.6 percentage points (95% CI = 0.3, 0.9) in 2015-2017 compared to 2008-2010. The probability of mental health treatment did not change over this time period. Future research is needed to elucidate the mechanisms and ensuing negative outcomes behind the observed decline in treatment.

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Contents

Introduction

As of 2018, Alcohol Use Disorder (AUD) is the most common substance use disorder in the United States, with 5.4% of Americans over the age of twelve affected (Substance Abuse and Mental Health Services Administration, 2019). In the US alone, AUD is associated with 65,000 deaths annually, and the overall number of deaths due to alcohol per year in the US have doubled between 1999 and 2017 (Rehm et al., 2014; White, Castle, Hingson, & Powell, 2020). AUD is associated with a host of medical problems including cancer, diabetes, and cardiovascular disease (Rehm, 2011). Although efficacious treatments for AUD exist, only about 10% of those with AUD receive treatment in a given year (Schmidt, 2016).

In the past decade, the US passed two major federal laws with the potential to address the treatment gap for AUD and other behavioral health disorders -- the Mental Health Parity and Addiction Equity Act (MHPAEA) and the Patient Protection and Affordable Care Act (ACA) -- in 2008 and 2010 respectively. These laws worked in concert to achieve three objectives: increase the number of insured individuals, increase the coverage for behavioral health treatment among the insured, and more tightly integrate behavioral healthcare and medical healthcare. First, the MHPAEA established parity for SUD benefits, which required that both treatment limits, such as caps on outpatient visits, and financing, such as co-pays were no more restrictive for SUD treatment than for any medical benefits offered (Busch, 2012). The ACA extended parity to individual and Medicaid plans and required covering SUD benefits as a part of the essential health benefits (EHB) (Barry & Huskamp, 2011). The ACA also increased the number of insured individuals, through both the individual marketplace and Medicaid

expansion (Kaiser Family Foundation, 2018; R. Mojtabai et al., 2018). Finally, payment reform and other incentives in the ACA were expected to lead to greater integration of SUD treatment with primary care, making treatment easier to access (Buck, 2011; McLellan & Woodworth, 2014).

Several studies have examined trends in treatment for SUDs, including AUD and illicit drug use disorders, since the MHPAEA and ACA were passed (Creedon & Cook, 2016; Olfson, Wall, Barry, Mauro, & Mojtabai, 2018a, 2018b; Saloner, Bandara, Bachhuber, & Barry, 2017; Saloner & Le Cook, 2014). These studies have typically found no change in the treatment rate for SUDs. However, these studies aggregate treatment for all substance use disorders, potentially masking differential trends for illicit drug use disorders and AUD. To date, only one known study has used national data (from 2010 to 2015) to investigate recent trends in AUD treatment specifically (Feder et al., 2017). Notably, this study only included data through 2015 (the first full year after ACA implementation), and it is important to understand how trends in treatment for AUD have changed in more recent years since its implementation. In addition, this study did not investigate changes in treatment location and only controlled for age, race/ethnicity, and gender.

To address this gap in the literature, I used nationally representative data from the 2008-2017 National Survey of Drug Use and Health to examine trends in treatment for AUD. I hypothesized the treatment for AUD increased over that time frame, in part due to an increase in insurance coverage as a result of the ACA. I examined three measures of AUD treatment (any treatment; any treatment in a medical location; self-help location only). I also examined trends in mental health treatment for the analytic sample, given the

high rates of co-morbid mental health disorders in this population, and past research showing high rates of mental health treatment among those with AUD (Edlund, Booth, & Han, 2012). Regression models controlled for predisposing, enabling, and need-related characteristics in adjusted analyses.

Literature Review

Alcohol Use Disorder

Alcohol Use Disorder (AUD) is a "chronic relapsing brain disease characterized by an impaired ability to stop or control alcohol use despite adverse social, occupational, or health consequences" (National Institute on Alcohol Abuse and Alcoholism, 2018). Currently, AUD is the most common substance use disorder in the US, with the most recent estimates showing that 14.8 million Americans over the age of 12 had AUD as of 2018, almost 7 million more Americans than all other illicit drug use disorders combined (Substance Abuse and Mental Health Services Administration, 2019). AUD is most likely to emerge in late adolescence or early adulthood, and prevalence declines thereafter; it is generally more common among men than women, among younger age groups than older age groups, and among Native Americans compared to other races and ethnicities (Delker, Brown, & Hasin, 2016; Grant et al., 2017; Seeley, Farmer, Kosty, & Gau, 2019; Sher, Grekin, & Williams, 2005). AUD is associated with 65,000 deaths per year in the US, almost 20,000 deaths per year more than the number of opioid overdose deaths in the US in 2017 (Rehm et al., 2014; Scholl, Seth, Kariisa, Wilson, & Baldwin, 2018). In addition, overall deaths due to alcohol doubled from 1999 to 2017 (White et al., 2020)

According to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-V), AUD is diagnosed when individuals meet at least 2 of 11 criteria measuring

alcohol abuse or dependence. These criteria include being unable to stop or cut down on drinking, or continuing to drink even after drinking has caused problems with family and friends (National Institute on Alcohol Abuse and Alcoholism, 2016). However, the conceptualization and definition of alcohol use disorder in the DSM has changed greatly over the past 50 years. Prior to DSM-III, alcoholism was the only alcohol use disorder included in the DSM, without any diagnostic criteria listed (Hasin, 2003). This changed with the publication of DSM-III in 1980, when two disorders, alcohol abuse and alcohol dependence, were included for the first time (Hasin, 2003). The distinction between abuse and dependence were maintained for DSM-IIIR and DSM-IV, before DSM-V reverted back to one disorder with criteria of both dependence and abuse, referred to as alcohol use disorder. The move to one disorder reflected emerging research consensus of continuum of AUD severity, instead of a distinction between abuse and dependence (Saha, Chou, & Grant, 2006).

Recent trends in AUD prevalence in the US have differed depending on the survey used. Grant et al. (2017) used multiple waves of the longitudinal survey National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) and found an increase in AUD prevalence from 8.5% in 2001-2002 to 12.7% in 2012-2013. In addition, the greatest increases in prevalence were found among women, African Americans, and adults 65 and older (Grant et al., 2017). In contrast, analysis of National Survey of Drug Use and Health (NSDUH) data, which is a cross-sectional survey over the same time period found no change in alcohol dependence from 2002-2014 and a decrease in alcohol abuse in 2012-13 compared to 2002-2003 (Cheng, Kaakarli, Breslau, & Anthony, 2018). Grucza et al. (2018) suggests possible methodological changes to

NESARC between waves that may have inflated alcohol-related estimates. Evidence points to the NSDUH estimates of overall declines in AUD prevalence being more accurate. However, there is substantial evidence that AUD prevalence has increased among those over 50+, especially among women (Grucza et al., 2018; Han, Moore, Sherman, Keyes, & Palamar, 2017; Keyes et al., 2019).

Table 1. *Criteria for AUD. From National Institute on Alcohol Abuse and Alcoholism (2016)*

	DSM–5 In the past year, have you:	
1	Had times when you ended up drinking more, or longer, than you intended?	The presence of at least 2 of these symptoms indicates an **Alcohol Use Disorder (AUD).** The severity of the AUD is defined as: **Mild:** The presence of 2 to 3 symptoms **Moderate:** The presence of 4 to 5 symptoms **Severe:** The presence of 6 or more symptoms
2	More than once wanted to cut down or stop drinking, or tried to, but couldn't?	
3	Spent a lot of time drinking? Or being sick or getting over other aftereffects?	
4	Wanted a drink so badly you couldn't think of anything else? ****This is new to DSM–5****	
5	Found that drinking—or being sick from drinking—often interfered with taking care of your home or family? Or caused job troubles? Or school problems?	
6	Continued to drink even though it was causing trouble with your family or friends?	
7	Given up or cut back on activities that were important or interesting to you, or gave you pleasure, in order to drink?	
8	More than once gotten into situations while or after drinking that increased your chances of getting hurt (such as driving, swimming, using machinery, walking in a dangerous area, or having unsafe sex)?	
9	Continued to drink even though it was making you feel depressed or anxious or adding to another health problem? Or after having had a memory blackout?	
10	Had to drink much more than you once did to get the effect you want? Or found that your usual number of drinks had much less effect than before?	
11	Found that when the effects of alcohol were wearing off, you had withdrawal symptoms, such as trouble sleeping, shakiness, restlessness, nausea, sweating, a racing heart, or a seizure? Or sensed things that were not there?	

An increase in AUD prevalence among older age groups and women is concerning, as AUD has a number of negative health impacts. AUD is associated with a host of medical problems including cancer, diabetes, and cardiovascular disease (Rehm, 2011). In addition, evidence is emerging that women experience deleterious health effects from alcohol at consumption levels below those of men (Szabo, 2018). Compared to those without AUD, individuals with AUD have around 3 times the risk of mortality, dying on average 12.2 years younger; this effect was even greater for women, who died on average 13.7 years younger (Schwarzinger, Thiebaut, Baillot, Mallet, & Rehm, 2017). Alcohol dependence, the more severe form of AUD, has a higher risk of mortality than alcohol abuse. (Laramee et al., 2015).

There are a multitude of potential treatments available to help treat individuals with AUD. Several forms of psychotherapy, as well as medications, are effective at treating AUD. Among the most common therapies are motivational enhancement therapy or motivational interviewing (MI) and cognitive behavioral therapy (CBT) (Connor, Haber, & Hall, 2016). MI aims to increase patient motivation to change behavior and has been found to reduce substance use (Soyka et al., 2017). CBT is a structured form of therapy that aims to change cognition and behaviors. CBT has been found to have positive effects on outcomes including reduction of alcohol consumption for AUD either by itself or in combination with MI (Soyka et al., 2017).

Additionally, there are a number of pharmacological options that can be used for treatment of AUD. The best evidence exists for Naltrexone and Acamprosate (Connor et al., 2016). A meta-analysis of pharmacological options for AUD treatment found both

were effective at extending abstinence, however there was not enough evidence to determine their effects on overall health outcomes (Jonas et al., 2014).

One treatment option is participation in the self-help group Alcoholics Anonymous (AA). AA is a free, peer-led support organization. AA groups hold community meetings in which individuals discuss their experiences with alcohol and recovery (Kelly, Humphreys, & Ferri, 2017). AA members must practice the twelve steps of AA, which include admitting powerlessness over alcohol, believing in a power greater than oneself to return to sanity, and making direct amends to those harmed by a member's drinking (Alcoholics Anonymous, 1981). Evidence for the efficacy of AA and similar twelve step programs is mixed (Connor et al., 2016). Some studies have found AA alone as effective, if not more so, than formal inpatient or outpatient treatment alone at maintaining abstinence and remission at 1, 3, and 8 years (Timko, Moos, Finney, & Lesar, 2000). However, a meta-analysis comparing AA and twelve step programs to a variety of treatments for AUD found a number of treatment options more effective than AA, including motivational enhancement therapy and the medication disulfiram (Miller & Wilbourne, 2002). More recent reviews have found more evidence for the effectiveness of AA and twelve step programs compared to clinical care like CBT, especially when it comes to maintaining abstinence, although the evidence is still considered to be lower quality (Kelly, Humphreys, & Ferri, 2020). Compared to other clinical interventions, AA and other twelve step programs were found to be more effective at promoting continuing abstinence at 12 months, and equally effective at reducing drinks per drinking day and reducing alcohol-related consequences (Kelly et al., 2020).

Despite effective treatment methods, only 10% of those with AUD receive treatment in a given year due to both attitudinal barriers, such as perceived need for treatment, and structural barriers, such as cost (Oleski, Mota, Cox, & Sareen, 2010; Schmidt, 2016). Past research on barriers to treatment has found that among those with AUD, attitudinal barriers are expressed more commonly than structural barriers (Oleski et al., 2010). Perhaps the biggest barrier to treatment is whether individuals with AUD perceive a need for treatment. When Oleski et al. (2010) analyzed national survey data for perceived need, they found that 81% of individuals with a lifetime AUD did not perceive a need for treatment. Among individuals who perceive a need for treatment but do not receive treatment, the most commonly cited attitudinal barrier was thinking the issue would get better on its own. Additionally, barriers related to stigma, both internalized stigma and perceived stigma from others, were commonly expressed, including thinking (he/she) should be strong enough to handle it alone and being too embarrassed to discuss the problem with others (Gilbert, Pro, Zemore, Mulia, & Brown, 2019).

Commonly cited structural barriers include not being able to afford the cost of treatment, not having the time for treatment, or health insurance not covering treatment (Gilbert et al., 2019). Alcohol treatment can be expensive, with an average outpatient visit costing $379 for the privately insured, and the average individual requiring 7 visits (Thomas, Hodgkin, Levit, & Mark, 2016). Without insurance covering treatment and defraying some of the cost, many individuals with AUD are unable to afford the costs of seeking treatment.

The Mental Health Parity and Addiction Equity Act and the Affordable Care Act

Nationwide policy efforts have been made to increase the treatment rates of substance use disorders (SUDs) including AUD. The Mental Health Parity and Addiction Equity Act of 2008 (MHPAEA) and the Patient Protection and Affordable Care Act of 2009 (ACA) were expected to improve access to and increase utilization of substance use treatment through several mechanisms.

First, both the MHPAEA and ACA improved insurance coverage for SUDs, reducing the costs of seeking treatment for those with insurance. The MHPAEA first established parity for SUD benefits provided under employer-sponsored and self-funded group plans, although this was only for plans that already offered SUD benefits (Wen, Cummings, Hockenberry, Gaydos, & Druss, 2013). Parity required that both treatment limits, such as caps on outpatient visits, and financing, such as co-pays were no more restrictive for SUD treatment than for any medical benefits offered (Busch, 2012). The ACA extended parity to Medicaid benchmark plans as well as plans offered through the insurance exchanges. In addition, the ACA required covering SUD benefits as a part of the essential health benefits (Barry & Huskamp, 2011). Combined, these plans added SUD coverage and reduced out-of-pocket expenses for those seeking SUD treatment.

Second, the ACA increased the number of insured individuals through three main mechanisms, thereby decreasing the cost of seeking treatment for those with new coverage (Kaiser Family Foundation, 2018; R. Mojtabai et al., 2018). The ACA established individual marketplaces for private insurance coverage, with individuals between 100-400% of the federal poverty level (FPL) eligible for subsidies to help cover the cost of premiums (Frean, Gruber, & Sommers, 2017). To complement the subsidies

for private insurance, the ACA planned to expand Medicaid to all individuals under 138% of the FPL; however the Supreme Court ruled mandatory expansion was unconstitutional, allowing states to opt out (Frean et al., 2017). Nevertheless, as of March 13, 2020, 37 states, including DC, have expanded their Medicaid programs (Kaiser Family Foundation, 2020). For states that participated in the Medicaid expansion, this was expected to provide coverage to individuals with higher rates of SUDs than the currently insured population (Busch, Meara, Huskamp, & Barry, 2013; Mark, Wier, Malone, Penne, & Cowell, 2015). Finally, the dependent coverage provision of the ACA allowed young adults ages 18-26 to remain on their parents insurance plan (Sommers & Kronick, 2012). Between expanding insurance and mandating parity for behavioral health benefits, an estimated 62.5 million Americans were expected to gain coverage for SUD treatment (Frank, Beronio, & Glied, 2014).

Third, the ACA was also expected to increase integration of SUD treatment with primary care, making treatment easier to access (Buck, 2011; McLellan & Woodworth, 2014). The ACA's focus on integrated care models, like patient-centered medical homes and accountable care organizations, would lead to greater integration of SUD treatment into primary care (Barry & Huskamp, 2011). Additionally, the ACA created Medicaid "health homes," which provides care for those with multiple chronic conditions, which can include SUDs (Barry & Huskamp, 2011).

Parity and SUD Treatment Access

Studies investigating the effects of parity laws on SUD and AUD treatment have found positive effects of parity on increasing the overall use of SUD treatment services, as well as increases in insurance company spending among those who receive treatment.

Two studies looked at the effect of state parity laws, passed before the MHPAEA extended parity to the whole country. Wen et al. (2013) studied SUD treatment among states that established either full parity or parity if SUD benefits were offered between 2000 and 2008 and found an increase in the SUD treatment rate by 13%. McConnell, Ridgely, and McCarty (2012) examined the effects of Oregon's parity law of SUD and AUD spending and found an increase in spending for AUD disorder, but not for other drug treatment spending or for SUD benefits as a whole.

Studies of the national parity law have similar results. Busch et al. (2014) investigated the effect of MHPAEA on private insurers in 2009-10, immediately following passage of MHPAEA but before the ACA took effect. They found an increase in increase in per-enrollee spending on SUD treatment, but no increase in overall treatment, suggesting that insurers were covering more of the cost of treatment. However, a study using claims data from Optum enrollees found increases in per-member per-month spending, individual and group psychotherapy, and inpatient visits among enrollees with SUD (Friedman et al., 2017). Similarly, a study using Truven Health MarketScan claims data found an increase in both out-of-network utilization and spending for SUD treatment following passage of MHPAEA, which also expanded parity to out-of-network SUD treatment facilities (McGinty et al., 2015). Generally, there is moderate evidence that parity laws increase overall utilization of SUD treatment and strong evidence that among those who receive treatment for SUD, spending increases.

ACA and SUD Treatment Access

A number of studies have used nationally representative survey data to study the effects of the ACA on treatment for SUD as a whole and specific SUDs. Overall, these

studies have failed to find increases in SUD treatment. In one study, researchers used national data from 2008 to 2012 and did not find significance changes in SUD treatment among adults ages 18-25 (Saloner & Le Cook, 2014). The results were similar in studies using national data for all adults 18-64 from 2005-2013 or 2011-2014 (Creedon & Cook, 2016; Saloner et al., 2017).

Furthermore, researchers hypothesized the ACA could lead to increased treatment in medical settings, since the effects of the ACA in particular were to integrate SUD treatment more closely with the existing medical establishment (Tai & Volkow, 2013). However, two studies which examined trends in treatment location among those with SUD did not find any significant changes in treatment setting (Saloner et al., 2017; Saloner & Le Cook, 2014). More recent studies have started using data from 2015 and 2016, however the results remain the same -studies of both the ACA's Medicaid expansion and the dependent coverage provision through 2016 have failed to find any increase in treatment (Olfson et al., 2018a, 2018b)

The few studies that have examined AUD specifically have also found mixed results. McCarty et al. (2018) used Medicaid claims data from patients in Oregon's Medicaid Coordinated Care Organizations. They found an increase in treatment entry rates for AUD from 35 to 41% from 2010 to 2015 (McCarty et al., 2018). However, when Feder et al. (2017) used nationally representative NSDUH data to compare treatment rates of AUD in 2010-13 to 2014-15 among the general population, they did not find any increase in treatment, suggesting that the gains observed among the Oregon Medicaid population did not extend to the rest of the US.

Literature Gap and Policy Relevance

Although there has been a great deal of research on trends in SUD treatment since the ACA, we still know little about the trends in treatment for AUD. Two smaller studies, using claims data from Oregon, found increases in AUD treatment as a result of Oregon's state parity law and Medicaid expansion (McCarty et al., 2018; McConnell et al., 2012). The only study of AUD using nationally representative data, however, did not find increases in AUD treatment in 2014-15 compared to 2010-13 (Feder et al., 2017). However, this study does not include more recent years post-implementation and only controlled for age, race/ethnicity, and gender. In addition, no study of AUD has investigated whether AUD treatment location has changed after the passage of the MHPAEA or ACA, an important outcome since self-help groups alone are not the most efficacious treatment method (Connor et al., 2016). To address these gaps, this study used nationally representative NSDUH data from the years 2008-2017 to assess if AUD treatment has increased, and where any increases in treatment occurred.

Methodology

Theoretical Framework

In order to study trends in treatment for AUD, I created a conceptual model using the Andersen Behavioral Model of Health Care Utilization, as well as economic theory of demand (Andersen & Davidson, 2007). At a broad level, the Andersen framework models health service use as a function of predisposing, enabling, and need factors at both the contextual and individual levels. At each level, predisposing factors indirectly affect the propensity that individuals will use health services, enabling factors directly facilitate or prevent the use of services, and need factors, which can be individual's

perceived need, or a medical professional's evaluated need for care, lead individuals to seek and receive treatment. As this study investigates the utilization of health services to treat AUD, the Andersen framework helps to define constructs that are associated with whether individuals with AUD receive treatment.

Focal Relationship

The focal relationship I studied examines how use of treatment for AUD has changed since the MHPAEA and ACA were passed. Treatment for AUD was defined as utilization of health services for the purpose of alcohol treatment, a definition which draws on Andersen's definition of realized access (Andersen & Davidson, 2007). Previous research on treatment for AUD has found small increases in treatment, using non-nationally representative data, or failed to find an increase in treatment nationally but only through 2015 (Feder et al., 2017; McCarty et al., 2018; McConnell et al., 2012). I hypothesized that from 2008-2017, treatment for AUD increased, due to the pathways explained below.

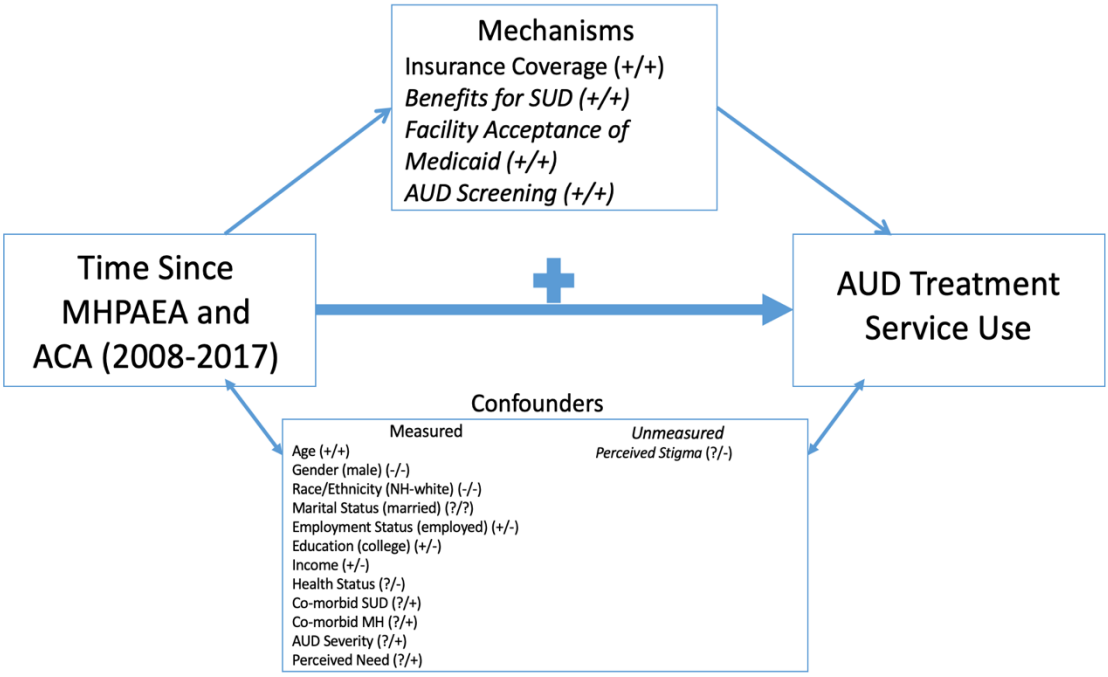

Figure 1. *Conceptual framework*

Pathways

There are at least four pathways that could have led to an increase in AUD treatment from 2008-2017. The first two pathways work in concert to reduce the cost of receiving treatment for AUD. As described previously, the ACA and the MHPAEA were passed in 2010 and 2008 respectively. These policies worked to increase insurance coverage, defined here as individuals having some form of health insurance policy, as well as increase the benefits for SUD treatment, defined here as the amount of treatment covered as well as the cost-sharing requirements of treatment (Busch, 2012). In both cases, I hypothesized that insurance coverage and benefits have increased over time. These increases lead to a decrease in the monetary cost of treatment seeking. According to economic theory, when the cost of a good decreases, the quantity demanded will increase; thus, the decrease in AUD treatment cost should lead to an increase in AUD treatment use (Kaiser Family Foundation, 2018).

In addition, there are two other pathways that may have led to increases in treatment for AUD that will be unmeasured. First, as the size of the Medicaid population increased in many states, the percentage of facilities that accept Medicaid for alcohol use treatment may have increased. Previous research has found that expansion increased the odds that Medicaid would be accepted by private SUD treatment facilities, although the study did not examine AUD specifically (Andrews, 2014). In addition, the implementation of MHPAEA was associated with an increase in the probability of an SUD facility accepting Medicaid (Geissler & Evans, 2020). An increase in facilities accepting Medicaid would increase the supply of available facilities for patients seeking treatment, thereby reducing the time costs associated with using treatment services. Finally, the screening rate for AUD and other alcohol problems may have increased, due in part to the increased focus on preventative medicine in the ACA (McLellan & Woodworth, 2014; Tai & Volkow, 2013). For example, alcohol screening is one of the preventive benefits required of marketplace plans (Healthcare.gov, 2019). As more people are screened for AUD, medical professionals may identify more cases of AUD and lead more individuals to seek treatment. However, no known study has investigated trends in screening for AUD, so the effects above are only hypothesized. Because only insurance coverage was measured in the current study, all other mechanisms are represented with italicized text.

Confounders

I identified a number of individual-level factors from the Andersen model that serve as confounders to the focal relationship.

Predisposing Characteristics

There are multiple predisposing characteristics included in the model. The first is age, here defined as chronological age, or the number of years an individual has lived since birth (Schwall, 2012). Although the US population has grown increasingly older in the years between 2008-2017, (U.S. Census Bureau, 2008, 2017) age has a mixed relationship with treatment for AUD, with some studies finding that AUD treatment increases as age increases (Cohen, Feinn, Arias, & Kranzler, 2007), some have found no effect of age (Edlund et al., 2012), and others have found that rates of treatment increased at different ages for different severities of AUD (Evans-Polce & Schuler, 2016).

Another predisposing characteristic, race/ethnicity, is defined here as a social construct related to phenotypic genetic expression and influenced by social and political factors (Ford & Kelly, 2005). The share of the minority population in the US continues to increase (U.S. Census Bureau, 2008, 2017) and past research has found that racial and ethnic minorities are less likely to receive care for AUD, especially as it becomes more severe (Schmidt, 2016).

A third predisposing characteristic, gender, is associated with treatment for AUD, as past studies have found that females have lower odds of receiving AUD treatment.(Cohen et al., 2007; Edlund et al., 2012; Gilbert et al., 2019; U.S. Census Bureau, 2008, 2017).

Fourth, education is defined as the years of schooling received by an individual, is another predisposing factor in the model. The US has continued to grow more educated (U.S. Census Bureau, 2008, 2017) and increased education has been found to decrease the odds of receiving AUD treatment (Cohen et al., 2007).

Additionally, marital status and employment status are included in the model. Previous research has found that unmarried individuals are more likely to receive treatment for AUD and unemployed individuals are more likely to receive specialty AUD treatment (Cohen et al., 2007; Edlund et al., 2012; Gilbert et al., 2019).

Perceived stigma is another predisposing factor in the conceptual model that is related to both the passage of time and AUD service use. I define perceived stigma as individual's perception of the negative views and stereotypes held be society at large (Eisenberg, Downs, Golberstein, & Zivin, 2009). There is some evidence the perceived stigma towards individuals with AUD has declined over time (Schomerus, Matschinger, Lucht, & Angermeyer, 2014) and much stronger evidence that individuals with AUD with higher levels of perceived stigma are less likely to seek care (Link et al., 2010). As perceived stigma will be unmeasured, it is represented in the model with italicized text. Finally, public attitudes towards AUD treatment is another unmeasured construct that is related to both the time since the MHPAEA/ACA were passed and AUD service use. AA, for example, has seen declining membership since 2001, which could in part be due to changes in beliefs towards AA as a treatment option (C., 2015). Additionally, attitudes towards the effectiveness of AUD treatment are one factor in whether individuals seek care (Gilbert et al., 2019; Oleski et al., 2010).

Enabling and Need Characteristics

Income is an enabling characteristic included in the model. Income has increased in the years between 2008 and 2017 (U.S. Census Bureau, 2008, 2017), and previous research has found that as income increases, the odds of AUD and other SUD treatment decrease (Cohen et al., 2007; Edlund et al., 2012).

There are also several need-related characteristics included in the conceptual model. Andersen defines perceived need as "how people view their own general health and functional state" (Andersen & Davidson, 2007, p. 7). The model builds on this definition, to define perceived need as an individual's view of their health and functioning in relation to their alcohol use. Prior research has reported that perceived need is associated with whether individuals seek treatment for their AUD (Grella, Karno, Warda, Moore, & Niv, 2009). In addition, perceived need may be correlated with time, as one component of perceived need is an individual's health beliefs, although this has not been proven and is only speculated (Andersen & Davidson, 2007). Researchers have argued that parity may act to decrease stigma and increase perceived need for care (Barry, Goldman, & Huskamp, 2016). To the best of my knowledge, however, no study has investigated trends in perceived need for care over time.

Another need-related characteristic is health status, defined here as "the extent to which a person can live a functional, comfortable, and pain-free existence" (Andersen and Davidson (2007, p. 9). As health status improves for those with AUD, they are less likely to seek treatment (Cohen et al., 2007).

Co-morbid mental health and co-morbid SUD disorders are defined as individuals with AUD who also meet the criteria for a mental health disorder, like depression, or a separate SUD, like OUD (Edlund et al., 2012). Rates of co-morbid mental health disorders and SUDs may have changed over time, and co-morbid mental health and SUDs are associated with increases in treatment seeking (Ramin Mojtabai, Olfson, & Mechanic, 2002).

The model also includes the construct of AUD severity. AUD severity is defined as having alcohol dependence instead of alcohol abuse. Alcohol dependence involves development of tolerance, withdrawal or compulsive alcohol consumption despite adverse alcohol-related consequences. In contrast, alcohol abuse involves adverse alcohol-related consequences without the development of tolerance, withdrawal, or compulsive use (*Diagnostic and statistical manual of mental disorders : DSM-IV*, 1994). Past research has found those with alcohol dependence are more likely to receive alcohol and mental health treatment compared to those with alcohol abuse (Edlund et al., 2012).

Testable Hypothesis

H1: AUD service use increased between 2008 and 2017, after controlling for confounders.

As explained previously, the passage and implementation of the ACA and the MHPAEA had a number of effects that should work to increase utilization of services to treat AUD. Using economic theory of demand, the increase in insurance coverage and expansion of benefits for SUD treatment should decrease the cost of treatment, thereby increasing demand. I will also test whether there was an increase in treatment in any medical location, which can be paid for by insurance. Additionally, since past research has found that individuals with AUD also seek mental health services for treatment, I will also test for an increase in mental health treatment (Edlund et al., 2012).

Data Description

I used data from the 2008-2017 National Survey of Drug Use and Health (NSDUH). NSDUH is an annually conducted, nationally-representative, cross-sectional survey of the US civilian, non-institutionalized population over the age of 12 (Center for

Behavioral Health Statistics and Quality, 2018f). NSDUH uses multistage area probability sampling for all 50 states and DC, with oversampling among youths ages 12-17 as well as adults ages 18-25. During the years of data that will be used for this study, sample sizes ranged from 67,804 to 70,109 and weighted response rates ranged from 67.12% to 75.56% (Center for Behavioral Health Statistics and Quality, 2018b, 2018c, 2018d, 2018f). The survey is conducted with computer-assisted interviewing (CAI) methods (Center for Behavioral Health Statistics and Quality, 2018f). NSDUH collects information on basic demographics, use of alcohol, tobacco, and illicit drugs, as well as mental health among the target population (Center for Behavioral Health Statistics and Quality, 2018f). This study was exempt from IRB review in a letter of determination from Emory University's IRB as it did not meet the definition of "human subjects" research because all data came from publicly available sources without Private Health Information identifiers.

Table 2 describes how the constructs from the framework were mapped to NSDUH questions.

Table 2. *Construct measurement*

Construct	Measure	Hypothesized Relationship to the DV

Time Since ACA and MHPAEA Passage	• Years
	  ○ 2008-2010
	  ○ 2011-2014
	  ○ 2015-2017
		AUD treatment increased as the years since ACA/MHPAEA passage increase

AUD Treatment Service Use	• Received Treatment:
	  ○ Yes: Received treatment in last year for alcohol alone, alcohol and drugs, or alcohol logically assigned
	  ○ No: All other respondents
	• Treatment Location:
	  ○ Self-help group only: Only treatment location is self-help group
	  ○ Any Medical: Treatment location is hospital, rehab, mental health center, emergency room, private doctor
	  ○ Other/Unknown: Respondent gave other treatment location or did not answer treatment location questions
		AUD treatment is the dependent variable

Mental Health Treatment	• Mental Health Treatment: ○ Yes: Reported receipt of inpatient, outpatient, or pharmacological treatment in past year for mental health • No: Did not report receipt of treatment for mental health in last year	Mental Health treatment is the dependent variable

Insurance Coverage	• Insurance Coverage:
	  ○ Any Private
	  ○ Medicaid no Private
	  ○ Other insurance including Medicare and VA (no Private or Medicaid)
	  ○ Uninsured
		As insurance coverage increases, AUD treatment will increase

Benefits for SUD Treatment	*Unmeasured*	As benefits for AUD treatment increase, AUD treatment will increase

Construct	Measure	Hypothesized Relationship to the DV
Medicaid Facility Acceptance	*Unmeasured*	As Medicaid facility acceptance increases, AUD treatment increases
AUD Screening	*Unmeasured*	As AUD screening increases, AUD treatment increases
Age	• Age Group: o 18-25 o 26-34 o 35-49 o 50-64	As age increases, AUD treatment will increase
Race/Ethnicity	• Racial/Ethnic Group: o NH White o NH Black o Hispanic o NH Other	Compared to NH White, minority races will see a greater increase in AUD treatment
Gender	• Gender: o Male o Female	Compared to Males, Females will be less likely to receive treatment for AUD
Education	• Education Group: o Less than High School o High School Graduate o Some College o College Graduate	As education group increases, treatment for AUD decreases
Perceived Stigma	*Unmeasured*	As perceived stigma increases, AUD treatment decreases
Income	• Income Group: o Less than $20,000 o $20,000 - $49,999 o $50,000 - $74,999 o $75,000 or more	As income increases, AUD treatment decreases
Marital Status	• Marital Status: o Married o Widowed or Divorced o Never Married	Compared to married individuals, widowed/divorced and never married individuals are more likely to receive AUD treatment

Construct	Measure	Hypothesized Relationship to the DV

Employment Status	• Employment Status
	  ○ Full-time
	  ○ Part-time
	  ○ Unemployed
	  ○ Other
		Compared to full-time employment, unemployed individuals are more likely to receive AUD treatment

Perceived Need	• Perceived Need for Treatment:
	  ○ Yes: Reported perceiving a need for treatment, or perceiving an additional need for treatment
	  ○ No: Did not report perceiving a need for treatment or perceiving an additional need for treatment
		As perceived need increases, AUD treatment increases

Health Status	• Health Status Group:
	  ○ Excellent
	  ○ Very Good
	  ○ Good
	  ○ Fair
	  ○ Poor
		As health status increases, AUD treatment decreases

Co-Morbid SUD	• Any past year co-morbid SUD:
	  ○ Yes: Any illicit drug abuse or dependence in past year
	  ○ No: No illicit drug abuse or dependence in past year
		Individuals with co-morbid SUD are more likely to received AUD treatment

Co-Morbid Mental Health Disorder	• Any past year mental illness:
	  ○ Yes
	  ○ No
		Individuals with co-morbid mental health disorders are more likely to receive AUD treatment

AUD Severity	• Type of AUD
	  ○ Alcohol Dependence
	  ○ Alcohol Abuse
	• Number of AUD criteria met
	  ○ 1-2 criteria
	  ○ 3-4 criteria
	  ○ 5+ criteria
		As AUD severity increases, AUD treatment increases

The construct of AUD treatment service use was measured using a dichotomous variable. Respondents were asked whether they received treatment for alcohol or drugs in the last twelve months, and whether that treatment was for alcohol, drugs, or both. Those

who received treatment for alcohol alone, alcohol and drugs, or alcohol logically assigned were coded as receiving treatment. All other respondents were coded as not having received treatment.

In addition, three dichotomous measure were created, denoting the treatment location among respondents who received treatment. Respondents were asked if they received treatment in a hospital as an inpatient, in an overnight rehab center, in a rehab center as an outpatient, in a mental health center as an outpatient, in the emergency room, in private doctor's office, in prison/jail, in self-help groups, and in any other location. Respondents who said they received treatment in a self-help group but not any other location, were assigned a treatment type of self-help only group. All other locations except for other and prison/jail were coded as a health systems location. Respondents who reported any other location or who did not report any location were coded as Other/Unknown.

A dichotomous indicator for mental health treatment was also created, with respondents who reported receipt of inpatient, outpatient, or a prescription medication for mental health treatment coded as "yes." Respondents did not report any of the above forms of mental health treatment were coded as "No."

Insurance coverage was operationalized into a categorical variable. Respondents were asked whether they had various insurance types, including Medicare, Medicaid, Private insurance, VA, or other health insurance. I created a variable using priority coding, resulting in the following categories: any private insurance, Medicaid [no private insurance], other insurance, uninsured, and missing/unknown.

Predisposing characteristics in the framework were operationalized using measures of age, race/ethnicity, gender, education, marital status, and employment status. Age was measured as a categorical variable, with five categories: 18 to 25, 26 to 34, 35 to 49, and 50 to 64. Race/Ethnicity was measured with four categories: Non-Hispanic white, Non-Hispanic black, Hispanic, and Non-Hispanic other. Gender was dichotomized into male and female. Education was coded with four groups: less than high school, high school graduate, some college, and college graduate. Marital status was categorized into 3 groups: married, widowed or divorced, and never married. Finally, employment status was coded into four groups: full time employed, part-time employed, unemployed, and other.

Lastly, enabling and need characteristics were operationalized with the following measures. Income was coded into a categorical variable, with four categories: less than $20,000, $20,000 - $49,999, $50,000 - $74,999, $75,000 or more. Self-reported health status was categorized into five groups; excellent, very good, good, fair, and poor. Co-morbid SUD was coded as yes if individuals met the criteria for heroin, cocaine, or marijuana dependence or abuse, no if they did not. Co-morbid mental health disorder was coded as yes or no, based on a measure from the database that classifies respondents as having any mental illness in the past year if they meet a probability threshold using a specified algorithm from several survey items (Center for Behavioral Health Statistics and Quality, 2018a). In the main analysis, AUD severity was coded as the type of AUD, either Alcohol Dependence or Alcohol Abuse. For the sensitivity analysis, AUD severity was coded as the number of criteria met, categorized into 1-2 criteria, 3-4 criteria, or 5+ criteria. Finally, perceived need was coded as a dichotomous variable. Respondents who

reported a need for treatment, or who had received treatment but reported a need for additional treatment, were coded as perceiving a need for treatment. Respondents who did not report a need for treatment, or an additional need for treatment, were coded as not perceiving a need for treatment.

Sample

The total sample for all 10 years of NSDUH was 562,072. Those under age 18 or over age 64 were excluded first, since they were not the focus of the changes to the insurance market. This left 370,864 adults. I then excluded any individuals who did not meet the criteria for AUD. Finally, I excluded any individuals who were missing any covariate or outcome variables. This resulted in a final sample of 37,890 for analyses of any alcohol treatment, treatment in a medical location, and self-help only treatment. For the model of mental health treatment among those with AUD, an additional 177 observations were missing on the variable for mental health treatment. That model had a total sample of 37,713 individuals.

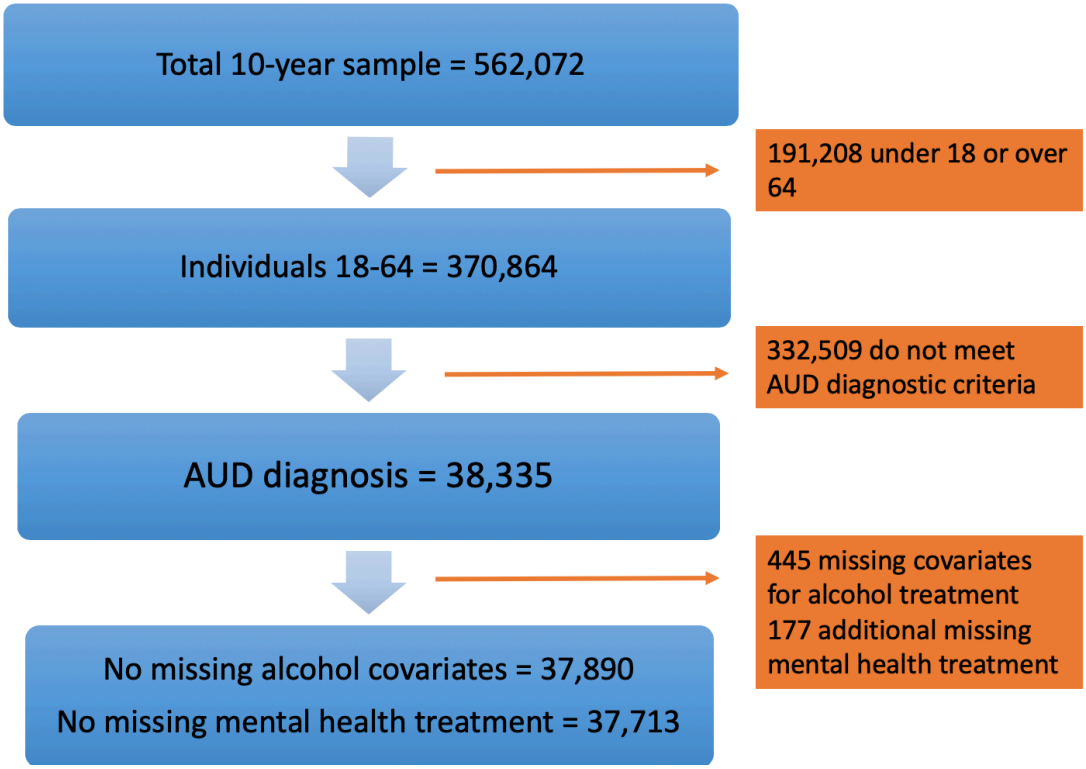

Figure 2. *Derivation of analytic samples*

Data Analysis

Analysis was conducted in STATA using the SVY command to account for the complex survey design elements of NSDUH. First, bivariate analyses were conducted using an Adjusted Wald test to compare treatment rates in 2011-2014 and in 2015-2017 to the baseline period of 2008-2010. Next, I estimated logistic regression models, controlling for the confounders identified above as well as insurance status. The equation is:

$$Pr(Treatment = 1) = B_0 + B_1Y_1 + B_2Y_2 + B_3C + E$$

where Y_1 is an indicator the time period 2011-2014, Y_2 is an indicator for the time period 2015-2017 and C represents the control variables and insurance status. Separate models were estimated for the dependent variables of any treatment in a medical location, treatment in a self-help location only, and mental health treatment. The alpha level for

statistical significance was set to 0.05 prior to running the analysis. Average marginal effects were reported for all models that were estimated. Marginal effects show how the predicted probability of the outcome changes holding all other covariates constant.

For a sensitivity analysis, the measure of AUD severity was changed from the type of AUD to the number of AUD criteria met.

Results

Table 3. *Characteristics of individuals with AUD from the 2008-2017 NSDUH*[a]

Variable	2008-2010 (N=13281)	2011-2014 (N=14992)	P	2015-2017 (N=9617)	P
Age					
18-25	32.9	30.0	.001	26.0	<.001
26-34	25.1	25.4	.792	25.2	.914
35-49	27.0	27.2	.786	27.6	.603
50-64	15.0	17.3	.026	21.1	<.001
Male	66.3	64.2	.016	63.3	.007
Race/Ethnicity					
NH-White	69.1	66.1	.003	66.0	.004
NH-Black	11.0	10.9	.821	10.8	.742
Hispanic	15.4	17.1	.016	16.6	.130
NH-Other	4.4	5.9	<.001	6.7	<.001
Marital Status					
Married	32.0	31.9	.885	33.3	.310
Widowed or Divorced	16.1	16.2	.857	16.7	.507
Never Married	51.9	51.9	1.00	50.0	.105
Income					
Less than $20,000	22.5	24.0	.096	20.1	.008
$20,000 - $49,999	31.0	30.9	.923	28.1	.001
$50,000 - $74,999	16.7	14.9	.027	14.8	.030
$75,000 or more	29.8	30.2	.744	37.0	<.001
Self-Reported Health Status					
Excellent	20.2	19.8	.594	18.1	.006
Very Good	39.0	38.0	.391	38.4	.558
Good	29.1	28.7	.733	30.1	.296
Fair	9.7	10.9	.036	11.3	.027
Poor	2.0	2.5	.149	2.0	.807
Education					
Less than high school	16.3	14.4	.021	11.7	<.001
High School Graduate	30.0	27.5	.014	23.8	<.001
Some College	29.6	30.8	.176	33.4	<.001
College Graduate	24.1	27.3	.001	31.0	<.001
Employment Status					
Full-Time	58.6	58.4	.838	60.8	.071
Part-Time	16.9	15.8	.206	14.5	.003
Unemployed	10.0	9.2	.173	7.6	<.001
Other	14.5	16.5	.009	17.1	.001
Co-morbid SUD	11.8	11.7	.868	11.7	.875

Variable	2008-2010 (N=13281)	2011-2014 (N=14992)	P	2015-2017 (N=9617)	P
Co-morbid Mental Illness	36.2	38.7	.013	40.1	<.001
Alcohol Dependence	47.1	47.9	.460	53.7	<.001
Number of AUD Criteria					
1-2	33.1	32.9	.905	29.6	.001
3-4	40.5	40.8	.723	42.3	.050
5+	26.4	26.2	.807	28.1	.044
Insurance Status					
Private	61.0	60.0	.372	64.9	.001
Medicaid	8.1	9.9	.002	14.3	<.001
Other Insured	5.8	6.0	.694	6.4	.260
Uninsured	25.1	24.1	.284	14.4	<.001
Perceived Need for Treatment	4.1	3.7	.324	3.6	.338

[a] NSDUH, National Survey of Drug Use and Health. Values are weighted percentages. P values from Adjusted Wald test comparing 2011-2014 and 2015-2017 values to baseline of 2008-2010.

Table 3 shows the weighted descriptive characteristics of the sample in each time-period. The proportion of individuals with AUD who were 18-25 declined over this time period, while the proportion who were 50-64 increased. As expected, the percent of individuals with AUD who were uninsured declined in 2015-2017 (14.4%) compared to 2008-2010 (25.1%, $p<0.01$), due to increases in both private insurance (61.0% to 64.9%, $p<0.01$) and Medicaid (8.1% to 14.3%, $p<0.01$) over that time period.

There was a decline in the percentage of those with AUD who perceived a need for treatment, from 4.1% in 2008-2010 to 3.7% in 2011-2014 to 3.6% in 2015-2017, although this decline was not statistically significant.

Table 4 shows the outcomes for each time period. There was an overall decline in any treatment of AUD from 8.4% in 2008-2010 to 7.0% in 2015-2017 ($p<0.05$). There was a decline in treatment in any medical setting from 5.5% in 2008-2010 to 4.6% in 2011-2014 and 4.9% in 2015-2017, although this decline was not statistically significant. Self-help only treatment declined from 1.2% in 2008-2010 to 1.1% in 2011-2014 to 0.7% in 2015-2017. The decline in 2015-2017 was significant compared to 2008-2010

(p<0.01). Mental health treatment increased from 22.6% in 2008-2010 to 23.2% in 2011-2014, and 24.8% in 2015-2017. The increase in 2015-2017 was significant compared to 2008-2010 (p<0.05).

Table 4. *Treatment rates for adults with AUD from 2008-2017 NSDUH*[a]

Variable	2008-2010 (N=13,281[b]/ 13,221[c])	2011-2014 (N=14,992[b] /14,925[c])	P	2015-2017 (N=9,617[b] /9,567[c])	P
Alcohol Treatment					
Any	8.4	7.4	.113	7.0	.032
Medical Location	5.5	4.6	.061	4.9	.240
Self-Help Only	1.2	1.1	.690	0.7	.002
Mental Health Treatment	22.6	23.2	.443	24.8	.024

[a] NSDUH, National Survey of Drug Use and Health. Values are weighted percentages. P values from Adjusted Wald test comparing 2011-2014 and 2015-2017 values to baseline of 2008-2010.
[b] Sample for Alcohol treatment models
[c] Sample for Mental Health Treatment model

Table 5 shows the results of estimated logistic regressions to assess whether there were significant changes in the probability of treatment in 2011-2014 and 2015-2017 compared to a baseline period of 2008-2010, controlling for related predisposing, enabling, and need characteristics. Compared to 2008-2010, the probability of receiving any treatment for alcohol declined by 1.1 percentage points in 2011-2014 (p<0.05) and 1.9 percentage points in 2015-2017 (p<0.01).

Compared to 2008-2010, the probability of receiving treatment in any medical location declined by 1.1 percentage points in 2011-2014 (p<0.05) and 1.2 percentage points in 2015-2017 (p<0.05). Compared to 2008-2010, the probability of self-help treatment only declined by 0.1 percentage points in 2011-2014 and 0.6 percentage points in 2015-2017. The decline in 2015-2017 was statistically significant (p<0.01).

Results from the model using mental health treatment as the dependent variable differed from bivariate analysis. After controlling for predisposing, enabling, and need factors, the probability of receiving any mental health treatment declined by 0.6

percentage points in 2011-2014 and 1.1 percentage points in 2015-2017 compared to 2008-2010, although neither decline was statistically significant.

Table 5. *Marginal effects (in percentages) for receiving treatment among those with AUD from 2008-2017 NSDUH*[a]

Variable	Any Treatment (Baseline = 7.6%)	Any Medical Location (Baseline = 5.0%)	Self-Help Only (Baseline = 1.0%)	Mental Health Treatment (Baseline = 23.4%)[b]
Year (reference = 2008-2010)				
2011-2014	-1.1*	-1.1*	-0.1	-0.6
2015-2017	-1.9**	-1.2*	-0.6**	-1.1
Male	2.5**	1.3**	0.5**	-11.1**
Age (reference = 18-25)				
26-34	2.1**	1.8**	0.1	4.0**
35-49	4.7**	3.9**	0.1	7.9**
50-64	4.0**	3.5**	-0.3	9.2**
Race/Ethnicity (ref = NH-White)				
NH-Black	-1.7**	-1.3*	-0.5**	-8.2**
Hispanic	-1.4*	-1.9**	0.0	-8.5**
NH-Other	-1.2	-1.5**	-0.3	-7.2**
Marital Status (ref = Married)				
Widowed or Divorced	2.8**	1.8**	-0.0	2.4*
Never Married	2.1**	1.2*	-0.1	0.4
Income (ref = 75,000+)				
Less than $20,000	1.6	1.4	-0.2	-0.6
$20,000 - $49,999	0.4	0.7	-0.2	-2.0*
$50,000 - $74,999	0.6	1.2	-0.1	-0.2
Self-Reported Health Status (ref = Excellent)				
Very Good	-0.1	0.4	0.0	0.5
Good	1.6*	1.6*	0.1	3.5**
Fair	-0.4	-0.2	0.5	4.1**
Poor	-0.8	0.3	-0.4	4.6
Insurance Status (ref = Uninsured)				
Private	0.1	0.7	-0.1	6.3**
Medicaid	2.9**	2.1*	-0.1	11.3**
Other Insured	1.3	1.1	0.6	9.9**
Education (ref = High School Graduate)				
Less than high school	0.2	-0.1	0.2	-2.7*
Some College	-0.2	0.2	0.6*	1.8*
College Graduate	-1.5	-0.5	0.3	6.1**
Employment Status (ref = Full-Time				
Part-Time	0.4	1.1	-0.2	2.9**
Unemployed	3.4**	3.8**	-0.1	5.4**
Other	2.8**	3.1**	-0.2	7.6**

Variable	Any Treatment (Baseline = 7.6%)	Any Medical Location (Baseline = 5.0%)	Self-Help Only (Baseline = 1.0%)	Mental Health Treatment (Baseline = 23.4%)[b]
Co-morbid SUD	6.9**	3.8**	0.8*	3.5**
Co-morbid Mental Illness	4.6**	3.0**	0.5**	24.2**
Alcohol Dependence (ref = Abuse)	6.0**	4.9**	0.7**	3.9**
Perceived Need for Treatment	-0.8	0.0	-0.6*	5.8**

[a] NSDUH, National Survey of Drug Use and Health
[b] Sample of 37,713 compared to 37,890 for alcohol treatment due to missing Mental Health Treatment
*p<.05, **p<.01

In the sensitivity analysis that used a measure of number of criteria met for severity instead of alcohol dependence versus abuse, the probability of receiving any treatment continued to decline in both 2011-2014 (-1.1 percentage points) and 2015-2017 (-1.9 percentage points) compared to 2008-2010. Those with 3-4 AUD criteria were 3.5 percentage points more likely to receive treatment and those with 5+ criteria were 14.4 percentage points more likely to receive treatment (full results in appendix).

Supplementary Analysis

To test an interaction between AUD severity and year, an interaction between year group and AUD criteria was added to the model of any treatment. Only the interaction between the most severe AUD cases (5+ criteria) and the later years (2015-2017) was significant, with those individuals being 5.0 percentage points less likely to receive any treatment compared to those with less severe cases of AUD (results in appendix). Additionally, an interaction between sex and year was also tested, but was not significant (results in appendix).

Among those who received treatment, bivariate analysis using Adjusted Wald tests examined whether private insurance, Medicaid, or other insurance (Medicare and VA insurance) were more likely to have paid for treatment in 2011-2014 or 2015-2017

compared to the baseline of 2008-2010. Bivariate analysis also tested whether self-pay decreased among those who received treatment (Table 6).

Table 6. *Payer for treatment among those with AUD who received treatment from 2008-2017*[a]

Variable	2008-2010 (N=1021)	2011-2014 (N=1057)	P	2015-2017 (N=697)	P
Paid for Treatment					
Private Insurance	30.6	34.2	.453	39.0	.089
Medicaid	12.8	16.2	.164	20.3	.007
Other Insurance	13.8	20.1	.018	22.3	.001
Self-Pay	57.0	52.8	.249	44.7	.005

[a] Values are in weighted percentages

Among those who received treatment, Medicaid was a payer 20.3% of the time in 2015-2017, a significant increase from 12.8% in 2008-2010 ($p < 0.01$). Other insurance also increased as a payer from 13.8% in 2008-2010 to 20.1% in 2011-2014 ($p<0.05$) to 22.3% in 2015-2017 ($p<0.01$). Also, self-pay declined from being a payer for 57% of treatment in 2008-2010 to only 44.7% of treatment in 2015-2017 ($p<0.01$). Despite this decline, it still remained the most common form of payment for treatment.

Finally, bivariate analysis tested unmet need for treatment, with unmet need being measured by individuals who perceived a need for treatment but did not receive treatment. Unmet need in 2011-2014 (3.1%) and 2015-2017 (3.1%) was compared to the baseline of 2008-2010 (3.6%). There was no change in unmet need among those with AUD from 2008-2010 to 2015-2017.

Discussion

This study analyzed trends in treatment for AUD from 2008-2017. Treatment for alcohol among those with AUD declined from 8.4% in 2008-2010 to 7.0% in 2015-2017. When predisposing, enabling, and need-related factors were controlled, the treatment rate significantly by 1.1 percentage points in 2011-2014 and 1.9 percentage points in 2015-

2017 compared to 2008-2010. Treatment rates for alcohol treatment in any medical location declined by 1.1 percentage points in 2011-2014 and 1.2 percentage points in 2015-2017, while treatment rates for self-help only treatment declined in 0.6 percentage points in 2015-2017. Treatment rates for mental health treatment did not significantly change over this timer period, once predisposing, enabling, and need factors were controlled for.

While the uninsured rate among those with AUD declined over this time period, the probability of receiving any treatment for alcohol declined during this time. Private insurance, which increased by 3.9 percentage points during this timeframe, had no association with the probability of receiving treatment for alcohol, although it was associated with a statistically significant 6.3 percentage point increase in receipt of mental health treatment. Only Medicaid insurance, which increased by 6.1 percentage points, was associated with an increased probability of receiving alcohol treatment. Supplemental analysis also revealed that among those who received treatment, there was a decrease in the rate of self-pay in 2015-2017 compared to 2008-2010 and an increase in the rate of Medicaid and other insurance paying for treatment in the same time periods.

There are several potential explanations for the observed declines in treatment. Even with expanded insurance coverage, the cost, both direct and indirect, of medical treatment may be high for individuals. Although MHPAEA was intended reduce the treatment limitations and cost-sharing faced by patients when seeking behavioral health care, recent evidence has called into question whether MHPAEA was effective. In 2017, SUD care was more likely to be out-of-network than medical/surgical care for inpatient visits (10.1x), outpatient visits (8.5x), and office visits (9.5x). These disparities increased

for all service types from 2013 to 2017 (Davenport, Gray, & Melek, 2019). Out of network services have higher cost-sharing than in-network services and are thus more expensive for individuals. Although many individuals with AUD gained insurance, the cost of receiving alcohol treatment may have been very high if they needed to seek out-of-network services. The average cost of one outpatient visit for alcohol abuse among the privately insured was $379 in 2012, although this includes both insurer and patient spending (Thomas et al., 2016).

Another possible explanation is that the supply of alcohol treatment facilities is limited, preventing those with AUD from accessing alcohol treatment. However, data from National Survey of Substance Abuse Treatment Services (N-SSATS), an annual survey of substance use treatment facilities in the United States, shows a modest increase in facilities offering various types of AUD treatment. For instance, the number of facilities offering Campral, one drug used for AUD treatment, increased from 2,376 in 2011 and 2,691 in 2017 (Substance Abuse and Mental Health Services Administration, 2012, 2018). Additionally, the number of facilities offering alcohol detoxification slightly increased from 1,703 in 2011 to 1,813 in 2017 (Substance Abuse and Mental Health Services Administration, 2012, 2018). Even as the overall number of facilities increased, the number of AUD clients severed by these facilities has decreased. The overall number of individuals who sought treatment for alcohol alone or alcohol and drugs decreased every year measured since 2011, declining from 756,890 in 2011 to 712,480 in 2017 (Substance Abuse and Mental Health Services Administration, 2018). Future research should examine whether increased emphasis or increased demand for other types of SUD

treatment, like opioid use disorder treatment, is leading to reduced capacity to treat those with AUD.

Although a potential explanation for the decrease in alcohol treatment is substitution with mental health treatment, I did not find an increase in mental health treatment over this time period among those with an AUD. The percentage of those with AUD with a co-morbid mental health condition significantly increased in 2015-2017 compared to 2008-2010, from 36% to 40%, and bivariate analysis did show an increase in mental health treatment in 2015-2017 compared to 2008-2010. However, this increase was not statistically significant once predisposing, enabling, and need factors were controlled for, suggesting that individuals with AUD are not likely substituting for a decline in alcohol treatment with increases in mental health treatment.

In addition to declines in overall and medical treatment, self-help treatment declined by 0.6 percentage points in 2015-2017 compared to 2008-2010. As far I am aware, no other study has investigated trends in self-help treatment. Alcoholics Anonymous has seen a steady decline in their members since 2001, which could in part explain the decline noted in 2015-2017 (C., 2015). This decline could be related to changing attitudes towards self-help, but more research is needed in this area.

Finally, although increasing insurance coverage and benefits addresses one of the main structural benefits individuals with AUD face when getting care, there are still additional structural and attitudinal barriers to receiving care. The MHPAEA and ACA did not address more indirect barriers towards care seeking including lack of childcare, lack of transportation, or loss of income during treatment. Additionally, among those with AUD who perceive a need for treatment but do not receive it, attitudinal barriers are

endorsed more frequently than structural barriers (Oleski et al., 2010). Many attitudinal barriers are related to stigma towards AUD. For example, individuals with AUD who perceive public stigma towards those with AUD may feel too embarrassed to seek help (Hammarlund, Crapanzano, Luce, Mulligan, & Ward, 2018). The stigma towards AUD and other substance use disorders is higher than those for most mental health disorders, and the MHPAEA and ACA were not designed to reduce stigma (Schomerus et al., 2010). Additionally, I found that only 3.6% to 4.1% of individuals perceived a need for treatment, an amount that did not change over this time period. This suggests that attitudinal barriers may be the limiting step in increasing service use for AUD. Future efforts to increase treatment may need to address attitudinal as well as structural benefits.

Strengths and Limitations

This study has several limitations. First, these analyses are descriptive in nature, and cannot elucidate the reasons that account for the unexpected decline in AUD treatment in the face of so many national policies that expanded insurance coverage. There are several important unmeasured mechanisms that should be tested in future studies to better understand these trends, including: changes in insurance benefits for AUD treatment, changes in the geographic availability and capacity of substance use treatment facilities that offer AUD services, changes in screening practices for AUD, and changes in public sentiments and attitudes towards AUD treatment. Another limitation is that survey design changes in 2015 restricted measurement of co-morbid SUDs in these analyses to those that were consistently measured during the study period (Center for Behavioral Health Statistics and Quality, 2018e). Lastly, NSDUH excludes the

institutionalized and non-civilian US population. Thus, the estimates from this study cannot be generalized to those populations.

Despite the limitations of this study, it still provides valuable advances to the state of the literature on recent trends AUD treatment. This study is the first to examine trends in AUD treatment in recent years using a nationally-representative dataset. This study adds to the literature through its use of more recent data, which accounts for more time since implementation of the ACA. Additionally, this study uses more robust methods than past studies of trends in AUD treatment by controlling for more confounders. Finally, this study includes an examination of overall trends in AUD treatment as well as trends by treatment location.

Implications

Although not causal, the results of this study found that treatment for AUD declined even as insurance coverage increased among individuals with AUD. The need for treatment and cost of not treating those with AUD is only predicted to increase in the future. A recent study found that deaths per year due to alcohol doubled from 1999 to 2017, reaching 72,558 a year in 2017 (White et al., 2020). This trend was confirmed by a second study this year, which found an increase in age-standardized alcohol-induced death rate from 8.9 deaths per 100,000 residents in 2000 to 12.0 deaths per 100,000 residents in 2016 (Spillane et al., 2020). Although not all deaths due to alcohol use are caused by AUD, policymakers and heath care stakeholders should continue to focus on developing and implementing policy interventions to increase access to and use of treatment services, as an increase in treatment for AUD could help reduce alcohol-related deaths.

Recommendations for Future Research

Future research is needed to elucidate the key drivers of the decrease in alcohol treatment in recent years. Research is needed to investigate whether there have been changes to AUD treatment supply as a potential mechanism for the decline in treatment observed in this study. This would include investigation of changes to the number of facilities and the capacity of facilities to treat those with AUD. Finally, future research should investigate individual experiences of stigma and attitudinal barriers to care as well as the extent to which attitudinal barriers explain declines in self-help versus medical treatment.

Conclusion

This study used more recent national data to provide the most comprehensive examination of trends treatment for AUD after passage of the MHPAEA and the ACA. I found declines in treatment for AUD in both unadjusted and adjusted analyses, and no change in mental health treatment in adjusted analyses. Given the gains in insurance coverage during this time period, further research is needed to tease out the exact mechanisms responsible for the decline in treatment.

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Appendix

Table A.1 - Marginal effects (in percentages) for receiving treatment for alcohol among those with AUD from 2008-2017 with severity measured by the number of criteria met

	Any Treatment (Baseline = 7.6%)
2011-2014	-0.011*
	(0.031)
2015-2017	-0.019**
	(0.002)
Male	0.022**
	(0.000)
Ages 26-34	0.018**
	(0.004)
Ages 35-49	0.043**
	(0.000)
Ages 50-64	0.039**
	(0.004)
NH-Black	-0.012*
	(0.045)
Hispanic	-0.014*
	(0.016)
NH-Other	-0.011
	(0.164)
Less than $20,000	0.016
	(0.062)
$20,000 - $49,999	0.003
	(0.663)
$50,000 - $74,999	0.005
	(0.590)
Very Good	-0.002
	(0.705)
Good	0.011
	(0.148)
Fair	-0.007
	(0.385)
Poor	-0.012
	(0.309)
Private	0.003
	(0.578)
Medicaid	0.028**
	(0.003)
Other Insured	0.010
	(0.246)

Less than high school	-0.000
	(0.955)
Some College	-0.003
	(0.650)
College Graduate	-0.012
	(0.110)
Part-Time	0.005
	(0.432)
Unemployed	0.030**
	(0.001)
Other	0.028**
	(0.001)
Widowed or Divorced	0.024**
	(0.006)
Never Married	0.018**
	(0.007)
Yes	0.051**
	(0.000)
Yes	0.033**
	(0.000)
3-4 criteria	0.035**
	(0.000)
5+ criteria	0.147**
	(0.000)
Perceived a Need for Treatment	-0.023**
	(0.004)

Marginal effects; *p*-values in parentheses
* $p < 0.05$, ** $p < 0.01$

Table A.2 – Marginal Effects of Interaction terms for receiving any treatment

Interaction Term	Marginal Effect
2011-2014 x 3-4 criteria	1.3
2011-2014 x 5+ criteria	0.3
2015-2017 x 3-4 criteria	0.5
2015-2017 x 5+ criteria	-5.0*
2011-2014 x Male	-0.9
2015-2017 x Male	-0.7

*p<.05, **p<.01