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# Opioid Use Disorder: The Ugly Return and Treatment Effectiveness of Heroin Use

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# OPIOID USE DISORDER: THE UGLY RETURN AND TREATMENT

Opioid Use Disorder: The Ugly Return and Treatment Effectiveness of Heroin Use

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in partial fulfillment of the requirements for the degree of

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COLLEGE OF ARTS AND SCIENCES

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CERTIFICATE OF APPROVAL

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## Opioid Use Disorder: The Ugly Return and Treatment Effectiveness of Heroin Use

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## Abstract

Relationships among demographic, socioeconomic and person factors and Opioid Use Disorder diagnosis, treatment, and recidivism were explored. Data from a sample of 4,860 adults with substance use difficulties were analyzed. A program evaluation was conducted on Gateway Community Services to explore the use of Medication Assisted Treatments (MATs) and Psychosocial (PS) treatments to address Opioid Use Disorder. Using archival data, a chi-square analysis and independent sample t-test was performed. The results expressed that a relationship among race, type of substance use diagnosis, and treatment type and recidivism rate was found. While White/Non-Hispanics adults were more likely to use heroin than any other racial/ethnic backgrounds, gender differences were also found. Finally, frequency and duration of a combined treatment (PS + MAT) were negatively related to recidivism with no determination of previous prescription opioid use to be examined at this time.

*Keywords:* medication assisted treatment, recidivism, psychosocial, opioid, heroin

## Opioid Use Disorder: The Ugly Return and Treatment Effectiveness of Heroin Use

The topic of substance use negatively touches, affects or presents itself to nearly every family, school, workplace or community. Those who struggle with substance use unduly impact those near them in ways that exceed the mere duration of intoxication. For example, there are financial costs (e.g., court, DUI, medical), lost potential, and direct theft of family members that add up over time. Beyond the immediate family, patterns of substance use in a community ebb and flow across time. One pattern of substance use that has a particularly unique and problematic history in the United States and even more sharply in Southeast Georgia/Northeast Florida is that of Opioid use. The current study will review the history of opioid use within the United States and in the immediate Southeast Georgia/Northeast Florida region. Further, this investigation will explore the relationships among demographic, socioeconomic, person factors, and opioid use, and will evaluate the relation of various treatment options with recidivism.

### **Literature Review**

Substance use problems have been noted in the literature throughout the ages (e.g., the army of Alexander the Great and its reliance on alcohol for engagement and continued conquest; Sir Arthur Conan Doyle penning Sherlock Holmes in opium dens). Beyond romantic depictions of use, the struggles related to substance use have not diminished in importance or acuity or in their more accurate reality of costly and tragic impact and outcomes. In recent decades, individuals like Marilyn Monroe and Robin Williams committed surprising suicides, with their life stories revealing significant struggles with mental health issues and illicit and prescribed substance use (Bloomquist, 2008).



## Diagnostic Considerations

The diagnostic process and conceptualizations of substance use have changed over time. Early research and literature on substance use coined and used the terms addictions and drugs. Addiction was acknowledged as a process whereby a behavior, that functions to produce pleasure and/or escape from internal discomfort, is employed in a pattern characterized by (1) recurrent failure to control the behavior and (2) continuation of the behavior despite significant negative consequences (e.g., getting fired from a job, losing a relationship; Goodman, 1990). Goodman also defines a *drug* as a construct representing any substance that when it enters the body, it alters the body's functioning in a physical or psychological manner; with the exceptions of food and water, and of legal or illegal status. In contrast, the more expansive concept of a *substance* has been defined in research as a physical material of discrete existence or particular matter of definite chemical constitution deemed harmful and usually subject to legal restriction.

In the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (American Psychiatric Association (APA), 1994), substance use struggles were diagnosed as either Substance Abuse or Substance Dependence. Substance Abuse was described as involving problematic but acute struggles with substance use, such as going on repeated weekend benders, with continued functionality, and no tolerance issues. Substance abuse was understood as the overindulgence in an addictive substance, marked by a change in behavior caused by the biochemical changes in the brain after continued substance abuse.

Substance Dependence was defined as having chronic struggles with a pattern of substance use, prior failed attempts at quitting usage, and tolerance and withdrawal effects. Substance dependence was categorized by the compulsive and repetitive use that may result in developing a tolerance to the effects of the drug and symptoms of withdrawal if the use is reduced or stopped. In the current Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-V) (APA, 2013), substance use issues have been collapsed into Substance Use Disorder diagnoses by category of substance. Illicit opioids, prescribed analgesic misuse and heroin use are all diagnosed as Opioid Use Disorder, with a specifier of mild, moderate or severe noting the level of struggle (APA, 2013). Therefore, Substance Use Disorder replaces terms such as drug abuse, substance abuse and dependence. Substance Use Disorder is thus defined as the recurrent use of alcohol and/or substances causing clinically and functionally significant impairment. Substance Use Disorder is also represented as a behavior pattern characterized by overwhelming involvement with the substance and its use despite the adverse penalties it creates (Straub, 2014). The American Psychiatric Association and substance use researchers have further enhanced the elements, dimensional characteristics, criteria or requirements, and categorical organization for substances used in a problematic manner within the Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-V). The DSM-V allows for diagnosis of Substance Use Disorder via the use of sets of criteria that establishes criteria for eight different categories of substance-related disorders and the diagnostic severity level (Horvath, Misra, Epner, & Cooper, 2016).

**Opioid use disorder.** Of those eight categories, Opioid Use Disorder has striking local relevance to the population of Northeast Florida due to its historical pattern of usage – drifting from one opioid substance to another, both across the population and within individual case histories - and its impact on both users and the medical field. In the mid-to late-1800's, opium was a popular substance. Initially thought to be harmless and useful, it was used as a common pain medication within medical operations or traumatic injuries, as well as for less invasive, common issues like coughs or sleeplessness (Booth, 2013). Because of its aid in such arenas, it continued to be heavily marketed as being non-addictive. However, as time passed, there was an awareness of the possibilities of misuse and a shift in the understanding of just how powerful heroin and other opioids could actually be.

### **Prevalence and Relevance**

Comparing the misuse of medications by category in 2015, 12.5 million people misused opioid pain medications (4.7 %), 6.1 million misused tranquilizers (2.3 %), 5.3 million misused stimulants (2.0 %), and 1.5 million misused sedatives (0.6 %; Hughes et al., 2016). The numbers suggest that our societal struggles with opioids far outweigh those of other misused medications. It is estimated that between 26.4 to 36 million people abuse opioids worldwide and 2 million people in the U.S. suffer from substance use disorders related to prescription opioid pain relievers as of 2012 (NIDA, 2014).

When looking at the prevalence of opioid misuse and its relevance, it is important to discuss the demographics of those persons. An individual plagued with a substance use disorder does not represent a specific demographic. This disorder reaches that of all

racess, ethnicities, sex, and socioeconomic status. All demographics represent a fluctuation of use between years 1975 to 2015. For instance, according to the Centers for Disease Control (CDC), “The age-adjusted drug poisoning death rate involving opioid analgesics increased from 1.4 to 5.4 deaths per 100,000 populations between 1999 and 2010, decreased to 5.1 in 2012 and 2013, then increased to 5.9 in 2014, and to 7.0 in 2015. The age-adjusted drug poisoning death rate involving heroin doubled from 0.7 to 1.4 deaths per 100,000 resident populations between 1999 and 2011 and then continued to increase to 4.1 in 2015.” (CDC, 2015). This information showed an ultimate increase of death rates for all ages, all sexes, all races, and all ethnicities for opioid and heroin related deaths by year 2015 from year 1999.

### **Demographics of Users**

To further address demographic information, we must establish a general consensus on addiction. Addiction is shown to not be a moral failing or a character defect, but an ongoing yet fixable brain disease categorized by compulsive substance abuse and repeated relapse (APA, 2017). This idea of addiction is important to acknowledge as it expresses the history of treatment for addiction as well as the history of use. There was evidence that an addiction took place, and then the individuals were isolated. After, the heroin addiction shifted to individuals that were of minority decent and below the poverty line. The trend continues to shift because in more recent history, the make-up of those individuals using heroin in the 1960s were predominantly men (82.8%, mean age 16.5 years) and their first experience with opioid use was heroin (Booth, 2013). However, In recent studies, users are older ( $M = 22.9$  years old) men and women living in less urban areas who were introduced to opioids through prescription

drugs (75%), with 90% of which that began using in the last decade being white (Cicero, Ellis, Surratt & Kurtz, 2014). Specific to prescription drugs representing a gateway, the CDC reported that the misuses of prescription opioid medications killed 18,893 people in the U.S. in 2014 with an additional 10,574 individuals dying from heroin overdose (CDC, 2015). As well, in 2011, the rate of overdose deaths from opioid prescription drugs was highest in states with higher poverty levels. Currently, the epidemic that has been discussed in the literature acknowledges that young White Americans in rural areas of practically every state are using heroin (Bowser, Fullilove, & Word, 2017). Additionally, there is a shift in the way drugs are sold due to phones, messaging, and the internet. As well, heroin sellers are distributing to suburban and exurban areas, which means there is no longer need for distributing to urban black and Latino minority communities to sustain profit.

### **Medical versus Non-Medical Use**

When medication is used as intended after it is prescribed, it can be a useful tool that benefits the medical patient by helping to reduce pain, enhance, sleep, reduce pain-related irritability, and improve social and work functioning. Medications like Opioids can help patients who struggle with chronic pain issues to find enough relief to allow for productive work and healthy lifestyles. A current consideration for Opioid Use Disorder is whether the opioid use is for medical or non-medical purposes (Boyd, Cranford, & McCabe, 2016). Such a medical versus non-medical consideration includes “shades of gray,” as an individual’s use of an opioid pain medication may once have been a legitimate effort to address injury-related or post-surgical pain but may evolve over time into non-medical use. This takes place if the opioid use extends past the duration of time

required for most patients following similar procedures or injuries. Recent data from Boyd, Cranford, and McCabe (2016) also suggests that people in the United States use approximately 80% of the world opioid supply despite making up only 5% of the world's population. Unfortunately, a good portion of that 80% of opioid supply usage is likely not legitimate.

### **Types of Opioids**

There are many types of opioids that are used and possibly abused. For instance, the pharmaceutical opioids are those such as codeine, morphine, hydrocodone, oxycodone, methadone, buprenorphine, and fentanyl and could represent a high level of injection (Ambekar, Rao, Mishra, & Agrawal, 2015). Heroin is an opioid drug made from morphine which can be of a white or brown powder, or a black sticky substance (NIHA, 2016). Heroin produces similar responses as morphine and codeine but is cheaper to produce and get on the street. For instance, the average cost of a single dose of heroin is approximately \$15-\$20 depending on purity and availability with a dependence costing an individual \$150-\$200 a day (Perdue, Sherba, Gersper, & Martt, 2015). An individual injecting heroin may spend more. However, without insurance, an individual with chronic pain would possibly spend over a thousand dollars a month for a prescription opioid out of pocket if they are limited. However, the economic burden of illicit opioid use in 2013 was estimated to be about 78.5 million dollars for health care, criminal justice costs, and substance abuse treatment (Florence, Luo, Xu & Zhou, 2016).

**Biological process and opioids.** Opioids such as morphine and heroin mimic endorphins (the body's natural opiates), and molecules of the synthetic opiates bind to the

receptor sites for endorphins, stopping the body from naturally producing opiates (Straub, 2014). Opiate drugs exert their effects by binding to three opioid receptor types mu, delta, and kappa receptors. These receptors mimic the actions of endogenous opioid peptides: the endorphins, enkephalins, and dynorphins. An endorphin, enkephalin, and dynorphin are analgesics and properties of opioid receptors responsible for euphoria, tolerance, dependence and sedation (Tordjman et. al, 2003)). They are also responsible for immune suppression and stimulation as well as respiratory depression and myosis. These receptors, through second messengers, influence the likelihood that ion channels will open, which in certain cases reduces the excitability of neurons. Through neuroimaging displaying the involvement of the frontal cortex, we learned that opioids bind to these opiate-specific receptors which activate the reward system and increase levels of dopamine (Goldstein & Volkow, 2002). Added research has expressed that opiate alkaloids are known to suppress immune function by acting on the brain and producing effects such as euphoria by activating both the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system (Wooten & Guthrie, 2012). Additionally, studies have found that there are various systems involved with opioid use related to heroin. Specifically, Heroin is represented as a full opioid agonist and activates all opioid receptors completely (De Vries & Shippenberg, 2002). Heroin's relationship to opiates presents a relationship that warrants further analysis of the process of heroin dependence before treatment can efficiently take place.

**Transitions within opioid use disorder.** An interesting pattern observed by law enforcement is that a good portion of individuals appear to transition among types of opioids over time. As a stand-alone issue, heroin has been a long-standing illicit

substance sought after by individuals who seek its intoxication effects. However, a portion of users are thought to have initially used prescription opioid medications prior to using heroin, also evidenced by research studies. Concern has risen about individual usage involving a transition from opioid medication misuse to heroin usage. Initial legitimate use of opioid pain medication following surgery or injury may become illicit or inappropriate use of the patient continues to seek opioids after their medical need ceases (e.g., pain subsides, healing occurs; Mars, Burgois, Karandinos, Montero, & Ciccarone, 2014). It is important to revisit the difference between medical versus illicit forms of opioids because during the past decade, while pharmaceutical medications have risen in cost, the price of street heroin has dropped (Unick, Rosenblum Mars, & Ciccarone, 2014). What experts fear is that due to the relatively lower cost of street heroin versus prescription opioids, individuals may be seduced to the use of the less costly heroin alternative (Cicero, Ellis, Surratt, & Kurtz, 2014). In turn, seeking pure heroin for pain has itself undergone change, with a rise in fatalities from use of heroin revealing a “laced” nature of the heroin. Fentanyl and other substances appear to be making heroin injections yet more lethal (Stogner, 2014). With the ideas of cracking down on the opioid prescriptions, the higher cost of out of pocket purchase becomes more of an opportunity to buy these substances on the streets. However, it is important to note how rapidly the addiction transitions.

Overprescribing of opioid pain relievers has led to a major increase in the status of opioid addiction, which has been associated with a rise in overdose deaths and heroin use (Kolodny et al., 2015). Because heroin mimics the reaction of prescription medication, it is said that nearly 80 percent of Americans using Heroin reported misusing



prescription opioids prior to heroin. The increase of heroin use is not the only clear change in the realm of substance use. There appears to be a shift in the demographics of those individuals using heroin. Within this shift in demographics, there is an increase in use in suburban areas. Such a transition must be explored because pathways to heroin use may differ in suburbia than those followed in more impoverished or urban populations within the United States. How does a person with adequate resources and housing begin to use heroin? Are there gateway medications or substances that make heroin usage more likely? Also, what treatments of Opioid Use Disorder are related to more positive outcomes?

## **Treatment**

In history, addiction was treated as a moral flaw. In this, treatment consisted of imprisonment and admittance to insane asylums (Torrey, Stieber, & Ezekiel, 1998). Over the decades a shift took place to now view addiction as a brain disease characterized by fundamental and long-lasting changes in the brain. Treatment consists of detoxification which is a method of going through withdrawal brought on by isolation of the individual to focus on the physical symptoms of withdrawal. Detox was recognized in the past as a necessary part of rehabilitation but it was a painful process alone. Cognitive and Behavioral Therapy (CBT) was then implemented such as counseling, support groups, and other forms of therapy to address the emotional aspect of substance abuse and assist with preventing relapse (McHugh, Hearon, & Otto, 2010).

Today, there are controversial drugs used to assist in the recovery process called Medication Assistance Treatment (MAT) (Center for Substance Abuse Treatment, 2005).

These forms of treatment are used in combination with detoxification and CBT. MAT is medication used to assist with treating cravings and preventing relapse which buys time for the CBT to work efficiently and assists with the painfulness of detoxification.

There are several forms of drugs that are usually used in MAT. The drugs specific to opiate use and abuse are naloxone, methadone, and buprenorphine to name the popular forms. Naloxone is a drug that blocks or reverses the effects of opioid medication. Drugs like methadone and buprenorphine are used to reduce withdrawal symptoms and relieve pain (Griffin et. al, 2014). A combination of buprenorphine and naloxone creates a drug called Suboxone that has recently become popular. Suboxone is used for treatment and opioid dependence and should be used as a part of a complete treatment plan including counseling and support.

With our changing attitude of what substance use disorder is classified as, comes our changing need to provide effective treatments for Opioid Use Disorder. Treatment is now to be provided through Medication Assistance Treatment (MAT) as well as Cognitive Behavioral Therapy (CBT) coupled with traditional forms of treatment. Most importantly, the decision to use Suboxone as a form of MAT marks a new wave of understanding the disorder that is taking so many lives. The idea is then to address demographical shifts, changes in identification, and change in treatment to provide the best and most responsive form of care for the individuals plagued with this disorder.

### **Treatment Success**

In 1962, researchers attempted to use morphine as a medication maintenance for substance use disorder and realized that morphine may not have been a good choice

due to its' similar characteristics of heroin, oxycodone, and codeine (NIDA, 2016). Methadone maintenance was introduced as a possible treatment for substance abuse and in 1965, an expansion took place to measure the chances that methadone would not provide too many euphoric side effects to the patients. In 1985, researchers learned that methadone assisted withdrawal would need to consist of gradual methadone reduction versus other forms such as using clonidine because it resulted in higher withdrawal symptoms and discomfort (Rounsaville, Kosten, & Kleber, 1985). Researchers also opined that inpatient opioid detoxification would be a useful strategy for patients with severe psychological symptoms (San, Cami, Peri, Mata, & Porta, 1989). Methadone treatment recently has also expressed differences in sex. In a study conducted in 2015, there was evidence of a sex difference in polysubstance use, legal involvement, and employment status for men and women receiving methadone treatment (Bawor et al., 2015). As well, there has not been a particular weaning strategy identified to be universal for the individuals taking methadone over other prescribed infusion weaning for opioid addiction (Dervan, Yaghmai, Watson, & Wolf, 2017). Methadone has a proven success rate in handling opioid addiction; however, there is a higher probability that methadone users will not be able to get off of the methadone without replacing this medication with another one.

For the possibility of finding a medication combination that could assist with weaning as well as complete sobriety, researchers continued to explore other options. In specific, Suboxone has been found to be a less addictive medication treatment that can be prescribed at home. Further, its withdrawal symptoms are less severe than are those from alternative medications (Volkow, 2014). While Methadone is currently cheaper and has

been found to provide better relief in some studies, Suboxone has provided hope in regards to individuals needing substance use treatment but who are unable to get into or stay within residential treatment programs. In a study conducted on two-year treatment rounds with Suboxone, 75 percent had a successful response to the use of Suboxone with 43 percent remaining in Suboxone treatment, 21 percent tapering off successfully, and 58 percent reporting receiving CBT (Finch, Kamien, & Amass, 2007).

For the individual, Suboxone has been shown to decrease cravings and relieve withdrawal symptoms. Suboxone has been available since 2003. An estimated 400,000 people in the world are using it for opioid dependence (Fuller & Moore, 2017). There is not much information available about who exactly it assists or how it assists that person other than the generalized form of assistance with cravings and withdrawal. In relation to the universal aspect of Suboxone, it is recommended that suboxone be taken in conjunction with CBT and a full comprehensive treatment plan. Studies have shown that combining Mat with psychosocial support strategies such as CBT and support groups represent the best way to treat opioid addiction effectively (Lobmaier, Gossop, Waal, & Bramness, 2010). It is important to note in that Suboxone is underrepresented in regards to population it serves as well as the many trials that have been done. Although Buprenorphine is represented as a form, the connection with naloxone and its' success rate in addressing dependence is understated therefore, further research should be conducted.

## **Hypotheses**

Three main hypotheses were tested in the current investigation:

- 1) White/Non-Hispanic adults were expected to be more likely to meet diagnostic criteria for Opioid Use Disorder and use MAT treatment options more than were individuals from other racial/ethnic groups.
- 2) White/Non-Hispanic adults were expected to be more likely to have a history of Opioid medication misuse (versus other substance usage) prior to using Heroin, compared to users from other Race/Ethnicity backgrounds.
- 3) Combined Psychosocial (PS) and Medication-Assisted Treatment (MAT) services were expected to be related to more positive outcomes or “success” than were individual PS interventions.

### **Methods**

Via an application and initial review by the University of North Florida Institutional Review Board (Project # 1154144-1), the IRB informed the researchers of the project’s exempt status, with permission granted for use of archival data. The data was provided by a data collection and storing system generated by Gateway Community Services (GCS). GCS is a facility with an assortment of treatment and recovery based forms of services such as detoxification, CBT, and MAT. This program also provides individual and group counseling, support groups, and medications such as Suboxone. This facility was used due to the many programs of treatment that the patient may participate in and the knowledge and use of substance abuse diagnoses that are explored throughout an individual’s inpatient and/or outpatient stay with GCS.

**Variables.** For the use of variables, demographic information age (no birthdate), sex, race, ethnicity, marital status, parental status, education level, employment status,

annual family income, and was explored for each of the individuals. This demographic information was as follows: The reality of comorbid substance use (e.g., misusing more than one substance at a time was addressed in the GCS database via the use of *Primary* (substance of first choice for usage), *Secondary* (second choice) and *Tertiary* (third choice) substance categories. Treatment Completion was identified for *Psychosocial (PS)* and *Medication-Assisted Treatment (MAT)* interventions in a “Yes or No” manner. Individuals identified as using heroin also were coded in a “Yes or No” manner. While these variables were provided, the demographic variables that were of most important were race, ethnicity, marital status, education level, employment status, length of program enrollment, and reason for discharge. *Recidivism* was defined as the number of times a participant returned for substance use treatment. *Dose Effect* was defined as the number of treatments/sessions. *Treatment Outcome* was defined as the combination of *Treatment Completion* and *Recidivism*.

**Data Cleaning.** Archival data was originally collected by GCS staff evaluators who administered client assessments upon client application and entry to the treatment facility. Additional GCS staff entered and coded the data into a main GCS database. The individuals provided information for their top three substances of choice for use while undergoing intake assessment as well as a urine analysis that evaluated the individuals’ substance use more concretely upon entering GCS treatment. At that time, authorization via release forms, and multiple consent forms were collected from the individual for treatment and collection of the information. The data used for the current study represented 2014-2015 data from adults treated at the GCS facility.

## Results

The results of this student are presented in two parts. First, the sample composition will be described. Second, findings addressing the three proposed hypotheses (regarding the racial/ethnic background differences for Opioid Use Disorder, the relationships among Opioid Medication Misuse, Heroin use, and Race/Ethnicity, and the relations among treatment type and treatment outcomes) will be reported. All analyses were conducted using SPSS 22.0.0.0.

**Sample composition.** Data from 4,860 adult treatment participations at GCS during years 2014 and 2015 was included for analyses. The participants ranged in age from 18 to 86 years in Age, with Duration of Recovery or Treatment ranging from 1 to 862 days. In addition to Heroin and Opioid Medication misuse, there was a long list of substances misused by clients treated at GCS. Individuals with missing data for substance type and treatment type were excluded from the Hypotheses tests.

Individuals treated at GCS were predominantly male (59%). The sample was 65% White, 30% Black, and 5% identifying as American Indian/Alaskan, Asian, Hawaiian/Pacific Islander, or Multi-Racial. In terms of marital status, 63% were Never Married. Approximately 34% reported earning a high school diploma. A majority of the sample self-identified as Unemployed (53%). (Please see Tables 1, 2, and 3 for Demographic information).

The two main treatments provided for Opioid Use Disorder were Psychosocial Treatments (PS; e.g., individual or group counseling, 12-step programs) and Medication Assistance Treatment (MAT). While PS treatment is used at GCS to treat individuals

with a wide variety of Substance Use Disorders (e.g., Alcohol, Cocaine, Heroin), Suboxone-based MAT is used specifically for Opioid Use Disorder.

Less than one quarter (17%) of individuals treated at GCS during 2014-2015 received MAT treatment. MAT treatment appropriately targeted heroin and other opioid use. A chi-square was run on primary, secondary, and tertiary substance use related to heroin and MAT treatment. As the literature highlights the correlation between heroin use and other opioid use (opioid medication misuse), it was important to explore the validity of MAT treatment provision at GCS.

### **Hypotheses Tests**

**Race/Ethnicity differences in heroin use.** To explore whether White/Non-Hispanic adults would be more likely to struggle with Opioid Use Disorder than would persons from other racial/ethnic groups, a Chi-square analysis by Race/Ethnicity (White/Non-Hispanic, White/Hispanic, Black/Non-Hispanic, Black/Hispanic, Multiracial, Other) and on Heroin Use (Yes, No) was conducted. As predicted, group differences for heroin use were observed,  $X^2(7, N=4605) = 96.13, p < .001$ , with White/Non-Hispanic adults more often using heroin, than any other race/ethnicity (see Figure 13).



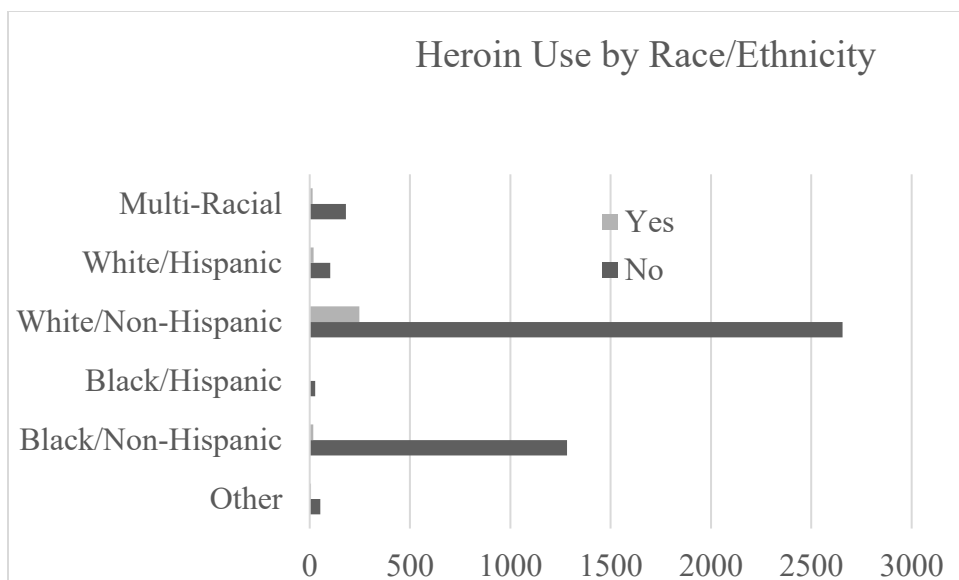


Figure 13. Heroin use (yes or no) by racial and ethnic identification.

In follow-up post-hoc analyses for Race/Ethnicity, gender differences were explored for White/Non-Hispanics, a Chi-square analysis by Gender (Male, Female) on Heroin Use (Yes, No) was conducted. The relation between these variables was significant,  $X^2(1, N= 2902) = 7.81, p < .001$ , with Males more likely to use Heroin than were Females (see Figure 14).

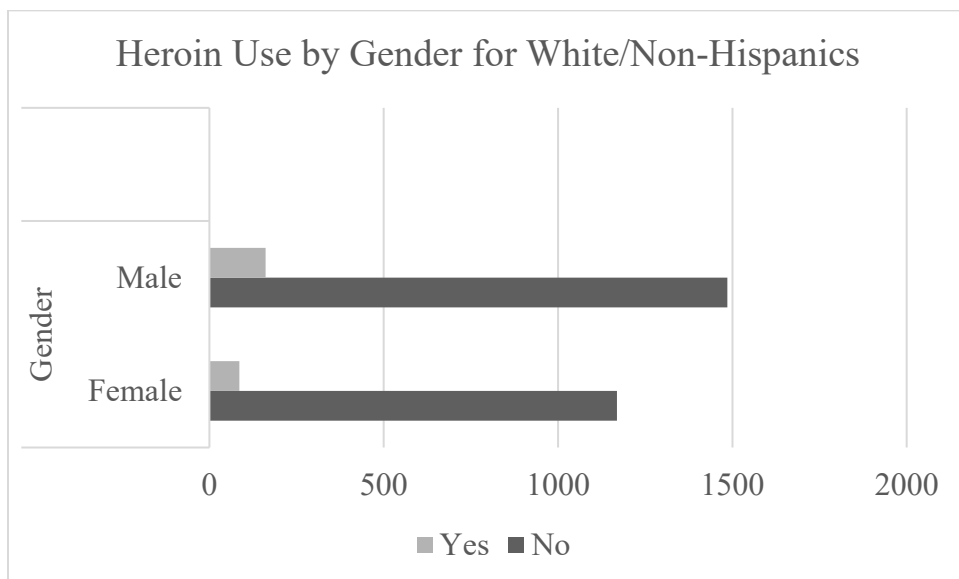
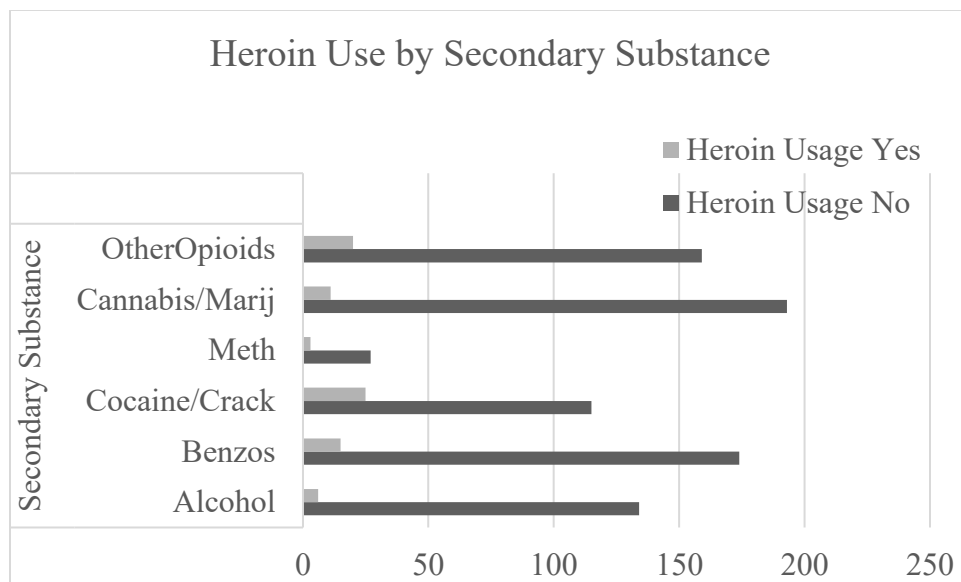


Figure 14. Heroin use (yes or no) by gender (male or female).

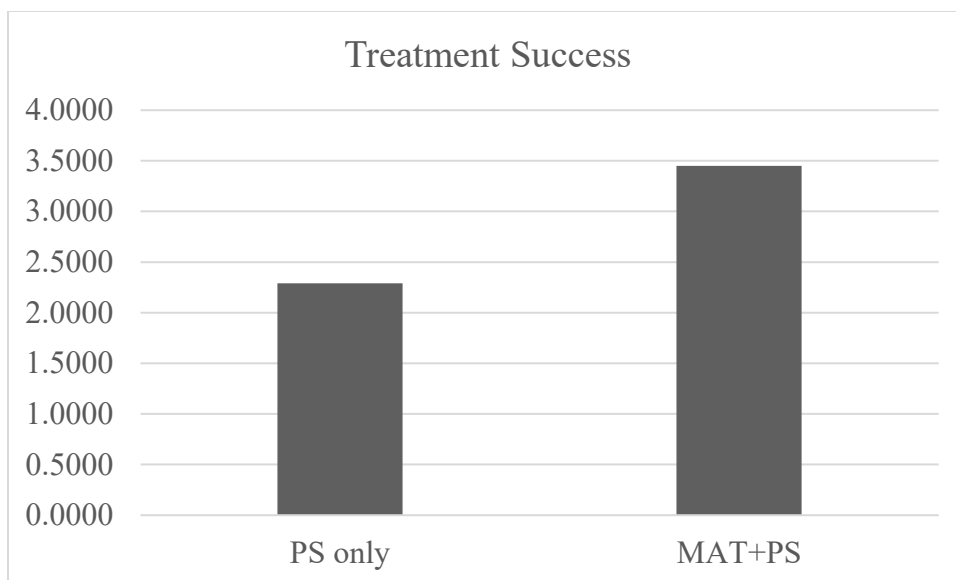
**Opioid medication misuse and heroin use.** Due to the limits of available information in the archival data, timing of usage (e.g., misuse of Opioid medications prior to (versus after) Heroin could not be determined. Instead, the researchers compared frequencies of reported simultaneous use of other common substances to the use of Heroin using a Chi-square analysis by Heroin and Other Substance (Alcohol, Benzodiazepines, Cocaine/Crack, Methamphetamines, Cannabis/Marijuana, and Other Opioids) for White/Non-Hispanics), with notably group differences in probability found for Secondary Substance,  $X^2(6, N=915) = 25.63, p < .001$ , but not for Tertiary Substance,  $X^2(6, N=378) = 9.01, p < 0.17$  (see Figure 15).



*Figure 15.* Heroin use (yes or no) by identified secondary substance of choice.

Post-hoc analyses for Secondary Substance found that White/Non-Hispanics were no more likely to use Other Opioids versus other secondary substances along with Heroin use,  $p_s > .10$ .

*Treatment Effectiveness.* To evaluate the relations among treatment type and client outcomes, the relationships among Combined Psychosocial and Medication-Assisted Treatment (PS+MAT) were compared to Psychosocial treatment alone (PS). Treatment Success was measured as a combinative score of Treatment Completion, Treatment Outcome (judgement by clinicians as free of substance use or not), and Recidivism (number of returns to GCS for additional rounds of treatment), with lower Treatment Success scores indicating greater success. An independent samples t-test was run, with results finding that individuals treated with only PS had greater success ( $M = 2.29$ ,  $SD = 1.5$ ) than those treated with both PS and MAT ( $M = 3.45$ ,  $SD = 3.1$ ),  $t(194) = 3.53$ ,  $p = .001$  (See Figure 16, noting the inverse scoring for success; e.g., lower scores indicate greater treatment success). Treatment type was associated with recidivism rates, with combined psychosocial (PS) and medication Assisted Treatment (MAT) treatment negatively related to recidivism, while individual PS only treatments were positively related to recidivism,  $p < .05$ . Individuals that remained in treatment for an extended length of time or throughout the entire duration of treatment were more likely to complete treatment successfully in both combined and individual treatment methods,  $p < .05$  (see figure 16).



*Figure 16.* Treatment success by PS versus MAT and PS combined.

## Discussion

**Demographics revisited.** Suboxone or MAT seems to represent a practical treatment opportunity for heroin and other opioid addiction (Sittambalam & Ferguson, 2014). It also seems to have impact on cocaine/crack users. There showed to be a significant response of MAT use for individuals with a secondary diagnosis of heroin. With regards to the hypotheses, White non/Hispanic individuals did prove to use heroin and other opioids more than other racial/ethnic backgrounds. However, the data also expressed that females were more likely than males to use other opioids and more likely to participate in MAT treatment even though males made up more of the population. This information may be related to barriers to treatment that may need to be explored for males such as more thorough explanation of the treatment options, explanation of cost, and benefit (Priester, Browne, Iachini, Clone, DeHart, & Seay, 2016). There also may be a different form of reasoning for exploring these options such as being involved with

child welfare services. As well, there were crucial findings in regards to those individuals in the facility being of non-Hispanic descent, being of White racial identification, never married (see Figure 5), and being somewhere between 9<sup>th</sup> to 12<sup>th</sup> grade or achieving a high school diploma/degree (see Figure 6). There were also findings related to those being unemployed making up a vast percentage of the population which suggests that there is a continuous link between unemployment and substance use disorders (see Figure 4). There was also acknowledgement that White individuals made up more of the population than any other race entering into the treatment facility. This represented a shift in the individuals using drugs as a general evaluation. Interpretation for the demographic findings are related to the literature in that there are increases in opioid use across all categories of demographics (Rudd, 2016).

Other recent studies have acknowledged that the demographics of heroin and other opioid users has been that of individuals identifying with White males of ages 21-29 and 35-44 (SAMHSA, 2011). The range in this study provided that there was not a significant age because of the spread of individuals entering into the facility. Again, related to demographic information, the more information we used in our analyses, the less of a difference we experienced. However, individuals identifying as white/non-Hispanic and male had a high probability of using heroin and other opioids in this study. They were also more likely to enter a substance use facility than individuals of other demographic markers.

**Duration and education of treatment.** Additionally, with regards to recidivism, the study did display that individuals that remained in treatment for a longer period of time were more likely to complete the treatment episode successfully. The recidivism

extends to individuals in MAT treatment as well. For the traditional PS treatment, there seemed to be a duration effect related to treatment and successful completion. However, in regards to Suboxone treatment as this facility, each individual that receives any form of MAT has to be provided education about the programs available. They must also be involved in some form of after-care program (groups or meetings), must initially go through detoxification to be put onto the medication and monitored to verify dosage, and must meet with the doctor to verify dosage on a scheduled basis beginning with meeting weekly for dosing and then more weeks between doses.

**Addressing the hypotheses.** In regards to the hypothesis pertaining to previous prescription and opioid use, relations between heroin use to prior prescribed opioid treatment was explored but unable to be confirmed at this level of analysis with this data set. However, educational attainment and polysubstance use at baseline were discovered. Most of the individuals entering treatment identified with an alcohol related substance use disorder which is related to limitations of this study. However, for those individuals that identified with a heroin or other opioid use disorder, they majorly represented the White/Non-Hispanic population. Frequency and duration of combined treatment with psychosocial (PS) and medication (M) treatment was negatively related to recidivism, while individual treatment with PS displayed slight positive correlations to recidivism.

Related to the literature, the desire of the current study was to find a link between opioid use and prescription opioids. This hypothesis would have been beneficial in exploring the gateway of use and how to address this matter in prescribing medications to the individuals in the substance abuse facility. Studies have expressed that there is a definite link but many are observational and don't provide directionality (Compton,

Jones, & Baldwin, 2016). This study sought to explore a directionality effect but due to the way in which the variables were collected and the form of assessment, there was limited information on prescription medication.

Furthermore, with the structure of an outpatient facility monitoring the dosage, the education related to the medication, and the addition of psychosocial treatment options, the MAT treatment could prove successful in treating related substance use disorders. Additionally, other studies have shown that Suboxone is explored because it allows for lower chance of dependence, and milder withdrawal symptoms (Schottenfeld, Pakes, & Kosten, 1998; Mattick, Kimber Breen, & Davoli, 2004). While this direct information was not covered in this study, Suboxone treatment does seem to prove a worthy investment related to tackling the opioid use disorder. However, due to the timing of introduction to the use of MAT in this facility, the stage of the epidemic at the time of the data collection, and the lack of follow-up information provided for the individuals, there does not show to be a significant benefit to use of MAT and PS in this facility at this time. Further study should be explored related to more recent data at the facility and compared to the use of MAT services at other facilities in the area.

**Limitations.** There was minimal information for how many times an individual's service count (meaning the amount of services an individual was receiving). Therefore, when an individual did receive services, there was not much information related to what order that individual received services but simply how many times. That may be problematic in addressing the amount of times an individual relapsed. As well, there was no direct indicator for follow up for a year or more after completion of the episode. This means that there is no way to evaluate whether or not the individual checked into another

treatment facility or died or relapsed and did not come back to the facility. This is the same for individuals that leave the Suboxone program.

Additional limitations are related to the fact that the study was specific to one treatment facility and cannot account for the statistics of others however; the attempt of using such a large sample size was to be able to generalize to more demographics. As well, by connecting with other treatment facilities to evaluate their use of data collected and treatment forms would allow for more generalizability.

Also, it should be noted that there are certain criteria that must be met for individuals to enter into the substance use facility. Those criteria are represented by a certain combination of substances having to be in the system at the time of arrival to the facility for possible admission. This means that the diagnoses of alcohol use disorder may be a part of a technicality because it is a guaranteed substance allowing for admission into detoxification. As well, this study represented a heavily correlational design.

In conclusion, the likelihood of treatment success was related to the length of program stay. Suboxone as a treatment option for heroin and parallel substance use disorders proved beneficial in regards to recidivism. With the correct amount of education and outpatient guidance, an individual in the program may be more likely to complete the program than individuals not pursuing MAT. However, without follow-up data for the individuals, it is not possible to identify what path the individuals took after completing the episode of care or if they are currently enrolled in treatment elsewhere.

In order to prevent relapse and sustain recidivism, further information should be explored pertaining to the current use of suboxone in facilities and all of the limitations



must be addressed. It is important to educate the staff as well as ensure that the individuals receiving treatment continue to understand their rights and the benefits of maintaining sobriety. By increasing awareness of the options for individuals with opioid related substance use disorders, there could be a decrease in the number of lives claimed by this opioid epidemic.

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Table 1

*Means and Standard Deviation for Adult Demographic Information*

Gender/Race/Ethnicity	%	M	SD
	Sex/Gender	1.59	.492
Female	41.13		
Male	58.90		
	Ethnicity	5.27	.993
Spanish/Latino	5.25		
None of the Above	89.34		
Haitian	0.14		
Unknown	5.23		
	Race	5.02	1.398
Other	1.22		
Black	29.70		
Multi-Racial	4.00		
White	65.10		
Total	100		



Table 2

*Means and Standard Deviation for Adult Demographic Information*

Marital Status	Percentages	M	SD
		3.62	1.505
Divorced/Legal Separated	17.14		
Married/not legally separated	16.75		
Never Married	63.15		
Unreported	0.93		
Widowed	2.04		
Total	100		

Table 3

*Means and Standard Deviation for Adult Demographic Information*

Education/Employment	Percentages	M	SD
	Education	8.68	5.673
4th grade and under	0.27		
5th to 8th grade	7.84		
9th to 12th grade, no diploma	34.40		
High School graduate/diploma/ degree	34.00		
Past/Current college, no diploma	12.98		
AA, BA, MS degrees	8.64		
Other Schooling/degree	1.87		
	Employment	11.81	5.410
Employed	27.76		
Unemployed	52.88		
Disabled	7.12		
Student	12.24		
Total	100		

Table 4

*Chi-Square Test: Heroin Use by Secondary Substance*

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	25.632 <sup>a</sup>	6	0.000
Likelihood Ratio	26.500	6	0.000
Linear-by-Linear Association	0.274	1	0.601
N of Valid Cases	915		

a. 2 cells (14.3%) have expected count less than 5.

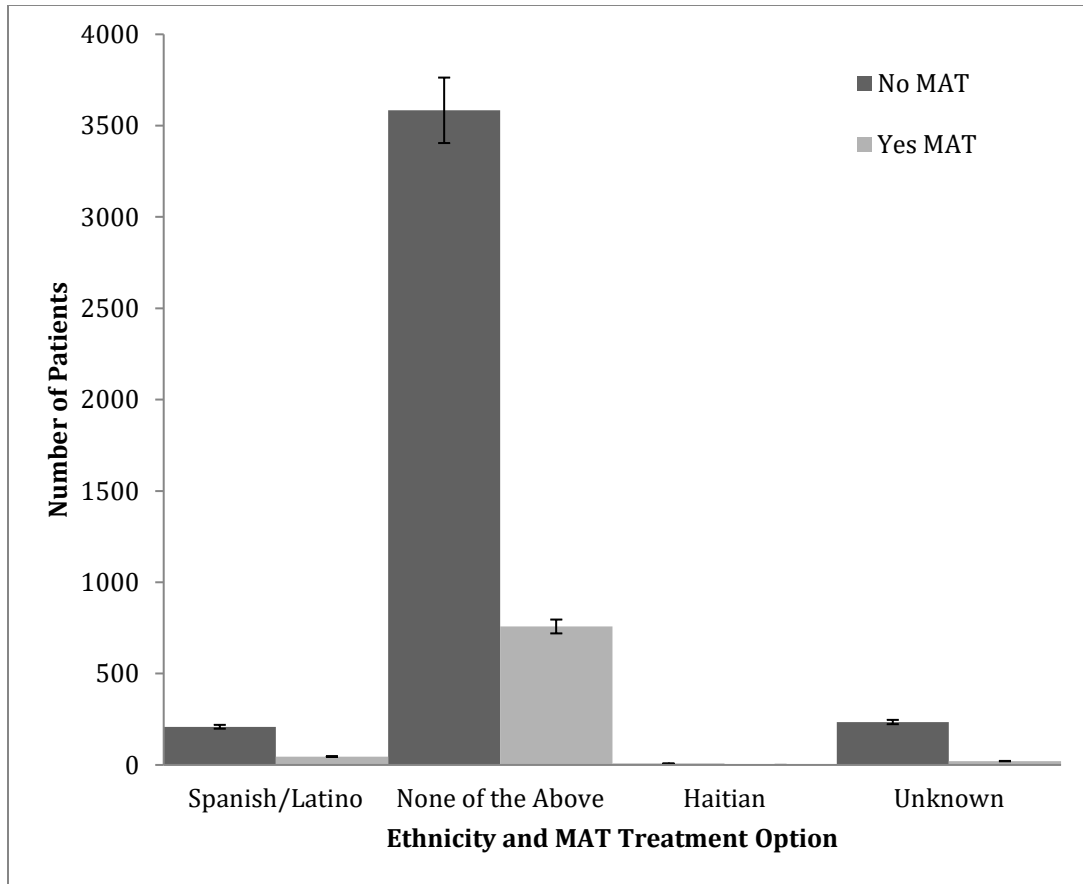


Figure 2: Patient Ethnicity and MAT Treatment

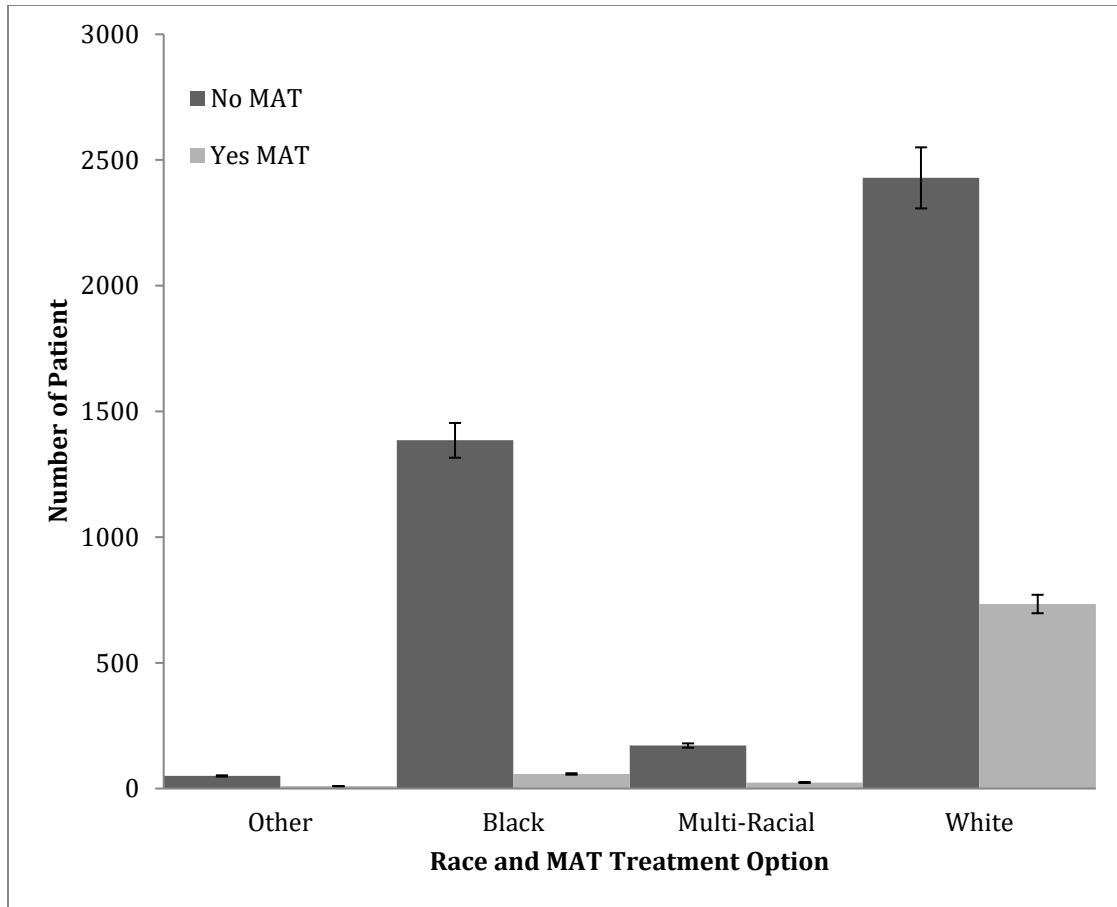


Figure 3: Race of Patient and MAT Treatment

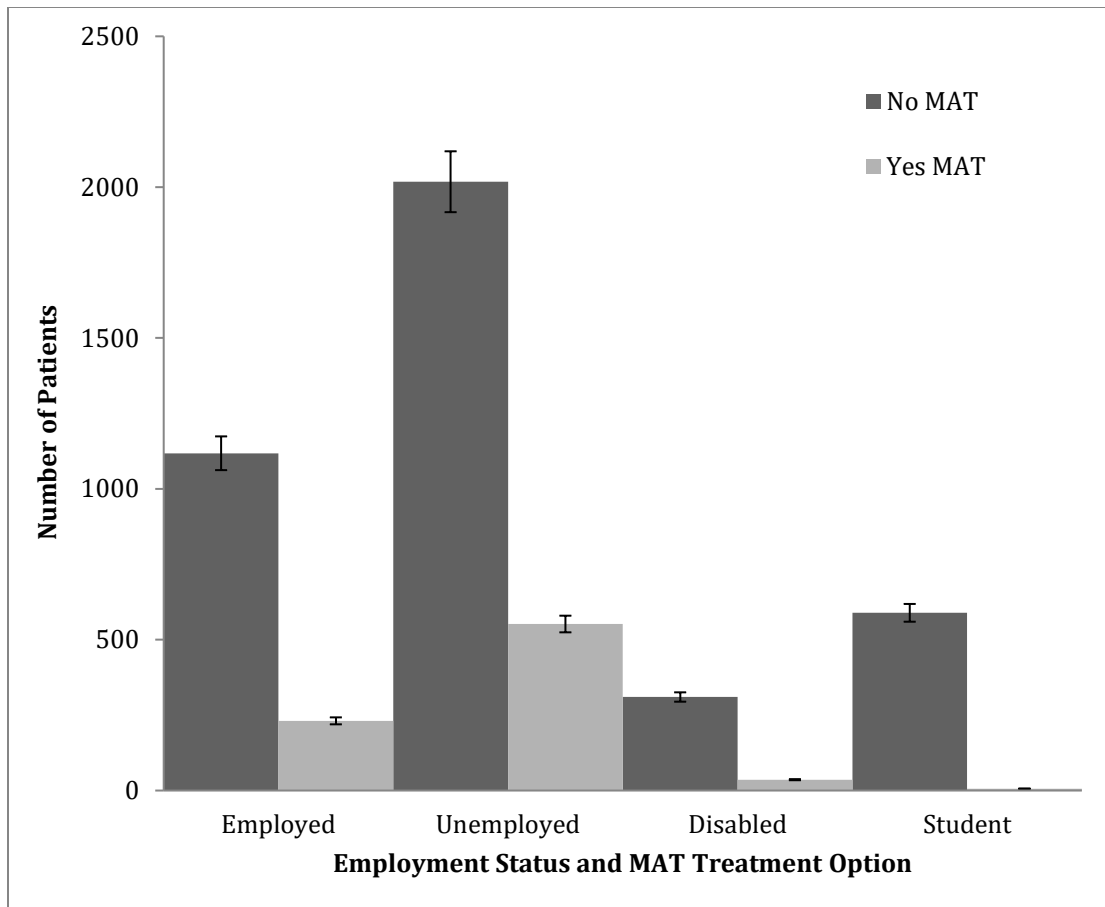


Figure 4: Employment Status of Patient and MAT Treatment

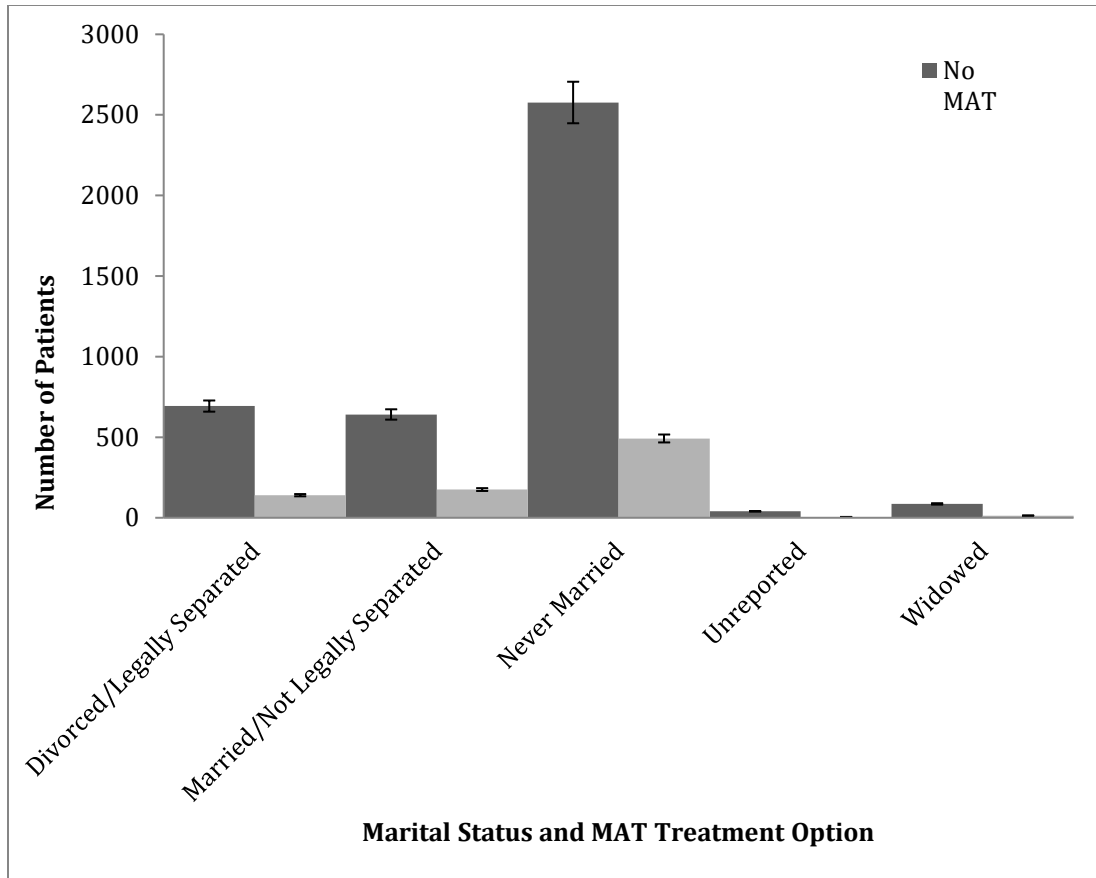


Figure 5: Marital Status of Patient and MAT Treatment

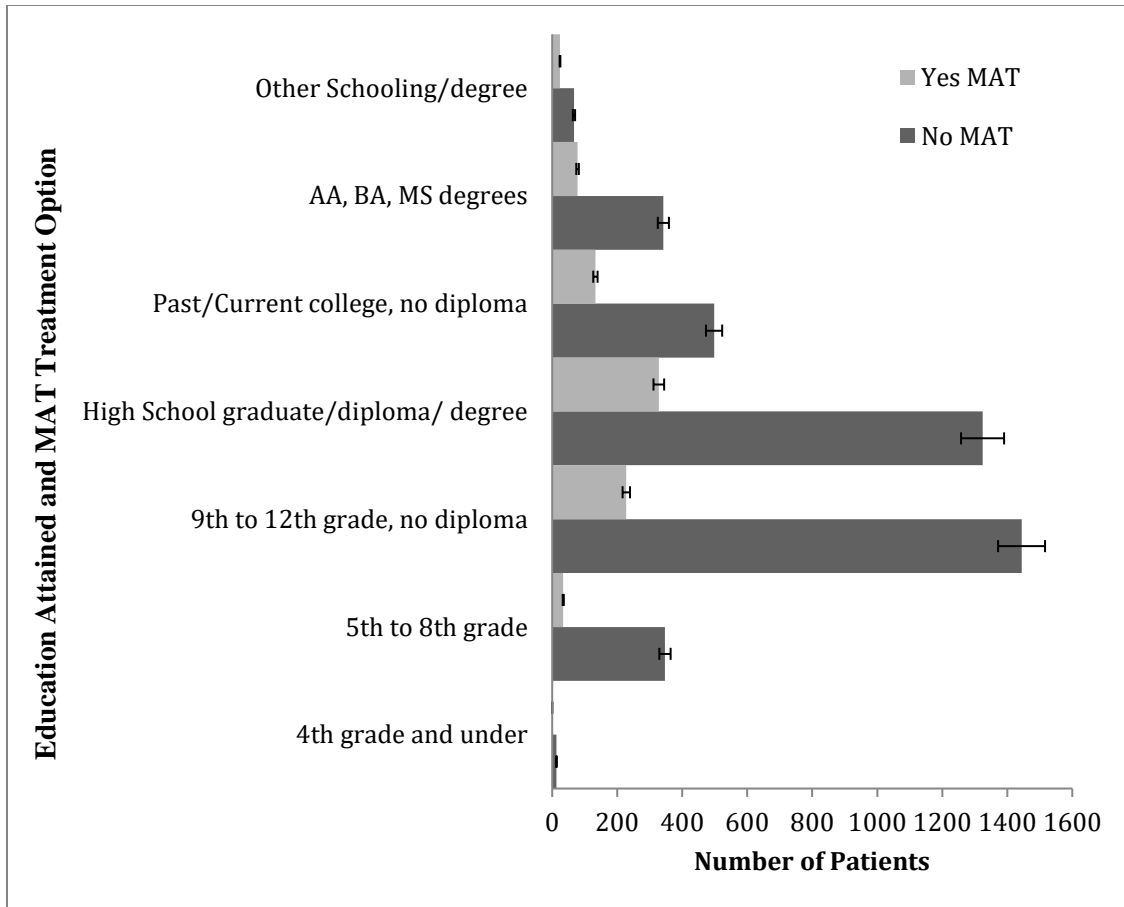


Figure 6: Education Attained and MAT Treatment

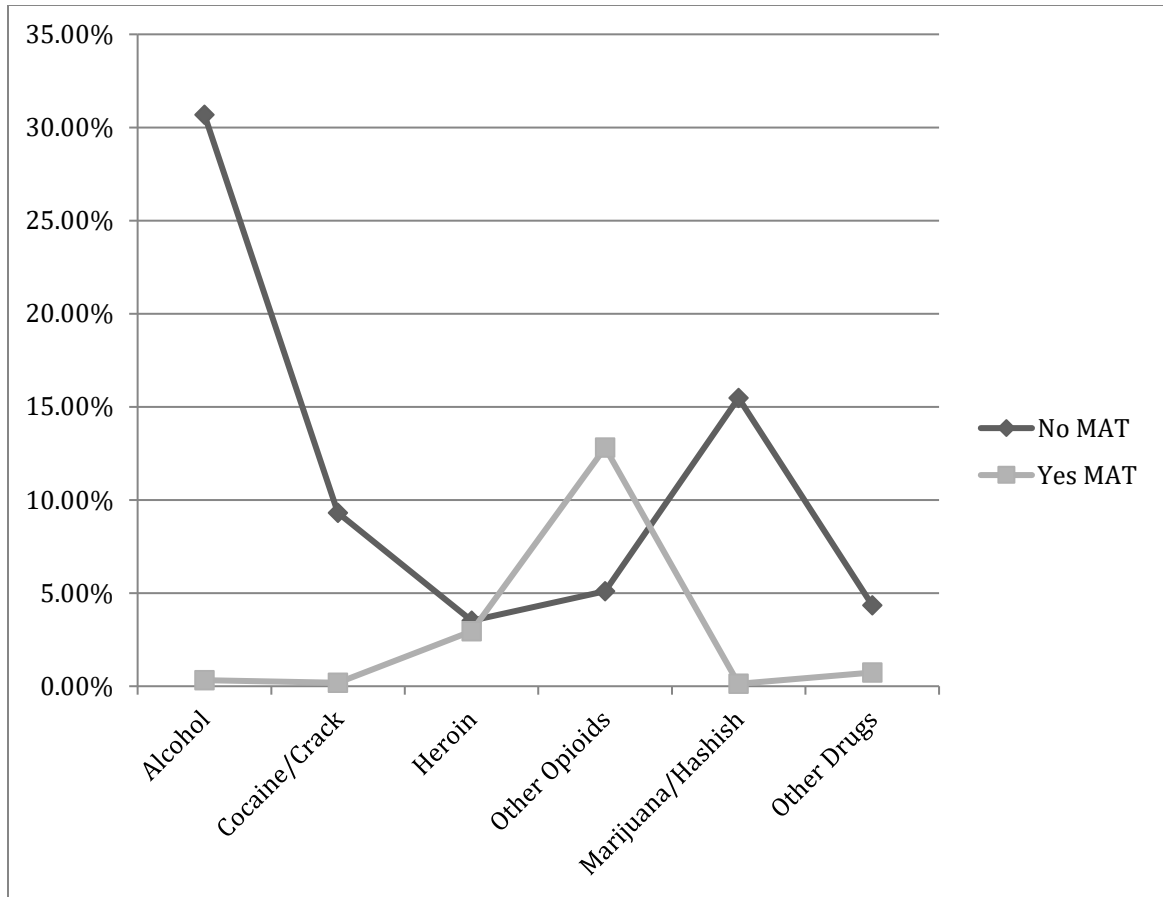


Figure 7: Primary Substance and MAT Treatment



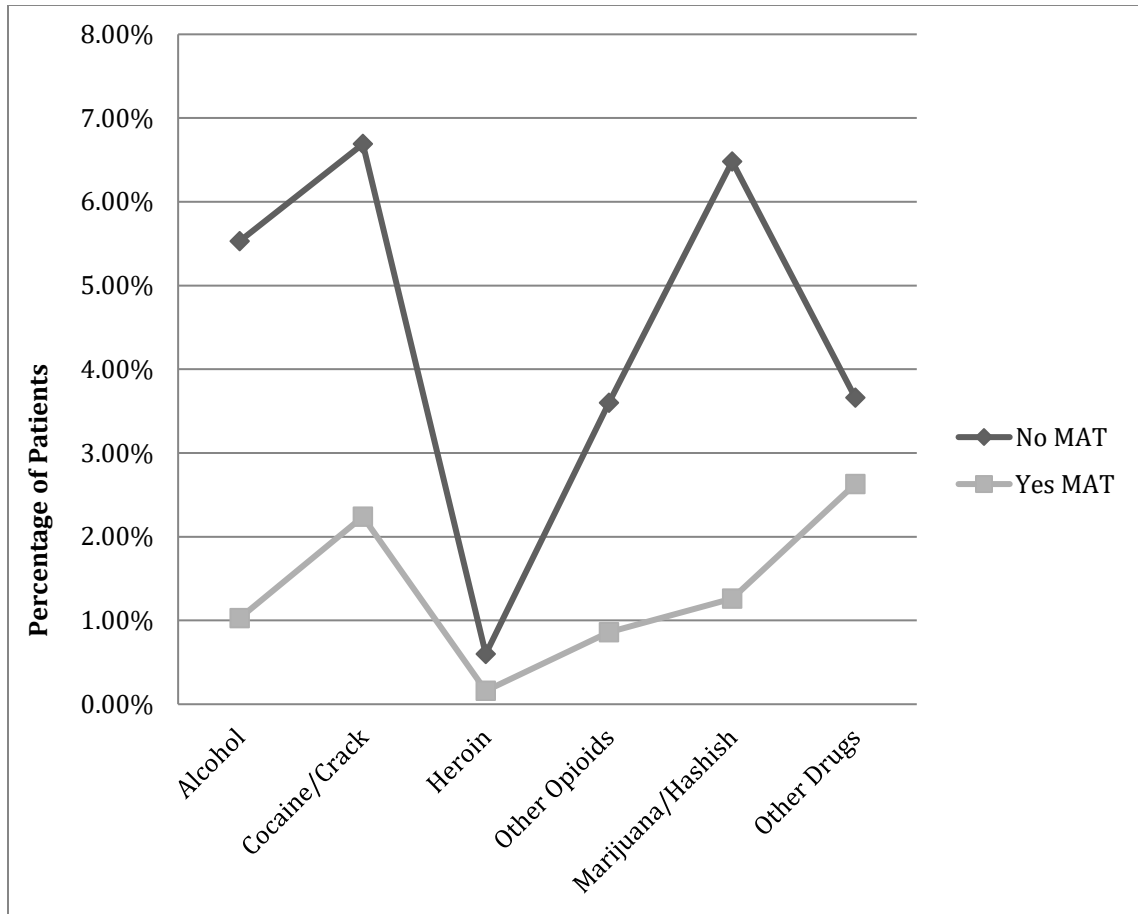


Figure 8: Secondary Substance and MAT Treatment

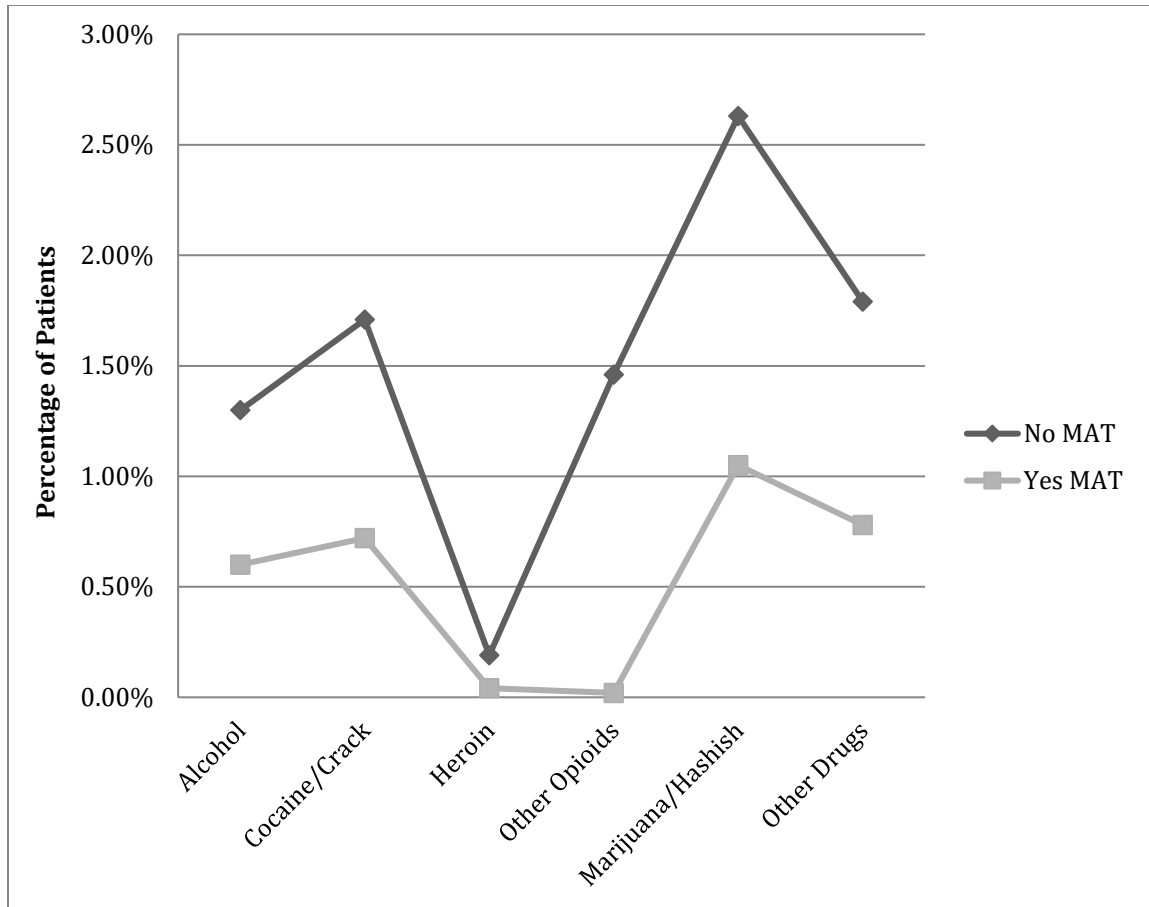


Figure 9: Tertiary Substance and MAT Treatment

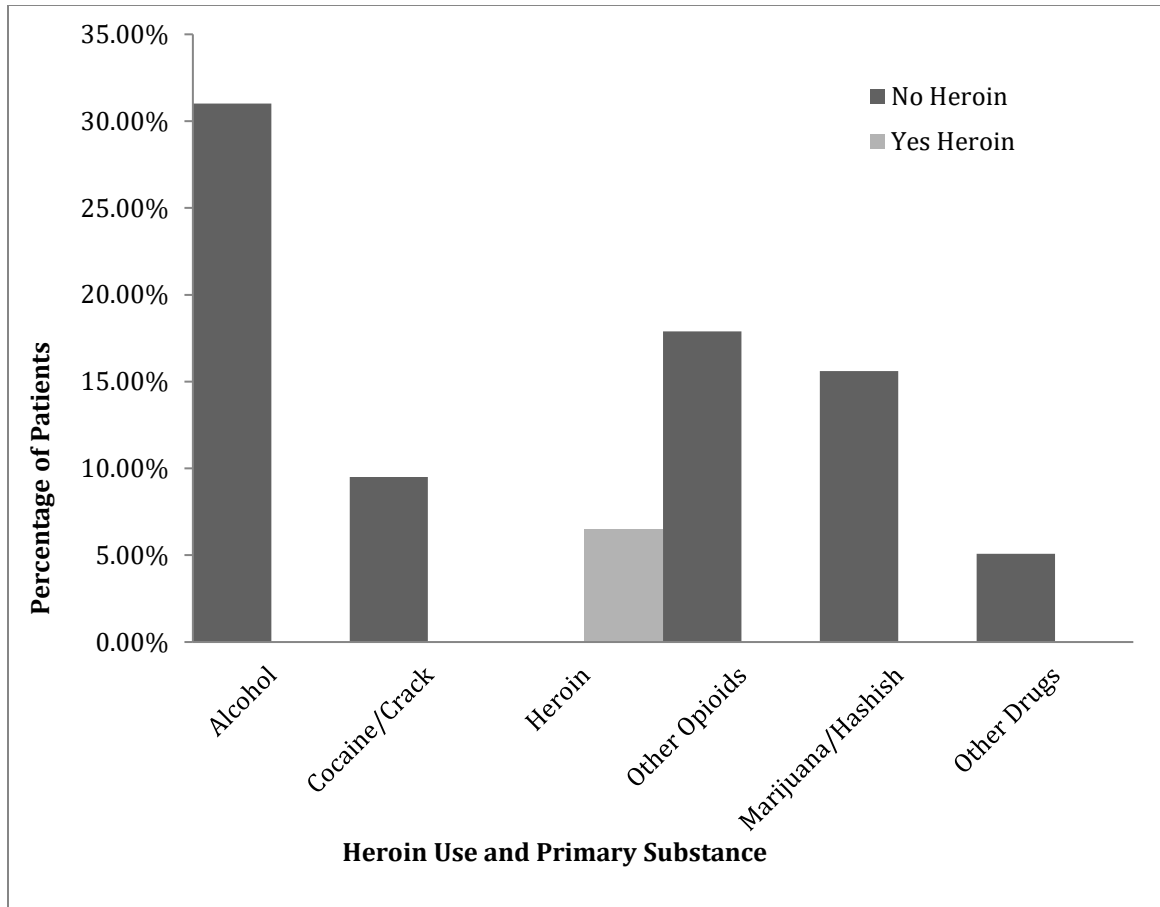


Figure 10: Heroin and Other Opioid Use by Percentage of Patients for Primary Substance

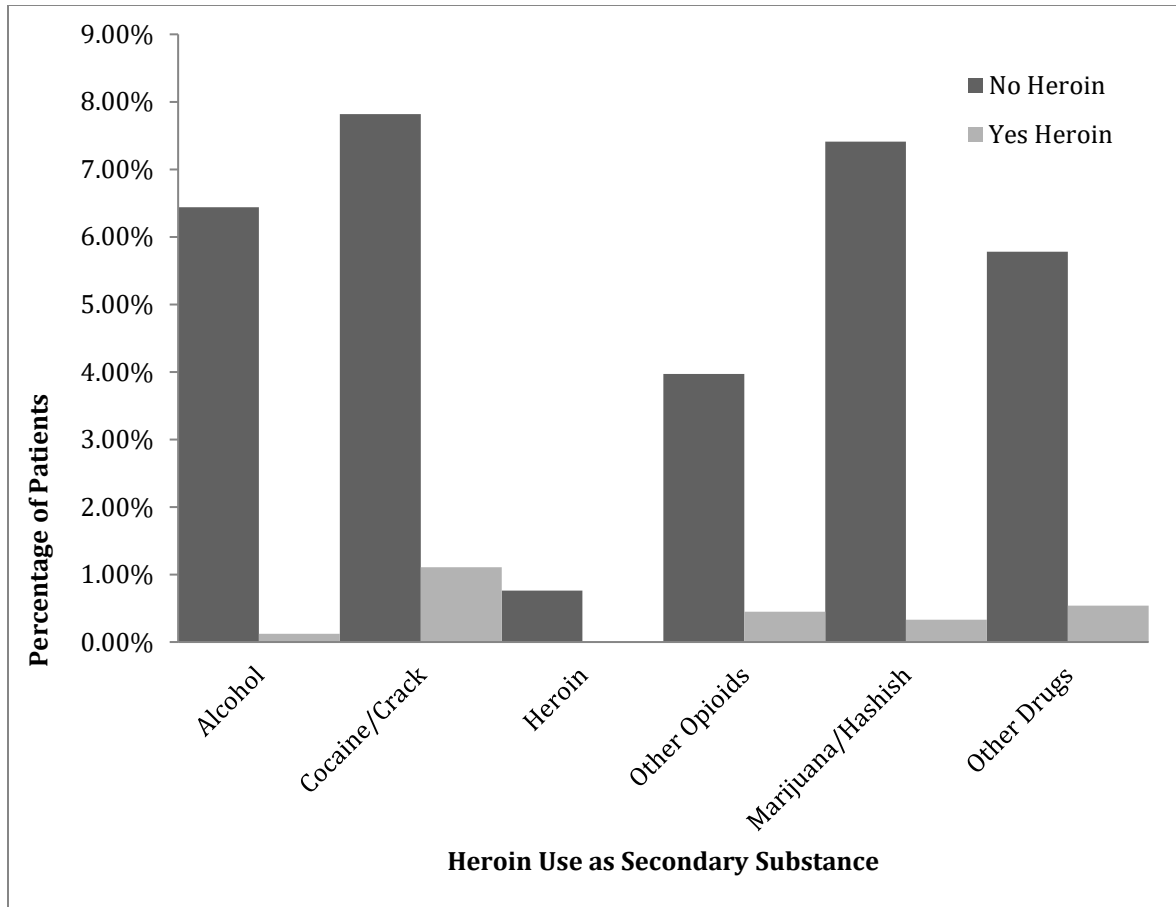


Figure 11: Heroin and Other Opioid Use by Percentage of Patients for Secondary Substance

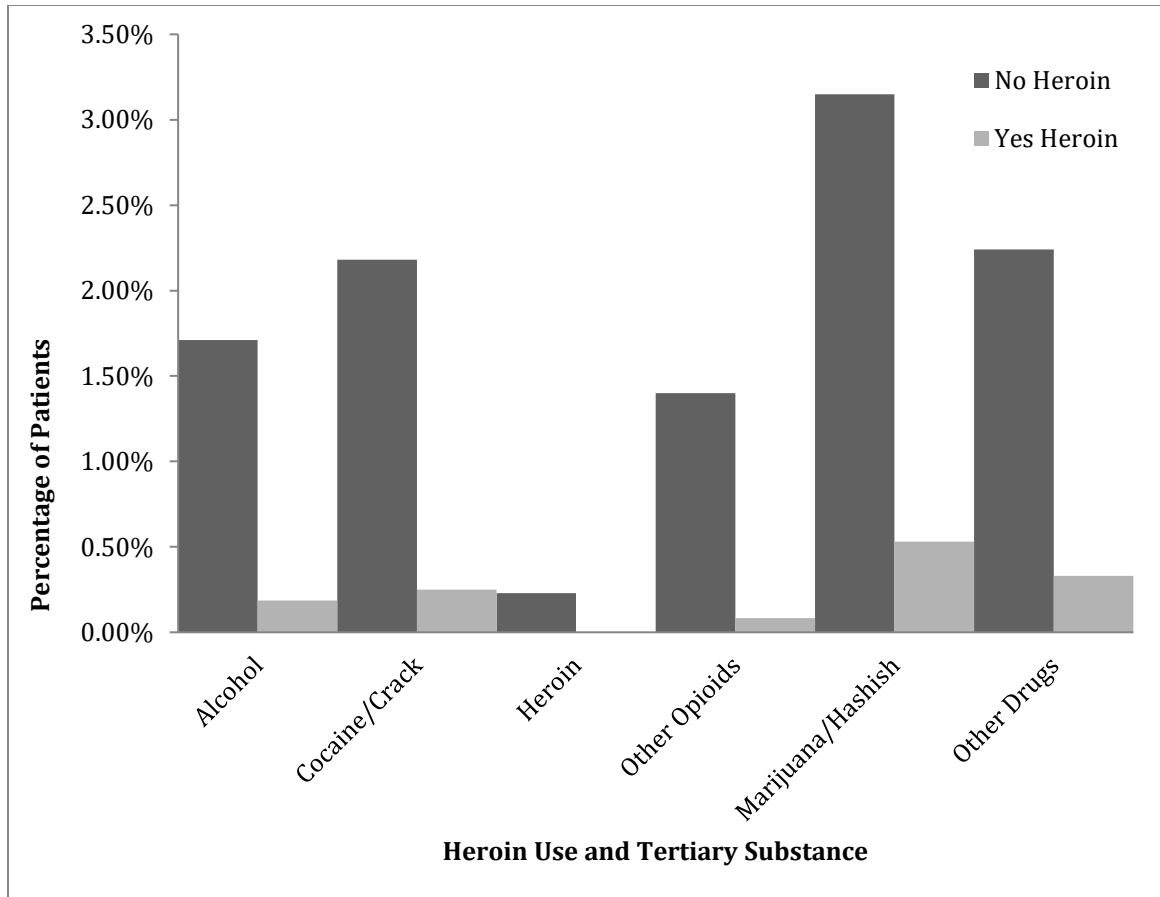


Figure 12: Heroin and Other Opioid Use by Percentage of Patients for Tertiary Substance

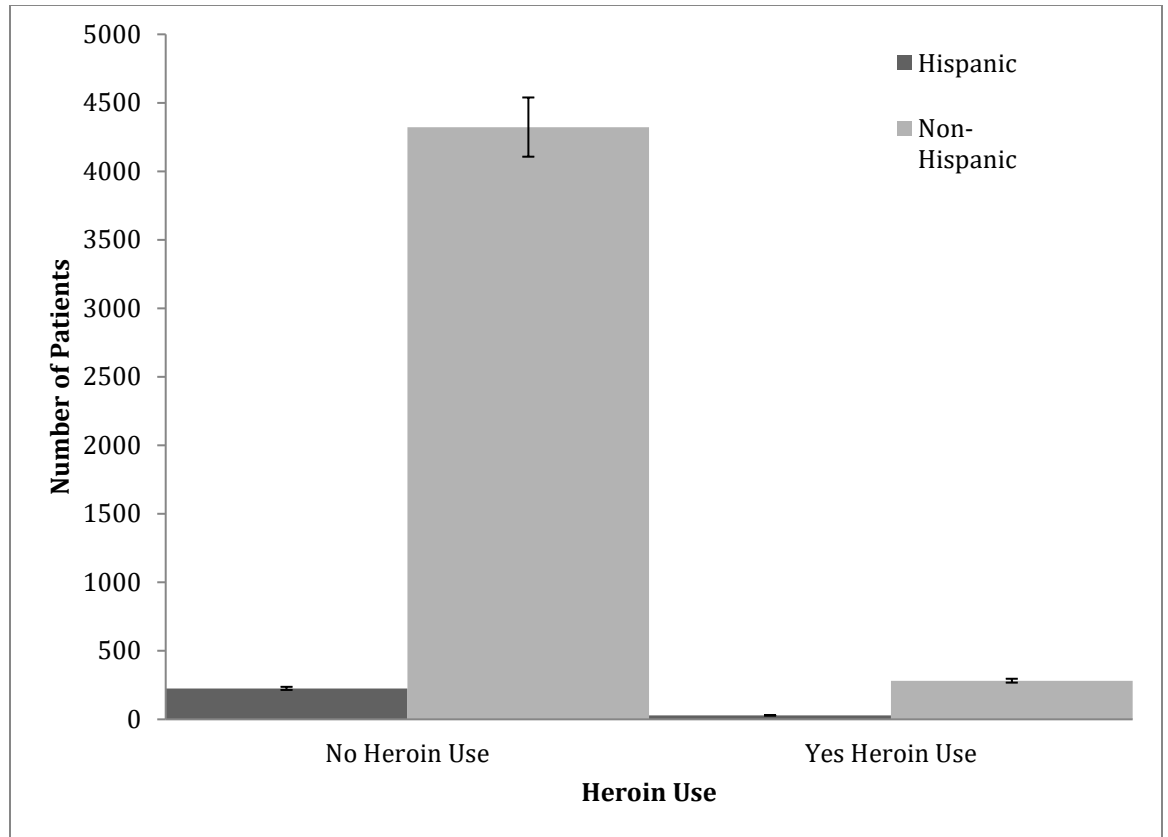


Figure 13: Heroin Use and Ethnicity

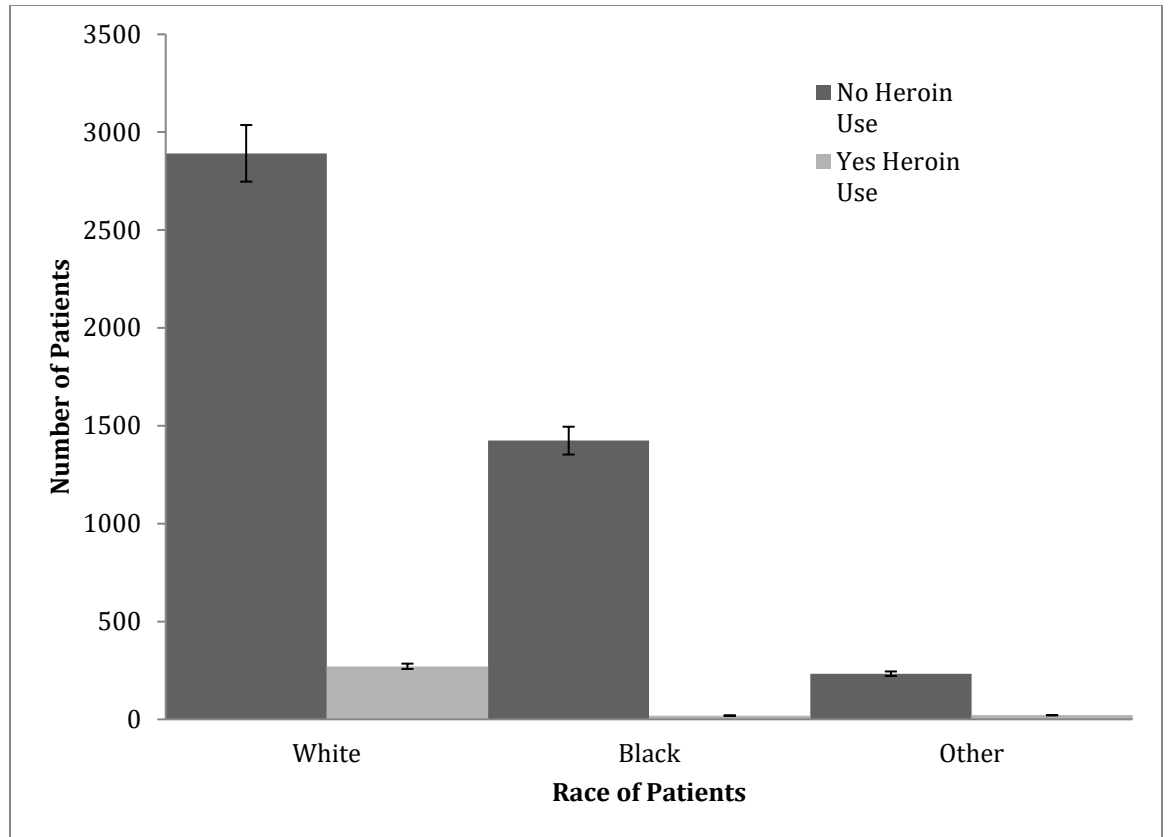


Figure 14: Heroin use and Race

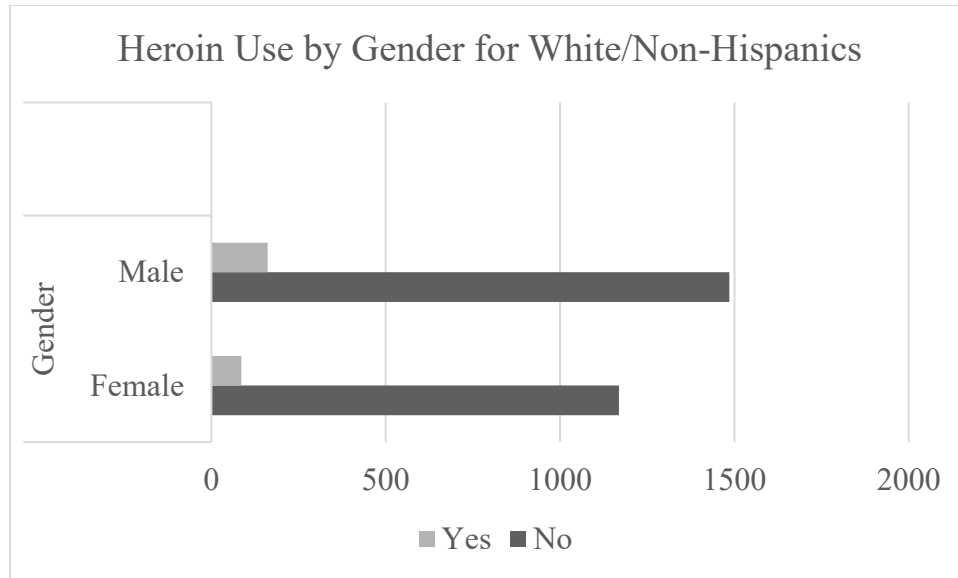
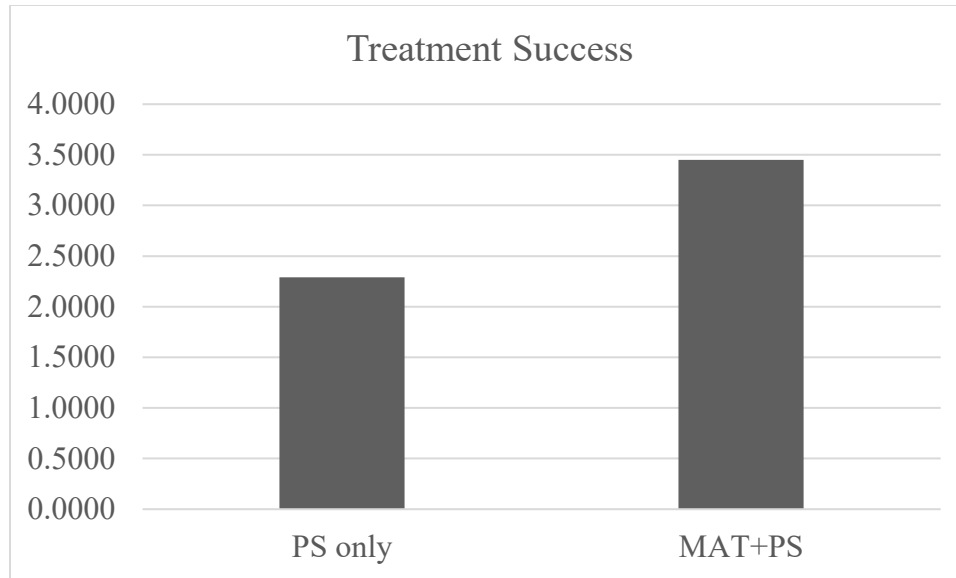


Figure 15: Heroin Use by Gender





*Figure 16: Treatment Success and Recidivism*