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Race-based differences in drug use prior to onset of opioid use disorder

Sasha Deutsch-Link[a], **Annabelle M. Belcher**[a], **Ebonie Massey**[b], **Thomas O. Cole**[a], **Michael A. Wagner**[b], **Amy S. Billing**[b], **Aaron D. Greenblatt**[a], **Eric Weintraub**[a], **Eric D. Wish**[b]

[a]University of Maryland School of Medicine, Baltimore, MD, USA

[b]University of Maryland, College Park, MD, USA

Abstract

Rates of opioid use disorder (OUD) have increased dramatically over the past two decades, a rise that has been accompanied by changing demographics of those affected. Early exposure to drugs is a known risk factor for later development of opioid use disorder; but how and whether this risk factor may differ between racial groups is unknown. Our study seeks to identify race differences in self-report of current and past substance use in OUD-diagnosed treatment-seeking individuals. Patients (n = 157) presenting for methadone maintenance treatment at a racially diverse urban opioid treatment program were approached and consented for study involvement. Participants were administered substance use history questionnaires and urine drug screening at intake. Chi-square, t-tests, and rank-sum were used to assess race differences in demographic variables. Logistic and linear regressions assessed the relationship between race and substance use for binary and continuous variables, respectively. 61% of the population identified as Black and 39% as White. Black participants were significantly older; age was thus included as a covariate. Logistic regressions demonstrated that despite similar urine toxicology at intake, White participants were significantly more likely to report having used prescription opioids and psychedelic, stimulant, and sedative substance classes prior to their first use of non-pharmaceutical opioids. Compared to Black participants, White treatment-seeking OUD-diagnosed individuals reported using a wider range of substances ever and prior to first use of non-pharmaceutical opioids. There were no differences, however, in presentation for OUD treatment, suggesting different pathways to OUD, which may carry important clinical implications.

Keywords

Opioid use disorder; opioid treatment program; methadone; race; substance use

CONTACT Annabelle M. Belcher abelcher@som.umaryland.edu Division of Addiction Research and Treatment, University of Maryland Drug Treatment Program, University of Maryland School of Medicine, 1001 W. Pratt Street, Baltimore, MD 21201, USA.

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Introduction

Rates of opioid use disorder (OUD) have increased dramatically over the last two decades. Data from the National Survey on Drug Use and Health estimate that over 800,000 Americans reported past year illicit opioid use in 2018, which is more than a two-fold increase from 2002 (Center for Behavioral Health Statistics & Quality, 2019; Lipari & Hughes, 2015). With this generalized increase has come a shift in the cultural and geographical landscape of those affected, and OUD is no longer primarily concentrated in poor, urban communities (Martins et al., 2017).

Significant attention has recently been directed toward prescription opioids, which have been a significant driver of the increases in opioid use and overdose. In recent years, national drug policy has focused on efforts to improve opioid prescribing practices, including the Centers for Disease Control's (CDC) new opioid prescribing guidelines (Dowell et al., 2016) and improved access to prescription history through prescription drug monitoring programs (Haffajee et al., 2015). These policies have been successful in decreasing the volume of opioid prescriptions in the United States, presumably reducing inappropriate iatrogenic opioid exposure in vulnerable patient populations (Guy et al., 2017).

Alongside these new tools to address rising rates of OUD in the United States, we have witnessed a shift in legal approaches to substance use disorders (SUDs). In response to the opioid epidemic, we observed widespread national and state-based increases in funding to provide treatment to people with SUD, with less effort and attention focused on criminalization. People with SUDs were viewed as people with an illness that needed treatment, and not as "criminals" (Mendoza et al., 2019). As a nation, we observed a paradigm shift from criminalization of patients with SUD toward compassionate treatment.

This paradigm shift sharply contrasts the national response to the cocaine epidemic in the 1980s. During this period, national and state-based responses relied heavily on law enforcement and criminalization (Santoro & Santoro, 2018). Black communities were disproportionately policed and imprisoned during this era. Unlike the more recent response to the opioid crisis, national funding did not focus on increasing access to treatment (Santoro & Santoro, 2018). Ultimately, we saw two very different responses – a criminalized/law enforcement response to the cocaine epidemic, and a medicalized response to the opioid crisis. While the cocaine epidemic tended to cluster in urban, Black communities (with the caveat that overall higher total numbers of White people use cocaine), the opioid epidemic affected more rural and suburban White communities (Dollar, 2019, Palamar et al., 2015). Some have criticized these disparate responses as having underlying race-based motivations (Dollar, 2019). Ultimately, when substance use began to affect predominantly White communities, blame shifted away from the person with the SUD and instead to external forces (i.e. prescribing practices/pharmaceutical companies, substance availability/selling tactics) (Mendoza et al., 2019).

Although prescription opioids served an important role in the current opioid crisis, they do not explain the epidemic entirely (Wei et al., 2019), or equally, across different demographic groups. Despite national increases in opioid prescriptions in the late 90 s, Black patients

were (and continue to be) less likely to be prescribed opioids by a healthcare provider than White patients (Burgess et al., 2014; Pletcher et al., 2008). This may partially contribute to lower current rates of OUD in Black populations (Pouget et al., 2018). However, opioid-related overdose deaths have increased substantially in Black people in the United States in recent years, particularly those aged 45–54 years (Lippold et al., 2019). These trends may suggest different pathways to opioid use disorder that cluster differently according to race. Particularly, this may suggest that in part due to disparate prescription practices, Black patients may be more likely to develop OUD through other processes that diverge from the more commonly recognized pattern of healthcare-provider prescribed opioids that eventually leads to opioid dependence and later, OUD.

Several reports suggest that race is an important determinant of various aspects of drug use. For example, prior research has shown that White persons with SUDs may be more likely to inject heroin or other substances and engage in poly-substance use when compared to Black patients with SUDs (Keen et al., 2014). This finding emerged from a sub-analysis of risk of infection disease in people who use drugs (PWUD), and was thought to explain a relative higher risk of having Hepatitis C Virus (HCV) amongst White PWUD. In a cross-sectional survey of PWUD to assess preferences for fentanyl, Morales et al. (2019) reported that White PWUD are more likely prefer fentanyl/*fentanyl-adulterated heroin* to pure heroin, compared to Black and Hispanic PWUD. Results also demonstrated that preference for fentanyl was higher amongst PWUD who initiated opioid use with opioid medications, an OUD trajectory that occurred more frequently in White study participants. They postulated that exposure to more types of opioids/synthetic opioids in medication-form may have contributed to this preference amongst white PWUD.

As a city that has had a heroin problem for over 50 years, demographic trends of OUD in Baltimore, Maryland, may provide insight into some of these race differences (Agar & Reisinger, 2002). Like many other parts of the country, Baltimore has witnessed alarming increases in OUD accompanied by changing demographics. But the city also has a large population of individuals who developed OUD prior to the vast influx of prescription opioids into the nation’s healthcare system (Schwartz et al., 2013). A recent nationwide study of CDC data found that among United States adolescents, Black male adolescents in Baltimore had the highest rates of heroin use, suggesting early exposure to heroin, and not exposure to prescription opioids, as a main culprit for subsequent transition to OUD for Black individuals (Gruber et al., 1996; Jones et al., 2019; Odgers et al., 2008). Early exposure to drugs is an identified risk factor for development of SUDs, and several epidemiological studies have reported associations between age of first use and subsequent development of a SUD (Wagner & Anthony, 2002). Yet to our knowledge, no study has attempted to characterize whether racial differences exist either in age or type of drug exposure in clinically-diagnosed OUD patients presenting for MMT (methadone maintenance treatment) intake.

The objective of the current study was to investigate race differences in reported substance use upon presentation for treatment at a racially diverse urban methadone maintenance treatment program in Baltimore. Specifically, we aimed to identify whether Black and White individuals differed in their self-reported substance use prior to non-pharmaceutical opioid

use. Additionally, we collected and analyzed urine toxicology findings to test differences in recent substance use between Black and White participants at treatment intake. These findings may help elucidate race differences in pathways leading to opioid use disorder, which could allow for better-targeted prevention initiatives and clinical interventions.

Materials and methods

Study overview

Data were obtained as part of a randomized controlled trial employing a behavioral intervention (ClinicalTrials.gov Identifier NCT02941809; Belcher et al., 2019). All data reported in this sub-study were obtained on the day of intake, prior to randomization and initiation of the clinical trial intervention. This study was approved by The University of Maryland Institutional Review Board and all patients completed a formal consent process to participate in the study.

Setting

The University of Maryland Drug Treatment Center (UMDTC) served as the study setting. An urban, community-based opioid treatment program located in West Baltimore, Maryland, the clinic is open 6 days a week (excluding holidays). In addition to providing medications for OUD that include methadone, buprenorphine and naltrexone, the clinic provides counseling, psychosocial support, and psychiatric services. The majority of patients reside within one of five zip codes immediately surrounding the clinic address, and present for treatment through a variety of referral channels or by self-presentation. A majority of patients identify as Black or White, and most patients have state-sponsored health insurance. Approximately 5 new patients are enrolled into methadone maintenance per week.

Patient recruitment

All participants were recruited from a population of treatment-seeking patients presenting to the UMDTC clinic with a primary diagnosis of OUD. Recruitment methods are described in Belcher et al. (2019), but briefly: new patients requesting methadone treatment were approached on their first day of treatment in the clinic and asked if they were interested in hearing information about a compensated research study testing a novel behavioral approach to enhance methadone treatment outcomes. Following consent, participants were given several experimenter-administered assessments, one of which included a comprehensive drug use survey (described below). Patients were recruited for the study from December 2017 to February 2020.

Eligibility criteria

Inclusion criteria were: 1) adult patients aged 18 years or older and 2) newly admitted to the clinic for methadone treatment of non-pharmaceutical opioid use disorder. Exclusion criteria were: 1) pregnancy, 2) recent methadone treatment elsewhere in the preceding three weeks, 3) hospital transfers (patients initiated on methadone in a hospital setting), 4) criminal justice referrals who had already been started on methadone, 5) planned opioid treatment with anything other than methadone (including buprenorphine and naltrexone), and 6) Race other than Black or White due to small sample size in other race groups, the reporting of

which could possibly jeopardize participant anonymity. Patients were included in the study if they met the above criteria, completed the consent process, and were willing to participate in the study. A total of 163 patients were enrolled and completed the substance use history questionnaire. Five patients were excluded, as they were the only patients who identified as races other than Black/African-American or White. One patient was excluded because he/she reported never using non-pharmaceutical opioids.

Measures

Self-report of substance use history—Baseline substance use history questionnaires were administered in person by study staff on the first day of treatment intake. Questionnaires were developed in collaboration with the Center for Substance Abuse Research (CESAR) at the University of Maryland, College Park and involved a comprehensive assessment of substance use history and treatment, environmental and psychosocial risk factors and use of licit and illicit drugs. Specifically, age first used, as well as past two-week and past 48-hour use of thirty-four different substances was assessed, including alcohol, cigarettes, hookah, e-cigarettes, cigars, synthetic cannabinoids, cannabis, methamphetamines, cocaine, LSD, PCP, MDMA (ecstasy), heroin, prescription opioids, methadone, buprenorphine, sedatives, and stimulants.

Urine drug screens—All patients completed baseline observed urine drug screens that assessed presence of opiates, fentanyl, methadone, amphetamines, cocaine, benzodiazepines, and cannabis. Specimens were then processed by LabCorp via enzyme-linked immunoassay (ELISA). Urine drug screens were administered by clinic staff and were part of the clinic's routine methadone initiation protocol.

Statistical analysis—Data were analyzed using Stata 15 (StataCorp, 2017). Race differences in baseline demographic data were assessed using chi-square analyses for categorical variables and t-tests and rank-sum analyses for normally and non-normally distributed continuous variables, respectively. Frequencies were reported for categorical variables, and means with standard deviations and medians with interquartile ranges were reported for t-tests and rank-sum analyses. Significance was determined at $p<0.05$.

Regression models assessed the relationship between race and self-reported substance use. Logistic regression was used for binary dependent variables, and linear regression for continuous dependent variables. Baseline characteristics that were significantly different across race in univariate analyses were included as covariates in the regression analyses. Results were reported as odds ratios and coefficients with confidence intervals, and represented graphically, when appropriate, with predicted probabilities and adjusted means.

Results

Patient demographics

Patient demographics are shown in Table 1. Of the 157 patients included in the study, 61% identified as Black and 39% as White. Black participants were significantly older, with a median age of 50 years compared to 39 years ($p=<0.001$). The sample was majority male

(66%) and gender did not significantly differ between Black and White participants. 34% of participants had not completed high school, and 94% reported a yearly income of less than $20,000 per year. Education level, income, and type of employment also showed no significant differences across race.

Self-reported substance use

Self-reported substance use for distinct substance classes are shown in Figures 1 and 2 and in Tables 2 and 3. Black patients were significantly older than White patients in the initial univariate analyses; thus, age was included as a covariate in all regression analyses. We included gender, education, and income as covariates in other analyses (not shown), and found that patterns of statistical significance for the key variable of race remained the same.

Logistic regression analyses showed that compared to Black patients, White patients were significantly more likely to have used prescription opioids (OR 3.79, CI 1.78–8.08, p=0.001), alcohol/sedatives (OR 2.72, CI 1.09–6.79, p=0.032), psychedelic substances (OR 7.70, CI 2.88–20.57, p<0.001), and stimulants (OR 3.17, CI 1.48–6.77, p=0.003), before the onset of non-pharmaceutical opioid use (Table 2 and Figure 1). While age of first non-pharmaceutical opioid use did not significantly differ between Black and White patients, age-adjusted linear regression results showed that White patients first used prescription opioids (β=−5.21, CI −9.58–−0.67, p=0.025), alcohol/sedatives (β=−2.05, CI −3.73–−0.36, p= 0.017), stimulants (β=−4.75, CI −7.45–−2.06, p= 0.001), and cannabinoids (β=−1.33, CI −2.53–−0.15, p=0.028) at significantly younger ages (Table 3 and Figure 2).

Self-reported lifetime substance use is depicted in Supplemental Digital Content 1 Table I, and in Supplemental Digital Content 2. White patients were more likely to report lifetime use of psychedelics (OR 8.78, CI 3.72–20.76, p<0.001) and stimulants (OR 3.12, CI 1.12–8.67, p=0.029). More detailed information on specific substances are included in Tables II–IV of Supplemental Digital Content 1.

Number of substances used

Total numbers of substances used are depicted in Table 4. Number of substance classes was a count variable including all six of the substance classes depicted in Table 2. Number of total distinct substances was also a count variable and included all substances in Tables II–IV of Supplemental Digital Content 1. White patients reported using a greater number of substance classes prior to non-pharmaceutical opioids (β=1.23, CI 0.69–1.77, p<0.001) and in their lifetime (β=0.96, CI 0.52–1.40, p<0.001). White patients also reported using more total substances prior to non-pharmaceutical opioids (β=1.45, CI 0.58–2.33, p=0.001) and in their lifetime (β=2.33, CI 1.18–3.48, p<0.001).

Baseline drug use characteristics

Baseline drug characteristics are shown in Table V of Supplemental Digital Content 1. Compared to Black patients, White patients were more likely to report a history of injection drug use (OR 12.87, CI 4.64–35.62, p<0.001), or to have a history of naloxone administration for an overdose (OR 2.43, CI 1.16–5.05, p=0.018). Preferred mode of opioid administration was also significantly different across race, with White patients more likely to

prefer using intravenous opioids (β=2.97, CI 2.00–3.93, p<0.001) or using both intravenous and intranasal use (β=1.52, CI 0.41–2.63, p=0.007) compared to sole intranasal use. First mode of opioid use, experience with Alcoholics/Narcotics Anonymous, prior treatment program exposure, age of entry into treatment, and number of drug-related hospital/ED visits did not significantly differ between Black and White participants.

Urine drug screens

Urine drug screen results at intake showed no race differences in presence of cocaine, opiates, fentanyl, amphetamines, methadone, benzodiazepines or cannabis. Results are shown in Supplemental Table VI.

Discussion

General findings

Rates of OUD have increased dramatically over the past two decades (Center for Behavioral Health Statistics & Quality, 2019; Lipari & Hughes, 2015). Excessive opioid prescribing that became common practice in the 1990s has been identified as a major progenitor of the current crisis—so much so that the CDC has characterized this increased opioid prescribing practice as the “First Wave” of what has caused massive nation-wide opioid overdose deaths that began at the turn of the century (Ciccarone, 2019). Thus, researchers have scrutinized the role of over-prescription of opioids, identifying this exposure as a pathway to development of OUD (Butler et al., 2016; Cerda et al., 2015; Han et al., 2017), a focus that has led to sweeping policy changes regarding opioid prescribing (Dowell et al., 2016; Haffajee et al., 2015). But it has been accepted for several years that early exposure to drugs *in general* is a known risk factor for later development of SUDs, including OUD (Odgers et al., 2008; Wagner & Anthony, 2002).

Several groups have found race-based differences in early-life substance use through the use of large-scale epidemiological data (Chen & Jacobson, 2012; Park et al., 2018). For instance, Chen & Jacobsen (2012) noted that when comparing Latino/a, White, Black and Asian adolescents, Latino/a youth had higher rates of substance use in early adolescence (age 12) and White adolescents demonstrated higher rates of substance use in mid adolescence through their early 30 s. Park et al. (2018) also noted higher rates of substance use amongst White adolescents compared to their Black and Latino/a counterparts. To our knowledge, no study has tested whether self-report of first use of substances differs between Black and White individuals in a community sample of treatment-seeking OUD-diagnosed patients.

Here we report consistent race-based differences in self-reported substance use prior to onset of OUD. Compared to Black patients, White patients presenting for methadone treatment reported a broader range of lifetime (ever) substance use, as well as a greater number of substances used prior to non-pharmaceutical opioid use. Detailed data on substance use history and its relation to onset of heroin use in this population is novel, with much of the prior data collected over two decades ago (Grella et al., 1995; Moise et al., 1982; Nemoto, 1994). Data from the 1990s indicated that Black patients presenting for MMT were more likely to report cocaine use (Grella et al., 1995; Nemoto, 1994), which was not consistent

with our study findings, but may reflect differences in time period. White patients in our sample were also more likely to have used prescription opioids prior to non-pharmaceutical opioid first use. This is consistent with a large body of literature showing that Black patients are less likely to be prescribed opioids (Burgess et al., 2014; Pletcher et al., 2008), and that non-medical prescription opioid use is higher in White populations in Baltimore (Khosla et al., 2011).

Despite these statistically significant race-based differences in self-reported substance use history, there was little to distinguish the patients in their OUD presentation at treatment intake. Specifically, baseline urine drug screens and prior treatment experiences were not different between the groups. Collectively, these findings suggest that although there may be different pathways in etiology, these trajectories converge to yield a common OUD endpoint.

The results of this study may provide insight into different pathways to OUD that cluster differently according to race. White patients in our sample were more likely to use several substances other than non-pharmaceutical opioids initially, which may have later changed their environment in ways that exposed them to non-pharmaceutical opioid use. Additionally, White patients were significantly more likely to have used prescription opioids prior to their first use of heroin, a finding that fits well with descriptions of the transition from prescription opioids to use of non-pharmaceutical opioids. Black patients, however, were less likely to have used other licit or illicit substances, including prescription opioids, prior to non-pharmaceutical opioids, which may indicate earlier environmental exposure to non-pharmaceutical opioids. This may be due in part to environmental availability of substances that differ in predominantly Black versus White communities. Differences in prescription opioid exposure are likely in part due to disparate prescribing practices, which have repeatedly shown that healthcare providers are more likely to prescribe opioids to White patients compared Black patients (Burgess et al., 2014; Pletcher et al., 2008).

It is important to highlight the significant differences we found in baseline drug use characteristics. Compared to Black patients, White patients were more likely to use opioids intravenously (either primarily or in combination with intranasal use), and to have been administered naloxone for overdose. Higher rates of naloxone administration follow logically, as intravenous use is associated with higher risk of overdose (Novak & Kral, 2011). The differences in intravenous opioid use could reflect that the White sub-population in our study occupies a more severe classification of OUD.

This finding may stem from geographic considerations. The majority of the residential population in West Baltimore identifies as Black (Lung-Amam et al., 2019). As such, White patients who present to treatment may have been displaced from other areas of Baltimore or Maryland. The displacement that they have experienced may reflect higher severity in their OUD. Unfortunately, detailed geographic histories were not obtained on this sample and could be a direction for future study. Another possibility is underlying disparities in buprenorphine access. Research has consistently shown that White patients, on average, have increased access to buprenorphine when compared to Black/African-American patients (Lagisetty et al., 2019). As such, by the time that White patients are presenting for treatment at MMT, they may have been more likely to have failed buprenorphine treatment previously.

Limitations

Our study has a few important limitations. First, our study sample is small and may not capture significant differences with smaller effect sizes. Our study also was predominantly White or Black, with only five patients who identified as any other race (and were excluded due to small sample size). Thus, our study was not able to explore differences across other races.

Black patients were significantly older in our sample, which may introduce some generation-related differences, particularly on entry into opioid use. During the late 1990s and early 2000s, prescription opioids became more widely available (Ciccarone, 2019). Thus, the predominantly younger, White sample of patients who might have been entering their late teenage years and early twenties likelier would have been exposed to prescription opioids prior to non-pharmaceutical opioids. To control for this, we included age as a covariate in our analyses. Prior studies have demonstrated that Black patients tend to be older when entering treatment for SUDs, so this baseline difference was not surprising to us (Lewis et al., 2018; Lundgren et al., 2001).

As discussed above, due to disparate access to buprenorphine and possibly different local environments, White patients who present for MMT intake at our clinic may reflect a more refractory population compared to Black patients. Our study did not gather detailed information on childhood/adolescence local environment or detailed history about access to buprenorphine treatment to further examine this relationship. However, we believe this relationship we observed across race also carries important clinical implications, with future work examining the extent to which this finding is generalizable.

Conclusions

It has been known for some time that race-based differences exist in the patterns, age of onset, and types of first-time substances used. These findings from studies of large epidemiological datasets are derived from data that are gathered from healthy individuals, and prior to the onset of SUD. To our knowledge, no study has explicitly tested whether race-based differences exist in self-report of early substance use in a sample of opioid use disorder-diagnosed individuals who are seeking treatment in a community-based methadone clinic. The distinct difference in this approach is that we are obtaining information from a sample of individuals who are similar in their ultimate presentation, and who have arrived at the common endpoint of seeking clinical MOUD treatment for moderate-to-severe OUD. We report significant differences between Black and White individuals entering into MOUD in their self-report of the types, and age of first use of substances prior to development of OUD—differences which recapitulate epidemiological data. Importantly, there were no differences between the two groups in urine toxicology screening, suggesting no differences in current substance use patterns.

This study should provoke further examination into the ways in which resources and attention are directed in the opioid crisis. Media coverage, national programs, and legislation have focused significant attention on the important role of prescription opioids. Our study suggests that the use of other drugs frequently precedes the use of opioids, a pathway that

may be more predominant in White patients. Some have even criticized the conception of the "opioid epidemic" in our country to have been racially biased – that the community at large only began recognizing OUD as a disease when the crisis began to affect White/Caucasian people (Santoro & Santoro, 2018). Disproportionate allocation of resources to the prescription opioid problem in our country could further contribute to racial disparities in OUD prevention and treatment. Future prevention and treatment efforts should account for these differences and equitably distribute interventions and resources across these distinct pathways.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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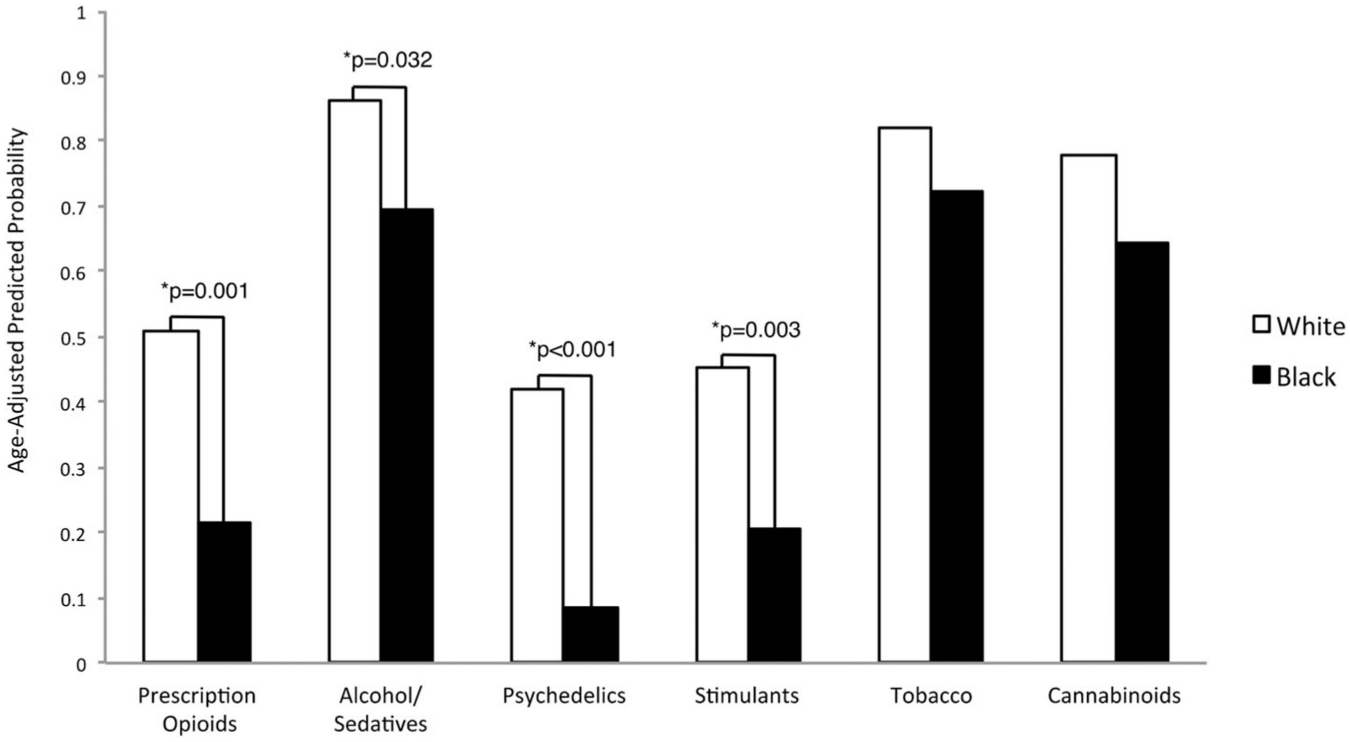

Figure 1.

Age-adjusted predicted probabilities of use of six different classes of substances prior to use of non-pharmaceutical opioids (NPO; e.g., heroin or fentanyl).

Compared to Black patients, White patients were significantly more likely to have used prescription opioids, alcohol/sedatives, psychedelic drugs and stimulants prior to their first use of NPO (see also Table 2).

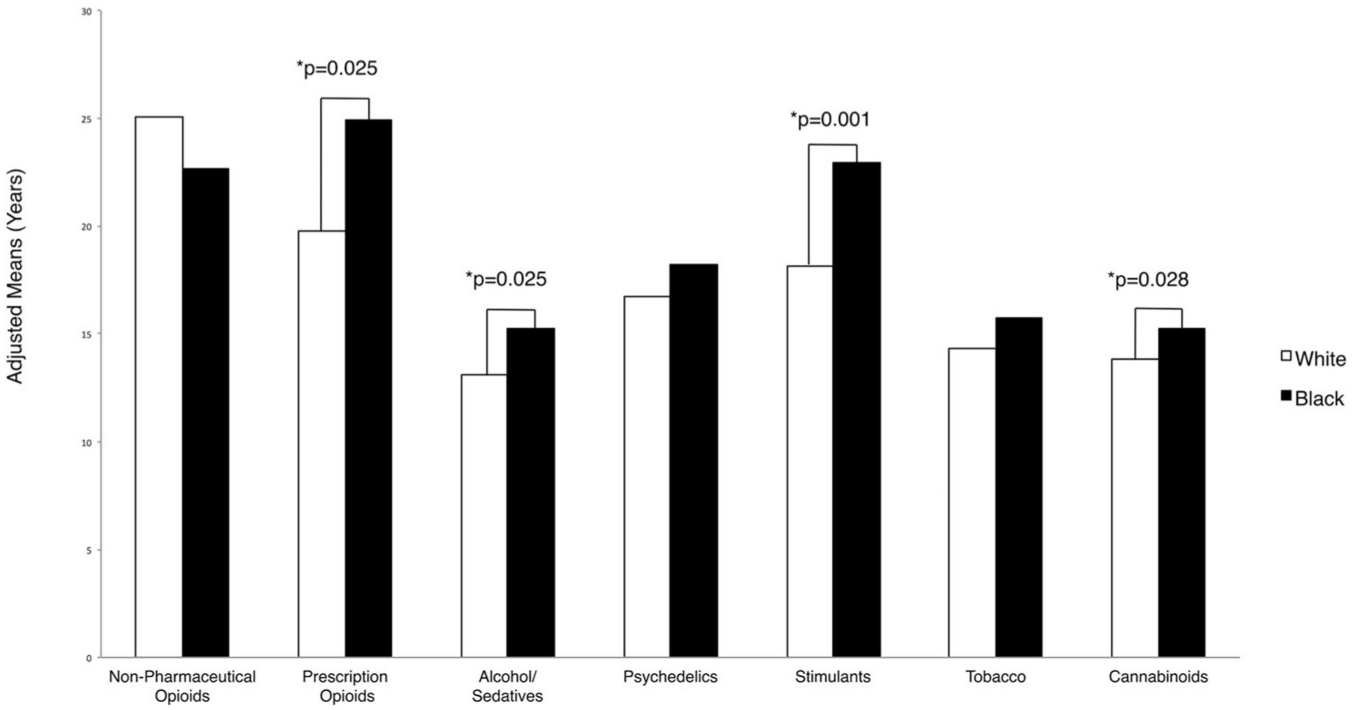

Figure 2.

Age-adjusted means of self-reported first use of multiple substance classes.

White patients were significantly younger than Black patients upon first use of prescription opioids, alcohol/sedatives, stimulants and cannabinoids. *p<0.05

Table 1.

Patient demographics overall and by race.

Characteristic	Total (n=157)	Black (n=95)	White (n=62)	P-value
Gender—n, (%)				0.424
Male	103 (66%)	60 (63%)	43 (69%)	
Female	54 (34%)	35 (37%)	19 (31%)	
Age—Years				<0.001***
Median (Inter-Quartile Range)	47 (36–54)	50 (45–56)	39 (33–48)	
Range	19–68	19–68	23–59	
Latino/a—n, (%)	5 (3.2%)	2 (2.1%)	3 (4.9%)	0.340
Education—n, (%)				0.761
Less than High School	53 (34%)	33 (34%)	20 (32%)	
High School Graduate/GED	73 (47%)	43 (45%)	31 (50%)	
Some College or Bachelor's Degree	31 (20%)	20 (21%)	11(18%)	
Income—n, (%)				0.238
Less than $20,000	147 (94%)	89 (94%)	58 (94%)	
$20,000−$39,999	7 (4.5%)	3 (3.2%)	4 (6.5%)	
$40,000−$59,999	3 (1.9%)	3 (3.2%)	0	
Employment in Past 12 months—n, (%)[1]				0.068
Part-Time	16 (10%)	10 (11%)	6 (9.7%)	
Full-Time	15 (9.6%)	10 (11%)	5 (8.1%)	
Retired/Disabled	34 (22%)	27 (29%)	7 (11%)	
Homemaker/Caregiver	8 (5.1%)	5 (5.3%)	3 (4.8%)	
Unemployed	83 (53%)	42 (45%)	41 (66%)	
Jail or Prison in Past 12 months—n, (%)	1 (0.64%)	0	1 (1.6%)	0.214

*** = $p < 0.001$.

[1] N = 156 (1 participant did not answer).

Table 2.

Effect of race on substance classes used prior to non-pharmaceutical opioids, controlling for age (N = 157).

Dependent variable	Independent Variable	Odds Ratio	Confidence Interval	P-Value
Prescription Opioids	Age	0.94	0.91–0.98	0.001
	Race: White	3.79	1.78–8.08	0.001 **
Alcohol/Sedatives	Age	0.98	0.95–1.02	0.399
	Race: White	2.72	1.09–6.79	0.032 *
Psychedelics	Age	1.04	1.00–1.09	0.062
	Race: White	7.70	2.88–20.57	<0.001 ***
Stimulants	Age	0.99	0.95–1.02	0.474
	Race: White	3.17	1.48–6.77	0.003 **
Tobacco	Age	0.98	0.94–1.01	0.208
	Race: White	1.77	0.74–4.23	0.199
Cannabinoids	Age	0.96	0.92–0.99	0.018
	Race: White	1.94	0.86–4.39	0.109

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

Table 3.

Effect of race on age of first substance class use, controlling for age.

Dependent variable	Independent Variable	Coefficient	Confidence Interval	P-Value
Non-pharmaceutical Opioids	Age	0.17	0.03–0.31	0.015
(N = 157)	Race: White	1.44	−1.66–4.55	0.361
Prescription Opioids (N = 63)	Age	0.28	0.07–0.49	0.010
	Race: White	−5.12	−9.58-−0.67	0.025 *
Alcohol/Sedatives (N = 147)	Age	−0.02	−0.09–0.06	0.667
	Race: White	−2.05	−3.73- −0.36	0.017 *
Psychedelics (N = 53)	Age	−0.02	−0.16–0.11	0.740
	Race: White	−1.97	−4.90–0.95	0.181
Stimulants (N-138)	Age	0.13	0.003–0.25	0.045
	Race: White	−4.75	−7.45-−2.06	0.001 **
Tobacco (N = 147)	Age	0.004	−0.07–0.08	0.910
	Race: White	−1.50	−3.20–0.21	0.085
Cannabinoids (N = 118)	Age	0.01	−0.45–0.07	0.716
	Race: White	−1.33	−2.53-−0.15	0.028 *

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

Table 4.

Effect of race on self-reported number of substances used, controlling for age.

Independent Variable	Dependent Variable	βCoefficient	Confidence Interval	P-value
Number of Substance Classes				
Lifetime Use	Age	−0.016	−0.035–0.0039	0.117
	Race: White	0.96	0.52–1.40	<0.001***
Before Non-Pharmaceutical Opioids	Age	−0.024	−0.048-−0.00042	0.046
	Race: White	1.23	0.69–1.77	<0.001***
Number of Substances				
Lifetime Use	Age	−0.084	−0.14-−0.032	0.002
	Race: White	2.33	1.18–3.48	<0.001***
Before Non-Pharmaceutical Opioids	Age	−0.049	−0.088-−0.0092	0.016
	Race: White	1.45	0.58–2.33	0.001**

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.