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## Substance Use Disorder Treatment and Completion among Older Populations

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## Abstract

Given the destruction caused by the current opioid epidemic, considerable focus has been channeled into finding ways to explain and mitigate its effect. However, research that explores the role of substance use treatment among older individuals is scarce. Moreover, recent work has denoted the stark racial/ethnic composition of the prescription opioid epidemic (Case and Deaton, 2015; Hansen and Netherland, 2016; Grooms and Ortega, 2019). This paper aims to look beyond the current epidemic by offering a historical investigation of admissions and discharges for treatment episodes from 1992 until 2017 across race, ethnicity, and age. Our results suggest that although older individuals are not typically associated with risky behavior, they are increasingly seeking treatment for substance use disorders. We find that substance use treatment admissions for people aged 50 and older have persistently increased over our sample period. Our findings also indicate that, on average, Black admissions across all ages are less likely to complete treatment and more likely to have their treatment terminated by a treatment facility (relative to Whites). Some evidence indicates that Hispanic individuals are less likely to complete treatment and that Hispanic admissions over 50 years old are more likely to have their treatment terminated (relative to Whites).

**Keywords:** Substance Use Disorder, Treatment, Baby Boomers, Race/Ethnicity, Disparities

**JEL:** I12, J14, J15,

1.25

## 1 Introduction

Twenty million Americans aged 12 or over had a substance use disorder (SUD) in 2018 (Substance Abuse and Mental Health Services Administration, 2019). According to the Center for Disease Control and Prevention (2019), in 2017, there were 70,237 drug overdose deaths in the United States. Understanding and adequately treating this medical condition is imperative to combat the number one cause of injury deaths in the United States. Furthermore, we must begin to recognize the need to address SUDs for individuals of all ages, not just younger adults. The relatively high United States life expectancy, coupled with the lack of awareness or information about substance use disorders among older adults, makes this population particularly vulnerable to SUDs and complications arising from substance misuse. In 2018, adults aged 55 to 75 accounted for 22.4 percent of all overdose deaths, substantially more than the 8.5 percent of overdose deaths among this age group in 1999 (Centers for Disease Control and Prevention, National Center for Health Statistics, 2018).

The first wave of baby boomers turned 65 years old in 2011; coincidentally, that also marked the year the United States began combating the opioid epidemic. During this time, the United States faced an upsurge in substance use that claimed an unprecedented number of lives and required substantial state and federal resources. From 1999 until 2017, drug overdoses persistently increased. Overdose deaths in 2017 were 300 percent of 1999 levels (Center for Disease Control and Prevention, 2019). Of the lives claimed by opioid overdoses, 40 percent (18,084) were age 45 or older. The opioid epidemic gave rise to a more critical perspective on SUDs and their treatment. Prior to the epidemic, substance use was seen as an addiction compared to a disease of the brain. It was also deemed to be a disorder that primarily affected younger adults. However, as the baby boomers get older, the number of older adults using substances and seeking treatment is growing substantially. In 1992, substance use treatment admissions over 50 years old accounted for 6.5 percent (102,705) of total admissions across all age groups. In the most recent year of available data, 2017, the same age group accounts for roughly 17 percent (333,728) of treatment admissions captured in Treatment Episode Data Set – Admissions (TEDS-A) (Substance Abuse and Mental Health Services Administration, 2018).

The body of literature on substance use in younger and middle-aged<sup>1</sup> adults is ever-growing. Conversely, research on substance use among older adults is sparse. In this paper, we pay particular attention to those recently retired or soon to retire, most of whom fall into the baby boomer generation. This segment of the United States population, which accounts for more than one-fifth of the total US population, is of particular interest because of the financial vulnerability of retirees. Baby boomers are the first generation to make the shift from pension retirement plans to 401(k) savings plans. According to Morrissey (2019), in 2016, only half of working-age families had retirement savings accounts. Retirement wealth

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<sup>1</sup>“Middle-aged” is a somewhat subjective term. In this paper, we use it to describe those individuals not near federal retirement age, roughly 35-50 years old.

on average and especially among lower-income and Black and Hispanic households has not grown at a substantial enough rate to meet the need of the rapidly aging population Morrissey (2019).

While SUDs among older populations are more readily overlooked, Han et al. (2009) projected that SUDs among people 50 years of age or older will rise to about 6 million in 2020. The U.S. Census Bureau (2018) estimates that the total number of adults 65 and older will rise from 40.3 million in 2010 to 77 million in 2034. Given that fact, even if the rate of substance use among older Americans stays constant, a spike in the absolute number of SUD cases among older Americans is inevitable as the baby boomers age. Given historical economic and social constructs, it is essential to consider effects across vulnerable populations and not merely the average effect across the general population. Research has established Blacks and Hispanics are less likely to complete SUD treatment (Mennis and Stahler, 2016; Saloner and Cook, 2013; Guerrero et al., 2013). Yet, it is unclear whether this effect has persisted over time or merely for the limited time frame explored in these studies. This analysis is particularly important given the stark demographic differences between the crack epidemic and the current opioid epidemic (Case and Deaton, 2015).

The bulk of recent research on SUD treatment focuses on the effects of Medicaid expansion, prescription drug monitoring programs, and other opioid-specific policies (Maclean and Saloner, 2017; Grooms and Ortega, 2019; Ellyson et al., 2020). That work has been useful for informing policymakers, this paper serves a more descriptive purpose, laying the foundation to contextualize policy effects fit within the nation's narrative on substance use treatment across demographic groups. We are interested in how SUD treatment admissions and completions differ relative to Whites. We also examine how these effects differ with age.

This paper makes a few contributions to the literature. First, it explores trends in SUD treatment admissions among older adults by race and ethnicity, focusing on the past three decades. Secondly, it analyzes the variation in completion and termination of treatment by race/ethnicity across age groups and over time (2006–2017). Finally, unlike other studies which focus on shorter time frames, we compare estimated effects over an extended period of time to determine whether differences or inequities are being driven by a single year and whether trends are changing.

Our descriptive and regression analyses grant us the ability to explore the landscape of SUD treatment admissions and discharges over a lengthy time span. This exploration shows that Black and Hispanic admissions are less likely to successfully complete SUD treatment than White admissions. Furthermore, these differences in the outcomes of SUD treatment by race/ethnicity are especially prevalent among soon-to-be retirees, aged 50 and over. This analysis raises two important policy concerns: 1) public health equity among older adults across racial/ethnic groups, and 2) financial and social implications of the increased prevalence of SUDs among older Americans.

## 2 Background

### 2.1 Substance Use Disorders (SUDs)

SUDs can take on many forms. Not all abused substances are illegal; for instance, alcohol and prescription drugs are frequent targets of abuse. The use of such substances encroaches on abuse when the substance is repeatedly used in an inappropriate manner— for instance, a prescription drug is used other than prescribed (e.g., to produce pleasure or avoid reality) (National Institute of Drug Abuse, Advancing Addiction Science, 2017). The American Psychiatric Association uses the term SUD to include substance addiction, abuse, and dependence. While the definition of addiction varies, nearly all researchers concede that addiction alters the brain’s functionality (Fowler et al., 2007; National Institute of Drug Abuse, Advancing Addiction Science, 2017; Substance Abuse and Mental Health Services Administration, 2019). The National Institute on Drug Abuse (2018) refers to an SUD as a chronic, treatable disease, and asserts it has relapse rates comparable to other illnesses, that also have a behavioral component, such as diabetes, hypertension, and asthma.

Access to proper treatment is imperative in treating the disease and the myriad of comorbidities associated with it, especially in older adults, who are more likely to have multiple chronic health conditions, which is associated with greater prescription medication use and consequently greater risk for adverse drug interactions (Lehmann and Fingerhood, 2018). Nonetheless, screening for substance use and alcohol disorders is not routinely part of medical visits for older adults. This lack of screening is particularly worrisome given that the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria clearly states that older adults “may be more impaired using the same amount” of a substance taken by a younger individual (American Psychiatric Association, 2013).

### 2.2 Race and Ethnicity

The prevalence of racial and ethnic disparities in morbidity, mortality, access to health care, and health care quality has been well documented. Such disparities persist even after controlling for socioeconomic conditions (Smedley et al., 2003). Black patients are less likely than Whites to receive adequate medical screening and more likely to be seen by less-trained medical professionals (Fiscella et al., 2000). To a lesser extent, Hispanic patients are also less likely than Whites to receive adequate health care. Racial and ethnic disparities in health care parallel disparities in other social services (e.g. education, criminal justice, labor). Systemic and institutional racism impact both the type of care racial/ethnic minorities receive conditional on seeking treatment, but also whether they even have access to care to seek treatment at all. Examining SUD treatment by race will not enable us to speak to the factors that contribute to inequitable treatment, but it will enable us to better identify racial differences in SUD treatment outcomes.

In addition to analyzing SUD treatment admissions and discharges (completion and termination) among older adults in the United States, we investigate these outcomes across race and ethnicity. The United States is in the midst of an opioid abuse epidemic, but this is

not the country's first experience of widespread drug use and addiction. Yet, the policy response to this epidemic has been dramatically different from the response during the "war on drugs" era. Stringent sentencing and drug criminalization proved ineffective in the 1980s and 1990s, and incarcerated a disproportionate percentage of the impoverished and minorities (Editorial Staff, 2020). Given the complex history of minorities in the United States, enduring disparities in SUD treatment and discharges, even in the absence of intense criminalization, should not be surprising. Furthermore, race and ethnicity may play a mitigating role in an individual's likelihood of completing SUD treatment. In a study examining racial and ethnic disparities in completion of SUD treatment using 2011 data, Mennis and Stahler (2016) found that Black and Hispanic patients were less likely to complete treatment. This result holds for Blacks across all substances. The authors echo other researchers in calling for "culturally appropriate" SUD treatment to help booster retention and completion. Using Los Angeles County data from 2006 to 2009, Guerrero et al. (2013) also find Black and Latino patients are less likely to complete treatment compared to White individuals. They also identify heterogeneity within racial and ethnic groups, which further motivates our analysis of the role of race/ethnicity in treatment outcomes for SUDs.

## 3 Data and Methods

### 3.1 Treatment and Discharge Data

The bulk of our data are collected from the Treatment Episode Data Set–Admissions (TEDS-A), made accessible by the Substance Abuse and Mental Health Service Administration (SAMHSA). TEDS-A collects and compiles annual admissions to substance abuse treatment for all treatment facilities that receive any federal funding. It does not include facilities operated by federal agencies, such as Veteran Affairs or prisons. The data, which has been collected from 1992 to present, comprise more than 48 million observations that account for approximately two-thirds of the entire population of treatment admissions (Dave and Mukerjee, 2011). The data include various demographic information collected from patients at admission. This paper makes particular use of age, race/ethnicity, and primary substance used at time of admission. Evidence suggests that some substances tend to be used at different rates in different racial/ethnic subgroups (Case and Deaton, 2015). This dataset affords us the ability to explore these established differences without compromising computing power.

In 2018, over 60 percent of all admissions reported in TEDS-A had at least one prior treatment episode (Substance Abuse and Mental Health Services Administration, 2019). Admission data fails to provide details in time during treatment. To help capture the full picture, discharge data from Treatment Episode Data Set–Discharge (TEDS-D) from 2006 to 2017 are incorporated. TEDS-D includes more than 19 million observations across variables comparable to those captured in TEDS-A. Each observation is an admission into SUD treatment for which discharge data was also collected. Discharge data are available for roughly 78 percent of all admissions during the study period. The combination of the two datasets allows us to explore who is receiving treatment and who is and who is not completing treatment. This

information is important given that completion of treatment is associated with improved health and employment outcomes (Zarkin et al., 2002). TEDS grants the ability to not only investigate admissions but also estimate the probability of completion or termination by race/ethnicity.

Both TEDS datasets use 18 categories to identify the primary substance used at the time of admission. We offer insight into treatment episodes for five of the most prevalent substances in the data: alcohol, crack/powder cocaine, heroin, prescription opioids, and methamphetamines. These five categories include over 75 percent of all observations found in both datasets, with alcohol typically accounting for more than one-third of treatment episodes. Data on state demographics are collected using the University of Kentucky Center for Poverty Research (UKCPR) and the Surveillance, Epidemiology, and End Results (SEER) datasets.

Taken together, these four datasets provide a substantial benefit in that they are standardized across all years, but they also have limitations. First, SAMHSA did not collect extensive data on completions and terminations of treatment prior to 2006; as a result, data on discharges, which provide a proxy for treatment efficacy, do not cover the full span of the data. Second, each observation represents a single admission or a single discharge. While we can observe the number of prior treatment episodes, we cannot link each admission/discharge with a unique individual in the same year or subsequent years. Throughout the data, roughly 36 percent of admission observations and 36 percent of discharge observations had no prior treatment episodes. We also use age 50 as a cutoff given that for some years, TEDS-D does not specify many categories beyond 50.<sup>2</sup> Another limitation is the capture of cocaine use in one broad category. Crack cocaine and powder cocaine are chemically near identical, but they are not usually seen as substitutes. The two substances have different price points, are consumed differently, have different relapse rates, and are used by different income and racial/ethnic groups (Editorial Staff, 2020). This distinction will be discussed further in the results section.

A critical distinction between TEDS-A (admissions data) and TEDS-D (discharge data) is that states are required to report the data collected in TEDS-A. Consequently, more states have data regularly missing from TEDS-D compared to TEDS-A. In 2006, 10 states did not report any discharge data. Conversely, in 2013, Mississippi and New Mexico were the only states that did not report any data. While the non-reporters vary by year, Washington D.C., Georgia, Mississippi, New Mexico, Pennsylvania, and West Virginia are repeat offenders; all are missing discharge data for at least six years.

## 3.2 Trends

We explore trends in admission and discharge data before describing the results of the regression analysis. Controls for individual characteristics are not utilized in this section; rather, this presentation is intended to serve merely as a visual depiction of the differences occurring over time. Nominally, most admissions and discharges for SUD are under the age of 50, but the over 50 population is not trivial. Roughly 11 percent of admissions and 16 percent of

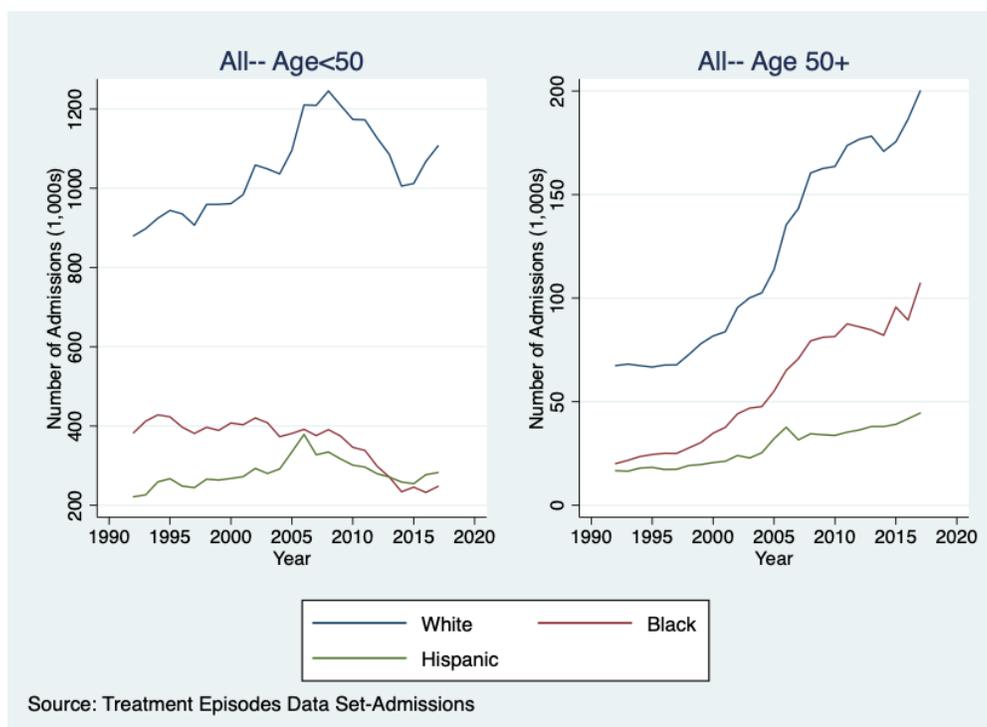
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<sup>2</sup>For many years, the oldest age category is “55 years of age and over.”

discharges in the data are for patients over 50 years old. Figures 1-6 partitions the number of admissions for all substances into two bins under 50 years old, and over 50 years old—and stratify the sample by race.<sup>3</sup>

The age of 50 is significant for two reasons. First, it captures the baby boomer population, which is predicted to have a higher rate of substance use than prior birth cohorts. The first wave of baby boomers turned 50 years old in 1996 and the last wave was 53 years old in 2017. While the data are not restricted to baby boomers, we presume a substantial portion of the admissions of those over age 50 are baby boomers. Secondly, TEDS data do not differentiate age after 55 years old.

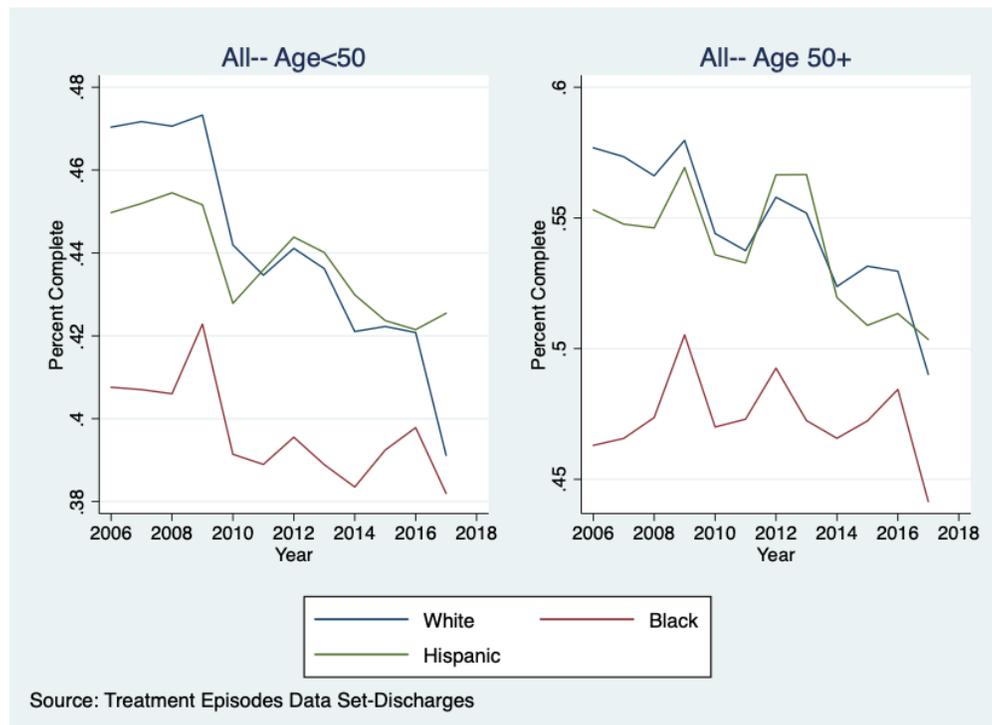
Figure 1: SUD Treatment Admissions by Age and Race/Ethnicity



In Figure 1, trends for all admissions (TEDS-A) are mapped from 1992 through 2017. The trend for admissions among those over the age of 50 has steadily climbed over the past two decades. Admissions for Whites over 50 have more than tripled from 1992 to 2017, while Black admissions quadrupled and Hispanic admissions nearly doubled. The trend is less clear for admissions under the age of 50. Admissions of Whites under the age of 50, increased from 1992 to 2009, then declined for the next five years. In 2015, admissions of Whites younger than 50 began to trend upward again, which might be attributed to the expansion of Medicaid (Maclean and Saloner, 2017; Grooms and Ortega, 2019). By contrast, Black admissions were relatively stable from 1992 through 2008. From 2008 through 2014, younger Black admissions decline. Trends in Black admissions under 50 are starkly different from those for Black admissions over 50. Admissions identified as Hispanic and younger than 50

<sup>3</sup>Note that scales are not the same within or across figures throughout the paper.

Figure 2: SUD Treatment Completion by Age and Race/Ethnicity



gradually increased from 1992 until 2006, followed by a gradual decline until 2015. To provide context for the nominal trends, on average, for all admissions, Blacks are overrepresented in admissions, compared to the overall population, in every year from 2007 to 2017. White admissions are underrepresented relative to the United States population across the same period (Substance Abuse and Mental Health Services Administration, 2017).

Admissions to SUD treatment are on the rise for people over 50, but the share of treatment completion is declining for all age groups across race/ethnicity as shown in Figure 2. The Black completion rate for all substances is the lowest for both age groups throughout the study period. For most years, White and Hispanic completion rates are similar over time. Interestingly, the most precipitous decline for White and Black admissions occurs in 2016.

We further assess trends in admissions and completion rates by substance type, stratified by race/ethnicity. Figures 3-6 disaggregate trends from Figure 1 to observe variations in trends at the substance-race/ethnicity level. Differences in substance use trends by race are evident when stratifying by substance type. Trends in alcohol admissions, Figure 3, closely mimics the overall trends shown in Figure 1. Trends for other substances vary drastically across groups. This variation is particularly evident in Figure 4, which shows that Black admissions for cocaine use make up the greatest number of admissions for most years across both age groups, even though the Black population makes up only 13.4 percent of the United States population.

Figure 6, which shows admissions for abuse of prescription opioids, shows there is a sharp increase in White admissions across both age groups over time. The slight increase in pre-

### Trends in Admissions by Substance Type

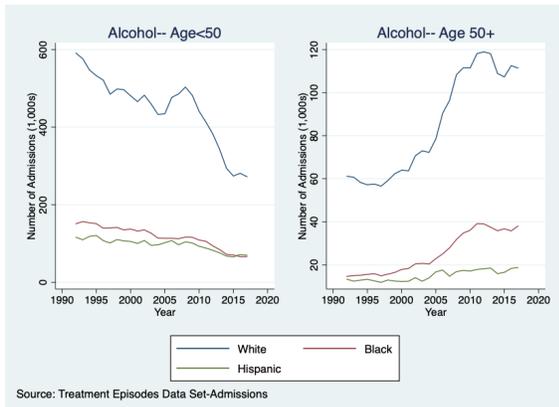


Figure 3: Alcohol Admissions

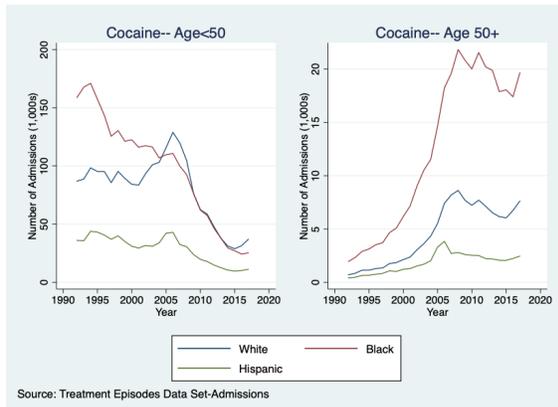


Figure 4: Cocaine Admissions

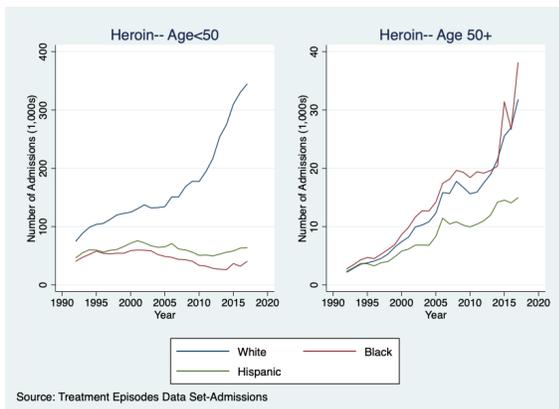


Figure 5: Heroin Admissions

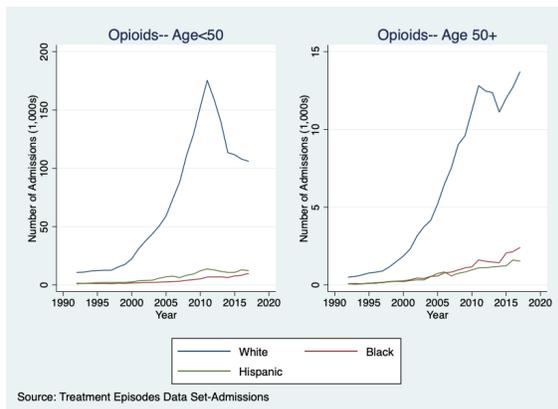


Figure 6: Prescription Opioid Admissions

scription opioid admissions for Blacks and Hispanics, pales in comparison. Figure 6 mirrors trends established in the opioid epidemic literature. Worryingly, the trend in admissions for prescription opioids among those over 50 is not declining in recent years, despite the many efforts (e.g., prescribing limits, prescription drug monitoring programs (PDMPs)) to combat the opioid epidemic.

### Trends in Completion Rates by Substance Type

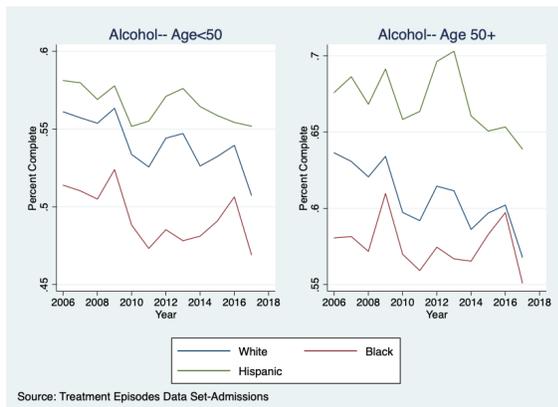


Figure 7: Alcohol Completion

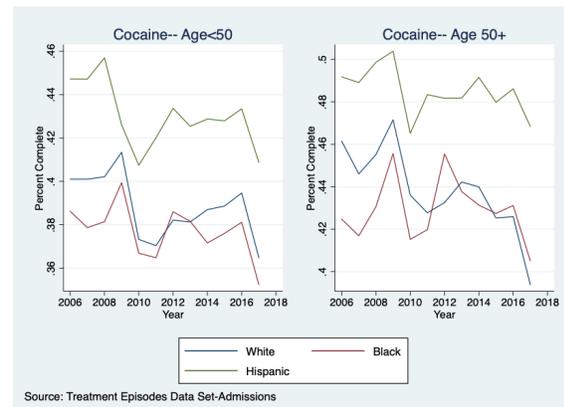


Figure 8: Cocaine Completion

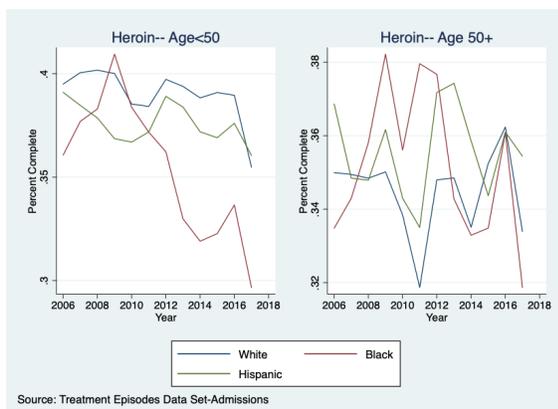


Figure 9: Heroin Completion

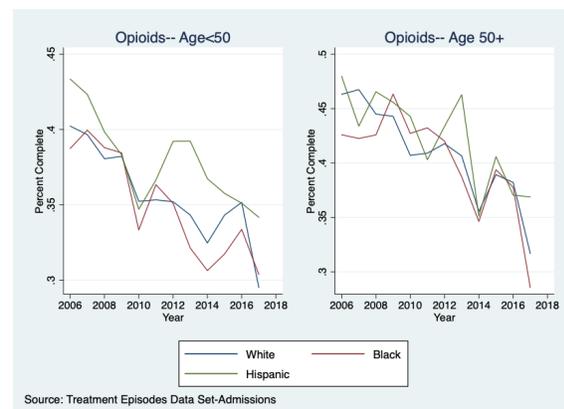


Figure 10: Prescription Opioid Completion

Although the number of admissions by substance type does fluctuate across racial/ethnic groups, Figures 3 - 6, admissions trends for those over 50 closely follow the trends displayed in Figure 1: that is, for the most part, admissions are steadily increasing for those older than 50. Distinct trends in completion rates by substance type and race/ethnicity over time are less apparent in this age group. Figures 7 and 8 show that, Hispanic admissions under and over 50 years old have the highest completion rates for alcohol and cocaine, a trend that persists over time. Yet, completion rates for Hispanic patients still trend downward.

Given the current opioid epidemic, the persistent downward trends in completion for prescription opioids among both age groups, shown in Figure 10 is concerning and requires more careful assessment. Unfortunately, this concern is beyond the scope of this paper, although

we do discuss relative treatment completions in the results section. Next, we briefly describe the methods employed to assess variations in SUD treatment completion by age groups and race/ethnicity.

### 3.3 Methods

We now consider SUD treatment outcomes across race/ethnicity and age. Specifically, our analysis estimates the likelihood of two outcomes of treatment observed in our data after conditioning on demographic characteristics; completing treatment, or being terminated from treatment. We use the following linear probability model (LPM) equation:

$$y_{ist} = \alpha + \beta_1 Black_{ist} + \beta_2 Hispanic_{ist} + X_{ist}\gamma + \epsilon_{ist} \quad (1)$$

where  $y_{ist}$  is an indicator equal to 1 if person  $i$  completed (or was terminated from) treatment in state  $s$  at time  $t$ , and zero otherwise.  $X_{ist}$  contains dichotomous indicators for high school education, employment status, service setting<sup>4</sup>, frequency of use, referral source, and prior treatment episode, as well as state and year fixed effects. We also control for state-level demographics.

Discharges are coded as one of four events completed, dropped out, terminated by the facility, or deceased. Of the 1.6 million discharges in 2017, roughly 41 percent completed treatment, 26 percent dropped out, and the facility terminated 6 percent were terminated by the facility. Twenty-two percent of discharges were eliminated from the data because they were transferred to another treatment program facility. We are not able to capture what facility these patients were transferred to, therefore we drop them from our data to eliminate any chance of double counting. An additional 5.6 percent were either incarcerated, deceased, ill, moved, or exited treatment for some other reason that is not captured by the data.

## 4 Results

Our main specification, Tables 1 and 2, investigates the likelihood of successfully completing treatment; that is, completing the planned course of treatment as opposed to being asked to leave, being terminated, leaving against medical advice, passing away, or leaving for some other reason. Table 1 displays results for Black and Hispanic completion relative to White completion for those 50 or older. Column (1) estimates the likelihood across all substances and columns (2) - (6) separates the effect by substance type. When controlling for individual characteristics, individuals who are Black and over the age of 50 are 22 percent less likely to complete a treatment episode than similarly aged White patients. Hispanics are 16 percent less likely compared to White completions. From 2006 to 2017, treatment episodes among the older Black group are significantly less likely to be completed when treatment was sought for alcohol, cocaine, or methamphetamine as the primary substance. Among older Hispanic

<sup>4</sup>“Describes the type of service and treatment setting in which the client is placed at the time of admission or transfer” Substance Abuse and Mental Health Services Administration (2018)

treatment episodes are significantly less likely to be completed when treatment is sought for heroin or methamphetamine as the primary substance.

Table 2 column (1) estimates that among the treatment population under the age of 50, both Blacks and Hispanics are significantly less likely to complete treatment than their White counterparts; Blacks are 14 percent and Hispanics 5.6 percent less likely to complete treatment. The significant decrease in completion rates is persistent for all substances except heroin. For Hispanics younger than 50, it is persistent for heroin and methamphetamine, as was the case for Hispanics older than 50. Black and Hispanic admissions are never more likely than Whites to complete a SUD treatment for any substance type, across all ages. This trend also holds for SUD treatment terminations. Blacks and Hispanics across age groups are never less than Whites to be terminated from SUD treatment. For many substances, Blacks and Hispanics are more likely to be terminated from treatment.

Table 1: Age 50+ Likelihood of Completion (2006-2017)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Alcohol	Cocaine	Heroin	Meth	Opioids
Black	-0.219*** (0.0430)	-0.145** (0.0454)	-0.0779** (0.0256)	0.0493 (0.0496)	-0.204*** (0.0353)	-0.0588 (0.0628)
Hispanic	-0.157** (0.0503)	-0.000932 (0.0410)	0.0517 (0.0491)	-0.0541** (0.0201)	-0.101*** (0.0125)	-0.0296 (0.0445)
N	2,113,216	1,235,500	232,198	347,545	91,218	92,328

Table reports point estimates from equation (1) where the outcome is whether an individual completed treatment or not for individuals 50 years of age and older. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

Tables 3 and 4 report estimates for terminations from SUD treatment by age, race, and substance type. Both younger and older Black SUD admissions are more likely to be terminated from treatment than White admissions in the same age group. On average, Blacks over 50 are 23 percent more likely than White admissions to be terminated. Black admissions younger than 50, are 17 percent more likely to be terminated. The largest effect for both age groups is when alcohol is the primary substance. Termination results are less pronounced for Hispanics younger than 50. Yet Hispanic admissions over 50, are 9 percent more likely to be terminated than White admissions in the same age group.

To examine how these effects have changed over time and ensure no one year or group of years is driving the results, we plot point estimates with 95 percent confidence intervals from Equation (1) or each year in our sample, shown in Figures 11 - 13. Figure 11 plots point estimates for Black and Hispanic treatment outcomes relative to White outcomes. For

Table 2: Age &lt;50 Likelihood of Completion (2006-2017)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Alcohol	Cocaine	Heroin	Meth	Opioids
Black	-0.140*** (0.0317)	-0.205*** (0.0397)	-0.107*** (0.0261)	0.0653 (0.0564)	-0.222*** (0.0286)	-0.0796* (0.0352)
Hispanic	-0.0562** (0.0208)	0.00241 (0.0243)	0.0134 (0.0445)	-0.130*** (0.0390)	-0.0634*** (0.0167)	-0.0525 (0.0304)
N	13,590,068	3,219,048	935,876	2,077,306	998,039	736,327

Table reports point estimates from equation (1) where the outcome is whether an individual completed treatment or not for individuals younger than 50 years of age. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

Table 3: Age 50+ Likelihood of Termination (2006-2017)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Alcohol	Cocaine	Heroin	Meth	Opioids
Black	-0.219*** (0.0430)	-0.145** (0.0454)	-0.0779** (0.0256)	0.0493 (0.0496)	-0.204*** (0.0353)	-0.0588 (0.0628)
Hispanic	-0.157** (0.0503)	-0.000932 (0.0410)	0.0517 (0.0491)	-0.0541** (0.0201)	-0.101*** (0.0125)	-0.0296 (0.0445)
N	2,113,216	1,235,500	232,198	347,545	91,218	92,328

Table reports point estimates from equation (1) where the outcome is whether an individual's treatment was terminated by a facility or not for individuals 50 years of age and older. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

Table 4: Age &lt;50 Likelihood of Termination (2006-2017)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Alcohol	Cocaine	Heroin	Meth	Opioids
Black	0.172*** (0.0258)	0.234*** (0.00575)	0.0622*** (0.00823)	0.00794 (0.00893)	0.188*** (0.0248)	0.144*** (0.0182)
Hispanic	0.0520 (0.0283)	0.0103 (0.00673)	0.0544*** (0.0110)	0.0155* (0.00770)	0.0882*** (0.0140)	0.0150 (0.0161)
N	10,831,391	3,822,014	933,484	1,942,136	750,561	924,734

Table reports point estimates from equation (1) where the outcome is whether an individual's treatment was terminated by a facility or not for individuals younger than 50 years of age.

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

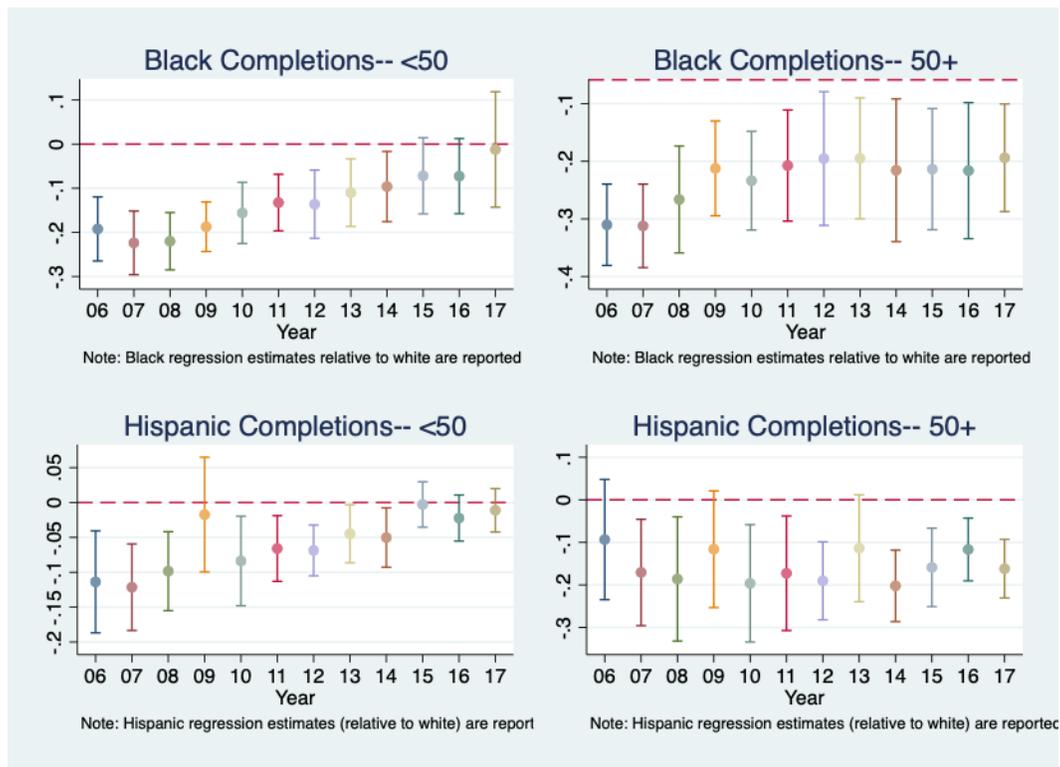
Black individuals, the results are clearly not being driven by any one year. However, there is a clear upward trend in relative completion rates for Blacks. The disparity in completion seems to dissipate over the time span of our analysis. Conversely, older black admissions are less likely to complete treatment (than Whites in the same age group) for every year in our sample. Similarly, for younger Hispanics, we observe a decrease in the completion rate disparity that we do not observe for older Hispanic individuals. A more stark difference is visible in Figure 12, where point estimates show that Black admissions of all ages are significantly more than Whites to be terminated by a treatment facility for every year of the data. Hispanic patients are never significantly less likely to be terminated from treatment than their White counterparts, but during two time periods, Hispanic admissions under 50 are more likely to be terminated and for six of the 13 years, Hispanics over 50 are significantly more likely to be terminated from treatment than Whites.

In Figure 13, we compare completions and terminations by race/ethnicity across age groups. For instance, the top left panel plots the point estimates of the relative completion rate of Black patients 50 and over relative to Black patients younger than 50. These figures clearly show that older minorities are more likely to complete treatment and less likely to be terminated than younger minority patients. More distinct and persistent differences among age groups are observed for White patients (Figure 14).

## 5 Conclusion

While SUDs among older populations are less frequently studied, it is clear that the number of SUD treatment admissions among older people has steadily increased. Understanding the population of individuals seeking treatment is essential to ensuring the efficacy of care.

Figure 11: Completions for Black and Hispanic Admissions Compared to White Admissions



According to the American Psychiatric Association (2013), older populations have a different set of risk factors than the general population. The relatively high United States life expectancy, along with the lack of awareness of substance use disorders among older adults, makes this population vulnerable to complications arising from substance misuse. This paper explores the landscape of SUD treatment by assessing admissions over the past 26 years and discharges over the past 12 years. We find that admissions of older individuals are trending upward across all racial/ethnic groups. The findings indicate that while Blacks and Hispanics are less likely to complete SUD treatment compared to their White counterparts across age groups, the likelihood of completion for Blacks and Hispanics is not statistically different from Whites in recent years. The same cannot be said for Black and Hispanic admissions older than 50. These individuals are persistently less likely to complete treatment throughout the time frame of the study, 2006 to 2017. Additionally, given the increase in older admissions, shown in Figure 1, this persistent inequity in the likelihood of completing treatment, shown in Figure 11, is concerning. This disparity raises a public health equity concern as older Black SUD treatment admissions do well compared to younger Black admissions but worse compared to older White admissions; the same is true for Hispanics.

Although this paper paints a vivid picture of SUD treatment in the United States, it still also draws attention to some unanswered questions. For example, it is not clear whether or how the high number of Black admissions aged under 50 in the 1990s is connected to the high number of Black admissions over 50 post-2005, shown in Figure 4. Also unclear is why admissions for prescription opioid abuse is still increasing for Whites over 50 admissions have

Figure 12: Likelihood of Termination for Black and Hispanic Admissions Compared to White Admissions

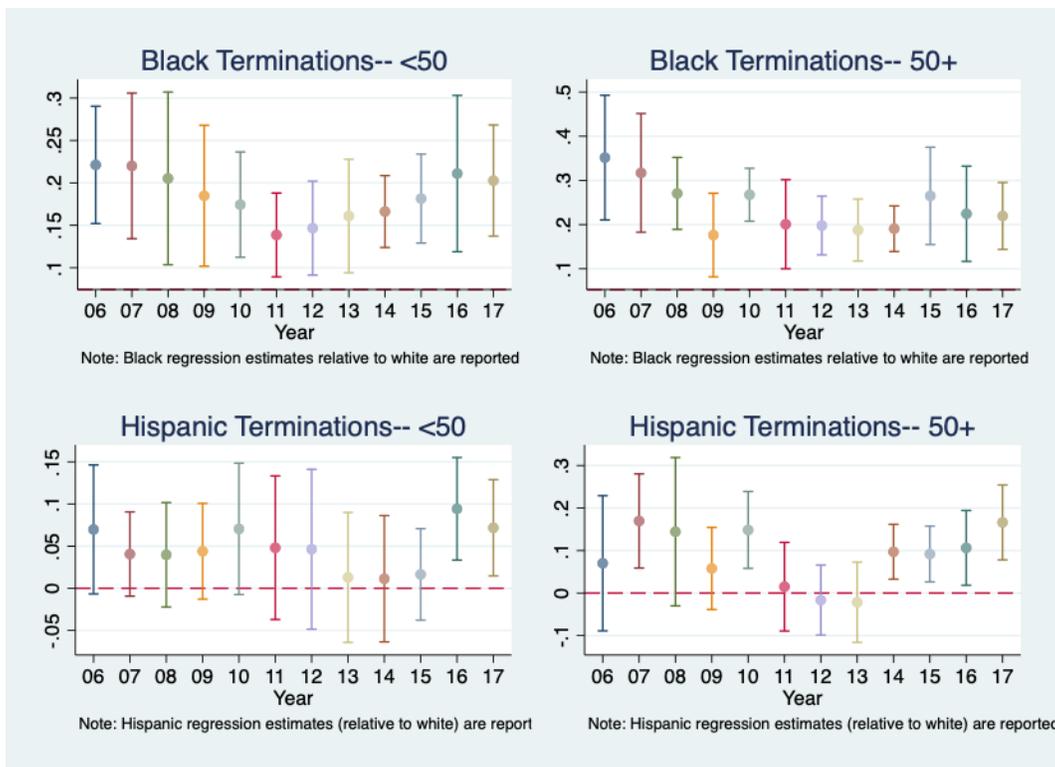
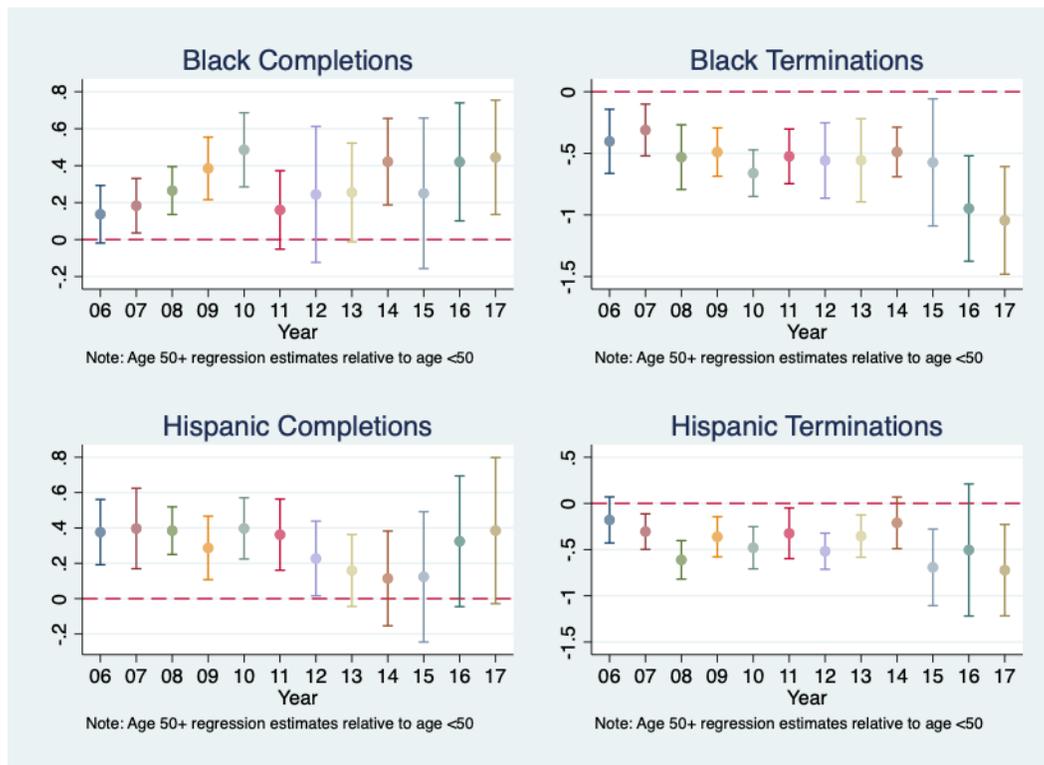


Figure 13: Completions and Terminations of Age 50+ relative to Age &lt;50



decreased sharply for those under 50. These findings suggest that the multiple measures to address the opioid epidemic (e.g., Ellyson et al. (2020)) have had little to no effect on older populations, that these measures might be under-utilized with older populations, or that these measures are less effective among older adults.

While this paper does not directly link SUD treatment admissions to retirement, increases in SUDs among older populations may impact retirement savings and inadequate care may place an undue strain on the social programs aimed at assisting the low-income elderly. Bogan and Fertig (2018) find that mental health ailments are associated with a substantial negative effect on retirement savings. The diminished use of defined benefit plans, which places the burden of managing retirement savings on households, lends urgency to this point.

Older people are typically not associated with risky behavior such as substance abuse; the rising numbers of SUD admissions in older age groups may indicate that the risky behavior model or paradigm is changing. Moreover, as a nation, we are investing heavily in addressing the opioid epidemic— a largely White affliction— but the findings of this paper suggest that minorities continue to struggle to complete treatment at all ages.

Although this paper doesn't employ novel statistical techniques, it helps to fill a gap in the literature on SUD treatment among older Americans. It begins to set the foundation needed to better understand the unintended consequences of public policies around substance use. In addition to understanding policy analysis, a deeper understanding of SUD treatment is essential to the growing literature on mental health and mental health disparities across

rac<sup>es</sup>/ethnicities. SUDs and mental health illnesses are often intertwined, but the directionality is less clear (Brady et al., 2013). Of the 20 million Americans aged 12 or over who had an SUD in 2018, nearly 10 million also had a mental illness (Substance Abuse and Mental Health Services Administration, 2019). The National Institute of Drug Abuse (2016) reported that half of all individuals who suffer from a mental health condition will suffer a SUD at some point in their life, and vice versa. It has been well-established that mental health diagnoses and utilization of mental health services are less prevalent among blacks and Hispanics (AHRQ, 2016). Lack of insurance, social stigma, distrust, lack of diversity, and cultural incompetence among providers are contributing factors to disparities in health care utilization.

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# Appendix

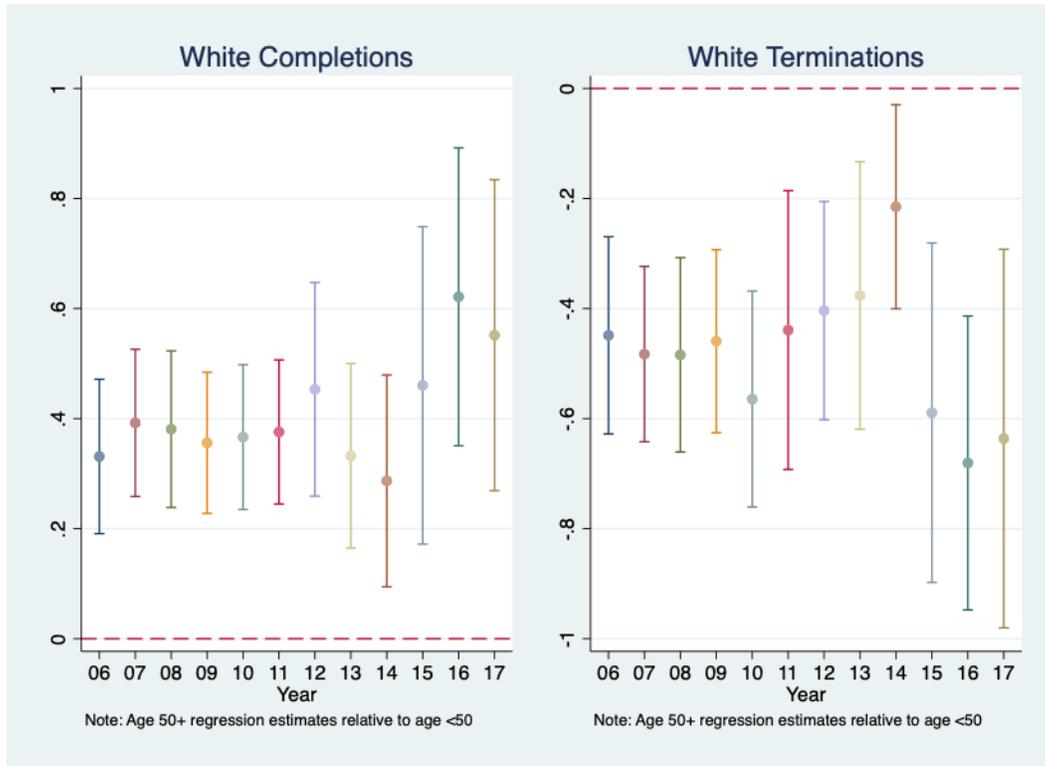


Figure 14