

DEMOGRAPHIC RISK FACTORS PREDICTING SUBSTANCE USE TREATMENT  
OUTCOMES

A thesis presented to the faculty of the Graduate School of  
Western Carolina University in partial fulfillment of the  
requirements for the degree of Master of Arts in Clinical Psychology

By

Jade Vincent Quintero

Director: Dr. Kia Asberg  
Associate Professor of Psychology  
Psychology Department

Members: Dr. Norman Hoffmann, Psychology  
Dr. Alvin Malesky, Psychology

January 2016

## ACKNOWLEDGEMENTS

I would like to thank my committee members and director for their assistance and encouragement. In particular Dr. Kia Asberg, Dr. Norman Hoffmann, Dr. Alvin Malesky, and Dr. Albert Kopak.

I offer my warmest regards and thanks to my family and friends for their continued support.

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## ABSTRACT

### DEMOGRAPHIC RISK FACTORS PREDICTING SUBSTANCE USE TREATMENT OUTCOMES

Jade Quintero, M.A.

Western Carolina University (January 2016)

Director: Dr. Kia Asberg

Substance use disorders and misuse of alcohol and drugs are significant problems in the United States. Demographic variables such as age, marital status, education, and race or ethno-cultural background may play a role in the prediction of substance use, especially problematic use or abuse. Findings throughout the literature, however, are mixed, perhaps in part because certain demographic risk factors may ‘behave’ differently depending on the outcome of interest (i.e., substance use versus relapse), and vary also as a function of norms of substance use within a certain group. Less is also known about the extent to which common predictor variables such as age and marital status are able to predict pre- and post-treatment adjustment across genders, ethnic groups, and treatment types. Finally, the relative dearth of studies examining demographic variables in relation to relapse, as well as the lack of current studies, suggests a need for a thorough investigation of the aforementioned variables as predictors of relapse in a clinical sample. Risk factors such as age, education level, marital status, and employment status have been shown to be predictors of substance use treatment outcomes in numerous studies. However, results of the present study suggest that when examining these risk factors across race, gender, and program type there is a compounding effect leading to higher relapse rates than when

examining just the risk factor regardless of age, gender, or program type. Findings may aid substance use treatment programs in their identification of clients who may do especially well in a particular treatment type, and also help prevent relapse among individuals with certain key risk demographics. Ultimately, such findings may reduce the financial and emotional cost associated with relapse following treatment.

## CHAPTER ONE: INTRODUCTION

The abuse of alcohol and illicit drugs is a significant problem in the United States (e.g., Blanco, Iza, Rodríguez-Fernández, Baca-García, Wang, & Olfson, 2015). According to the National Survey on Drug Use and Health, which was published in 2014, an estimated 24.6 million Americans aged 12 or older (i.e., 9.4% of that subgroup of the population), were current illicit drug users in the previous year. This is slightly higher than the rates in 2010 (8.9%), suggesting that the problem is ongoing. Furthermore, an estimated 60.1 million Americans aged 12 or older (22.9%) engaged in at least one episode of binge drinking in the past 30 days, and an estimated 16.5 million (6.3%) of those who reported such use were heavy drinkers. Binge drinking is defined typically as having five or more drinks at a one time in a day and heavy drinking, then, is defined as binge drinking at least 5 days in the past 30 days (National Survey on Drug Use and Health, 2014). In addition, the National Institute on Drug Abuse (NIDA) suggested that of the estimated 8.9 percent of Americans who needed treatment for substance use related problem, only 1 percent actually received treatment. This low number of people receiving treatment could be due to lack of information or knowledge that they need treatment, or choosing not to enroll due to fear of embarrassment or perception that seeking help implies weakness. For the 1 percent that does receive treatment for substance related problems, relapse rates of range from 40 to 60 percent (NIDA, 2014). Given these prevalence rates and the financial, emotional, and health related costs associated with abuse of substances there is a call for research that examines risk and protective factors for problematic use, as well as studies that can help us gain a better understanding of the variables that impact treatment outcomes for substance use disorders (SUDs).

Of particular importance to the present study are those demographic factors that may decrease or increase the risk of relapse following treatment for problematic substance use (including SUDs). Among the demographic risk factors, the person's age, marital status, employment, and education are the most common and frequently studied (e.g., Clinton-Sherrod, Barrick, & Gibbs, 2011). Specifically, younger age, single, unemployed, or those with lower levels of education are more vulnerable to engage in substance abuse and relapse after treatment (Parker, Weaver, & Calhoun, 1995; Simoni-Wastila, 2000), however findings are mixed. This may be due, in part, to the way the demographic variables are measured or the extent to which confounding variables are controlled for.

Furthermore, although correlations between demographic risk factors and specific outcomes have been studied (e.g., Zywiak, Hoffmann, & Floyd, 1999) far less research has compared these variables against one another in order to assess their relative contribution to the prediction of treatment outcomes. Along the same lines, few studies have examined the extent to which certain combinations of demographic variables result in greater predicative accuracy. Moreover, most studies have examined these demographic variables as predictors of engaging in substance use, with relatively few studies having examined these demographic variables predicting treatment outcomes such as relapse. In fact, of the handful of studies that do predict treatment outcomes based on demographic variables, very few are current. In view of this gap in recent literature, the proposed study examined specifically select demographic variables (e.g., age, marital status, employment, and education) to ascertain the extent to which a combination of these demographic indicators improves prediction of treatment outcome. Relapse rates (defined by resumption of use) was examined as an indicator of treatment outcomes. Demographic predictor variables and treatment outcomes were examined specifically during the 12 months

following primary treatment for substance dependence. Furthermore, we examined the extent to which these variables can accurately predict relapse across gender, ethnic groups, and program type. The relative weight of demographic risk factors (predictors) was also be examined across gender, ethnic groups, and program type. Findings may help in the development of a risk assessment scale to be used with the population and could yield valuable information about demographic risk factors for relapse in general, and also highlight which demographic factors are most important (i.e., overall and for specific subsamples). This, in turn, may have clinical implications for treatment providers, such as providing information and considerations for assigning a person, based on his or her demographic characteristics, to a particular treatment program. Specifically, given that most treatment programs focus primarily on the *types of substances* being used (i.e., often ignoring demographic factors) when assigning patients to a program, findings of the present could potentially yield some important information relevant to differential assignment of patients to program type. Consequently, by illuminating specific demographic risk factors (for the overall sample, by gender, ethnic group, and treatment program), substance abuse treatment programs may benefit in that they can tailor their programs to fit their demographic risk factors as opposed to the types of substances patients abuse.

## CHAPTER TWO: LITERATURE REVIEW

### **Substance Use Disorders and Treatment**

As noted, substance use disorders (SUDs) continue to be a pervasive problem in the United States and the misuse of alcohol and drugs places a multitude of emotional, health, and financial burdens on the individual, his or her families, and the society at large (e.g., Blanco, Iza, Rodríguez-Fernández, Baca-García, Wang, & Olfson, 2015). Despite the growing problem, as few as one in six individuals seek treatment in the year following a diagnosis of SUD, and those who enter treatment face an uphill battle as demonstrated by high rates of treatment drop-out, relapse, and other negative outcomes among individuals with SUD (Blanco et al., 2015). In addition to the role of specific treatments and the many clinical factors that may influence substance use and treatment response, an important line of research is examining the role of demographic factors. Previous studies have focused primarily on the role of demographic factors as predictors of substance use (e.g., Fleury et al., 2014) and treatment seeking (e.g., Blanco et al., 2015), but far fewer studies have examined the relative contribution of demographic variables in the prediction of treatment outcomes (e.g., relapse) across gender and treatment types.

### **Demographic Risk Factors for Substance Abuse**

Age, marital status, employment, and education are the most common and well know demographic risk factors or predictors for substance use and misuse. For example, Fleury and colleagues (2014) examined predictors for alcohol and drug dependence and found that sex, age, and stigmatization were significant predictors of substance dependence. Specifically they found that males, and those of younger age groups were the most at risk. In addition, Fleury, Greiner, Bamvita, Perreault, & Caron (2014) found that females with substance dependence were more

likely to suffer from social phobia and people over 50 years of age with substance dependence were more likely to have lower income and less social support. In contrast, an older study examined scores on a drinking problem scale and compared different groups (sex, age, marital status, income, and education) but found that none of these demographic variables had a correlation with the higher scores on the drinking problem scale. The author noted, however, that some groups have different “norms” with regard to drinking, i.e., drinking in social settings is more accepted, and what constitutes “problem drinking” could be relative to certain groups (Hilton, 1987). The apparent conflicting findings between the studies might be due also to the fact that the Fleury study focused on predicting a disorder while the Hilton study addressed “problems” irrespective of a substance use diagnosis (Fleury et. al., 2014).

Demographic risk factors have been studied also in relation to other outcomes in substance abusing samples, such as involvement with the criminal justice system. For example, when examining the total number of re-arrests among people with substance abuse some of these demographics are predictive of fewer re-arrests, such as being white (non-minority) and currently employed (Evans, Huang, & Hser, 2011). Evans and colleagues also found that having more re-arrests was associated with shorter treatment retention lengths. This could be due to those that are employed have more responsibility than those who are unemployed, and the time they would spend engaging in substances is now redirected towards their jobs instead. With regard to more re-arrests being associated with shorter treatment retention lengths, it is possible that re-arrests take time away from treatment and these individuals begin to drift away from seeking treatment again. Overall, demographic variables are associated with a variety of outcomes, including substance dependence, treatment completion, and re-arrests, but findings are mixed and may vary depending on the outcome variable or interest (problem drinking scale score

vs. dependence). Another possibility for these mixed findings is the duration between treatment and follow-up (i.e., the period to follow up was 30 months in Evans et al.'s study, as opposed to other studies that use 6 and 12 month follow ups).

For example, for heavy drinking there are static and dynamic predictors to take into consideration. Static predictors include alcohol dependence severity, treatment history, and marital status. As indicated, static predictors do not fluctuate. In contrast, dynamic predictors may vary greatly from day to day. Such dynamic predictors include negative affect, craving, and stress. A study examined these predictors and found that high levels of dynamic risk (e.g., higher levels of craving or stress) was significantly associated with greater increases in heavy drinking over time (Witkiewitz, 2011). The relationship between dynamic risk and heavy drinking is complex, however, as findings indicated also that frequent heavy drinking and higher static risk were predictors for higher dynamic risk. Taken together, findings suggest that the effects of dynamic and static risk factors are significant in predicting heavy drinking, but the magnitude of the effects is small (Witkiewitz, 2011). Another problem with these studies is that "heavy drinking" may be defined differently depending on the sample. As with other outcomes, the definition of the outcome and/or group categorization is critical to predictive indicators. There is a lack of rigor in the scientific integrity of many study designs as well as lack of consistency in how terms are used and measured

Research has been conducted not only on demographic risk factor or predictors for substance abuse and dependence, but also for treatment program retention rates and support group attendance (e.g., Alcoholics Anonymous; Wickizer et al., 1994; Zywiak, Hoffmann, & Floyd, 1999). For example, Zywiak and colleagues (1999) examined participants' attendance at Alcoholics Anonymous (AA) meetings as a function of demographic risk factors, and found that

individuals who were less than 25 years old, had less education (i.e., no high school diploma or GED; no four year college degree), were unemployed (not by choice), and unmarried/never married were less likely to attend AA meetings. Being part of a minority group may lead to poorer treatment outcomes and thus be seen as a risk factor. This could be due to a patient in a minority group not being able to relate or feel as though they cannot benefit from treatment compared to the majority of the group since they recognize differences between themselves and the group. An example of this would be an African American patient under 25 years of age dropping out of treatment because he does not believe he will benefit from it the same way as a White male over 25 years of age since he sees that is majority of the treatment group.

In addition, demographic variables may be useful in predicting time spent in treatment. Consistent with the findings of Zywiak et al., (1999), Wickizer et al. (1994) compared completion rates from inpatient and outpatient treatment groups and found that clients who were older, had more education, and a longer history of substance abuse, were more likely to complete treatment for either type of program. Findings suggested also that Whites were more likely to complete outpatient treatment than any other ethnic group, but they were less likely to complete inpatient drug treatment. Moreover, Native Americans were less likely to complete inpatient treatment for alcohol than clients of any other ethnic group, and Blacks were less likely to complete outpatient drug treatment. Finally, inpatient groups had a higher completion rate than outpatient (Wickizer et al., 1994). Although no casual inferences can be made, it is possible that these findings are due to Whites being the majority group in treatment and relating to most of the teachings and lessons that take place in treatment, and inpatient programs may have a higher completion rate than outpatient programs due to stricter rules and guidelines and, possibly, a stronger support system involved.

Other studies that have examined demographic variables in the context of treatment retention have found similar outcomes. For example, Tate et al. (2011) examined treatment retention rates for two different outpatient treatment groups: Integrated Cognitive Behavioral Therapy (ICBT) and Twelve-Step Facilitation Therapy (TSF). Although the treatment groups did not significantly differ in dropout rates, there was a significant difference between Minorities and Caucasians when it came to dropping out (i.e., attending less than eight sessions). Specifically, Minorities had a dropout rate of 33.8% and Caucasians had a dropout rate of 24.2%. This lowered attendance among minorities could be due to the minority group seeing the treatment and experiences as irrelevant or less applicable relative to their Caucasian counterpart. Another reason could be that clients in the minority group may not feel open to sharing personal details due to fear of being judged by their peers (Tate et al., 2011), which may increase drop-out rates.

Moreover, Vayalapalli (2013) examined a variety of predictors for substance abuse treatment completion among veterans, including patient demographics, housing status, employment, reason for hospitalization, toxicology screens, comorbid psychiatric and medical conditions, and physician visits. Of all the variables studied, findings suggested that housing status (homelessness) was the only predictor of starting, but not completing, the substance abuse treatment programs. Similarly, Kirst, Zerger, Misir, Hwang, and Stergiopoulos (2015) found that establishing housing for homeless individuals decreased alcohol use over time (i.e., while in treatment) compared to homeless individuals who simply received treatment as usual (without housing). Overall, stable housing status may benefit treatment outcomes for veterans (Vayalapalli, 2013) and homeless individuals (Kirst et al., 2015).

Predictors of treatment completion have been studied also among parole violators (Zanis, Coviello, Lloyd, & Nazar, 2009). Specifically, subjects in Zanis et al's study (97.6% male and

2.4% female, and a mean age of 36.9 years) participated in a 12-month treatment program instead of reincarceration. The 12-month program consisted of 3 months of residential substance abuse treatment followed by 9 months of outpatient counseling. This treatment program had a completion rate of 32.4% with a positive drug screen accounting for most failures to complete the program. Possible predictors examined were age, past 30-day heroin use, total months incarcerated, and problems with mother, with other demographic risk factors considered including race, marital status, and education to be possible predictors for treatment completion. Only two variables were significant predictors for treatment completion, older age and no heroin use in the past 30 days. This shows that for parole violators, people who are younger and/or have recent heroin use would be less likely to complete substance abuse treatment programs (Zanis et al., 2009). The role of age as a predictor variable among individuals in substance use treatment will be discussed next.

### **Age as a Demographic Predictor Variable**

#### **Age and Substance Use**

Throughout the literature, early onset of substance use is associated with economic, social, and parenting issues. For example, Hayatbakhsh and colleagues (2008) examined potential predictors for substance use during early childhood, specifically those associated with early onset of nicotine, alcohol and/or cannabis use. The main findings were that participants, who's data was collected from these children at birth and from follow-ups at 3-5 days, 6 months, 5 years, 14 years, and 21 years after birth, reported earlier ages of onset of substances are more likely to have come from a low SES background or had changes in their mother's marital status, maternal smoking and alcohol use when they were 5 years old, and child aggressive behavior at age 5 years. Poor supervision from the mother at 5 years also was associated with an increase in

likelihood of alcohol disorder in this study (Hayatbakhsh et al., 2008). The mechanism by which these childhood variables result in an increase in the likelihood of substance use remains less well understood.

Substance use at an early age influences directly or indirectly the use of harder drugs and substance abuse. A cross-sectional study by Bergen and Lape (2013) examined the relationship between age of first use and continued problematic use as emerging adults found that the lower the age of first use, the more likely to engage in problematic substance use for both alcohol and marijuana. Research has found that for adolescents, age of first use for alcohol is the most powerful predictor for substance use disorder. Alcohol and drug use are also risk factors for developing depression in adolescents. First use of alcohol beginning in middle adolescence increases the chance problematic alcohol use of emerging adults over twice than if they began alcohol use after age 16. Those who engaged in alcohol use before age 16 were three times as likely to be heavy drinkers than those who began alcohol use after 16. Age of first alcohol use also predicted emerging adults' marijuana use; if age of first alcohol use was before 16 they are twice as likely to have engaged marijuana in the past month (Bergen & Lape, 2013).

### **Age and Treatment Outcomes**

When examining age as a demographic predictor variable for treatment outcome a number of older studies have found evidence supporting that age can be seen as a predictor of treatment outcome, with older patients having better treatment outcomes (Agosti, Nunes, & Ocepeck-Welikson, 1996; Alterman et al., 1997; Gainey, Wells, Hawkins, & Catalano, 1993; Gutierrez, Russo, & Urbanski, 1994; Manu, Burlison, & Kranzler, 1994; Powell et al., 1998). The studies by Agosti et al. (1996), Alterman et al. (1997), and Gainey et al. (1993) all examined patients with cocaine abuse. Agosti et al. found that younger patients were less likely to complete

treatment and Alterman et al. had similar findings with older patients being more likely to complete treatment. The findings from Gainey et al.'s experiment contradicting Alterman et al.'s results stating that older patients were less likely to complete treatment.

As with many studies lack of consistent definition of terms is a potential problem in interpretation of findings. For example, what constitutes "older" or "younger" is subject to variation from study to study. Studies by Gutierrez et al. (1994), Manu et al. (1994), and Powell et al. (1998) examined patients with substance abuse unlike the previous studies mention that just examined patients with cocaine use. The results from Gutierrez et al.'s study found no relationship between age and treatment completion but Manu et al. found that patients under 30 were more likely to drop out from treatment before completion and Powell et al. had similar findings with older clients having better treatment outcomes. Most of the research on age as a demographic predictor of treatment outcomes is outdated, thus a current update on the role of age is warranted, but the research suggests that younger patients are likely to not complete treatment and/or relapse due to maturity and sense of responsibility being at lower levels than older patients, and not being able to relate to older patients in treatment programs.

### **Marital Status as a Demographic Predictor Variable**

#### **Marital Status and Substance Use**

Marital status has been studied at in a number of studies to see if there is a risk factor related to marital status (single, married, or divorced) and substance abuse. Marital status was found to be significant predictors for African Americans. Males age 18 to 34 years, who are divorced or separated had higher alcohol use. Although marital status is a significant predictor for alcohol use among African Americans, marital status is also a predictor of drug use across all ethnic groups (Parker, Weaver, & Calhoun, 1995), such that those who are married being more

likely to complete treatment and less likely to relapse. A separate study by Cranford, Floyd, Schulenberg and Zucker (2011) came to similar conclusions finding that people arrested for intoxication were less likely to be married and had higher rates of marital separation. A correlation has been found between marital issues and alcohol use disorders, so there could be an association with substance abuse and marital satisfaction (Cranford, Floyd, Schulenberg, & Zucker, 2011). Overall marital status appears to be related to substance use and potential development of substance related disorders, but the quality of the relationship may be important to consider. Another thing to consider is that if there is that association does not equal causation with regard to substance use being why people are divorced or separated, as well as the possible direction of causation may be different with use causing divorce, separation, or never being married. Overall, findings regarding the link between marital status and use are inconclusive or difficult to interpret, but the association warrants further study.

### **Marital Status and Treatment Outcomes**

For treatment programs, marital status appears to be a predictor for treatment completion. Clients who are divorced from their spouses are more likely to drop out of treatment. Dropouts also had poorer social composite scores on a questionnaire made by Sayre (2002) used to assess sociodemographic information, than people who completed treatment. This shows that people in pro-social settings do better in treatment due to their ability to form functional relationships and stay with the treatment program through to completion. These pro-social settings like stable relationships, employment, and organizational involvement give people a more supportive environment to help those with substance abuse (Sayre et al., 2002). Marital status also predicted the initial level of heavy drinking, with those who are not married having higher levels, and after treatment the change in heavy drinking with those who are married showing greater reduction

(Witkiewitz, 2011). These findings are consistent with older studies' findings of the relationship of being married with better treatment outcomes (Atkinson, Tolson, & Turner 1993; Schuckit, Tipp, Smith & Bucholz, 1997), and the relationship of patients who are divorced being less likely to complete treatment (Gutierrez et al., 1994). One study did find with patients who are married and in treatment for cocaine are less likely to complete treatment (Roberts & Nishimoto, 1996), although most research both old and recent have shown that people who are married are more likely to complete treatment and have better outcomes. The contrary findings by Roberts and Nishimoto could be due their study examining cocaine use alone without any other substances, or it could be due to the fact that their data were collected at the end of treatment and did not include any post-treatment follow-up data.

#### **Employment, Income, and Education as Demographic Predictor Variables**

In the substance use literature, socioeconomic status (SES), which can include variables such as employment status, income and education, are often considered as predictors of alcohol consumption and other types of substance use (e.g., Karriker-Jaffe, 2013). For example, employment status has been found to be a significant demographic risk factor of drug use, with unemployed individuals being more likely to engage in use (Parker et al., 1995; prescription drugs; Simoni-Wastila, 2000). This could be due to employed people being healthier than unemployed people, and those who reported poor health are more likely to get/use prescription drugs which could lead to possible abuse. Another increase in the probability of drug use is having financial access in the form of health insurance (Simoni-Wastila, 2000). As with marital status, the potential causal direction could be the other way, with use resulting in unemployment.

For alcohol, lower income has been associated with an increase in alcohol consumption. More specifically, African American men who have an annual family income less than \$15,000

were significantly more likely to have high levels of alcohol use than African American women and European Americans with similar incomes. The highest rates for heavy drinking among African American men with low income is in the \$10,001 to \$15,000 range (Zapolski, Pedersen, McCarthy, & Smith, 2014). This could be a result of being a double minority with regard to race and SES. Being African American and having a lower income are both risk factors for substance abuse alone, but when combined it could lead to a significantly higher risk factor than just having one of these risk factors.

### **Employment and Treatment Outcomes**

A few studies have examined employment status as a predictor for treatment outcomes among substance using population, but results are mixed. Consistent with other socioeconomic factors, some studies suggest that individuals who are unemployed experience poorer treatment outcomes relative to those who are employed (Brewer, Catalano, Haggerty, Gainey, & Fleming, 1998; McLellan et al., 1994). In contrast, Booth, Dale, Slade, and Dewey (1992) found no relationship between employment status and treatment outcomes. This could be due to Booth and colleagues examining just alcohol use where Brewer et al. examined drug use and McLellan et al. examined alcohol and drug use. Another reason could be due to sample size with Booth et al. having 100 participants, Brewer et al.'s study had 649 participants and McLellan et al.'s consisted of 69 different studies. This relatively small sample of Booth et al.'s study combined with just using patients with alcohol use could make their study less generalizable and/or subject to sampling influences.

### **Education and Substance Use**

A higher level of education appears to be related to greater alcohol and drug use. In a study by Parker et al. (1995) the results were that Black, Hispanic, and White participants who

work full-time, have higher income, and have the highest level of education engage in higher levels of alcohol consumption than those who are unemployed, lower incomes, and less education. In fact, higher education levels are associated with higher levels of alcohol use regardless of ethnicity or gender (Parker et al., 1995). This could be due to having access to resources to acquire alcohol (i.e., money and personal transportation). A study by McCrystal and Percy (2011) came to a similar conclusion. In their study they examined a young population enrolled in college, looking at educational performance as risk factors for substance abuse. Their level of academic achievement was measured by their performance on General Certificate of Second Education (GCSE) exams before entering college. In the sample, those who scored higher on GCSE exams were also associated with more drug use behaviors, which suggests that educational achievement is a key predictor for substance use and there were no patterns across genders for similar academic achievement levels. This shows that academic achievement is a predictor for substance abuse in this college population with higher levels of academic achievement becoming more likely to engage in drug use behaviors, which could lead to substance abuse, than those with lower academic achievement levels (McCrystal & Percy, 2011). This contradicts other findings from other risk factors (i.e. income and employment). One would believe that higher education levels would lead to higher income and greater likelihood of employment, which would in turn lead to a decrease in likelihood of engaging in substance use and misuse. This could suggest that education is not consistently associated with income and employment, or that the association between education/income and substance use is moderated by some other variable. Given the mixed findings, education and income cannot be ruled out as potential predictors of outcomes among individuals with substance use problems, but these variables may need to be examined in the context of other factors.

## **Education and Treatment Outcomes**

Although higher education has been associated with greater use, it is associated also with a greater likelihood of treatment completion for those with a substance use disorder. A study by Sayre, Schmitz, Stotts, Averill, Rhoades, & Grabowski (2002) compared clients who completed an outpatient substance abuse program to those who dropped out of the same program. It found that those who completed the program had more years of education than those who dropped out. This could be due to the people who dropped out and had fewer years of education had more difficulty completing assignments, not having the ability to fully express themselves in therapy, or having feelings of inferiority than the more educated people who completed the program. Based on this study it can be seen that education status is a predictor of completion but this study also showed among dropouts that those with more years of education stayed in treatment longer before dropping out than those with fewer years (Sayre et al., 2002). This is supported by older research showing that less educated patients are less likely to complete treatment (Agosti et al., 1996; Manu et al., 1994), and that better education levels in women is associated with lower relapse rates (Schnider, Kviz, Isola, & Filstead, 1995), but also contradicts older research showing that education level does not have an effect on treatment outcomes (Gutierrez et al., 1994; Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997; McKay, Maisto, & O'Farrell, 1993).

Overall, those with lower education levels appear to have a lower likelihood of completing treatment as well as a higher rate of relapse compared to their more highly educated peers. This could be a result of those with higher education levels having a better comprehension of the material and information given to them in treatment, and more likely to stick with the

program through to completion. With completed treatment, their likelihood of relapse should be lowered compared to those who do not even complete treatment.

## **Gender Differences**

### **Gender Differences in Substance Use**

Several studies have found that there are gender differences when it comes to the need for behavioral health services. Females are more likely to have mental disorders only, and males are more likely to have substance dependence. Females with substance dependence are more likely to have comorbid with anxiety and mood disorders, and males are more likely to have substance dependence comorbid with antisocial disorders (Fleury et al., 2014). A study by Gottfredson and Koper (1997) explored drug use and its risk factors across race and gender groups. This study compared black males, black females, white males, and white females. Black females reported lower levels of drug use, but little differences were found between genders in general (Gottfredson & Koper, 1997).

Among incarcerated populations – which is an important area for the study of substance use and treatment – some clear patterns have emerged. Specifically, over the years a growing number of studies report that there are gender differences in the incarcerated population with their characteristics and treatment needs (Proctor, 2012). One of the common findings to these differences is that females have a higher prevalence of emotional, physical, and sexual trauma than males which may contribute to substance use and involvement with the criminal justice system (Seal, Cohen, Waldrop, Cohen, Maguen, & Ren, 2011). For females, substance abuse has, in fact, been found to be a contributing factor for being incarcerated in the United States (Harris & Bove, 2008). Furthermore, incarcerated women have been identified as using harder drugs and using drugs more frequently than men, also using drugs for more reasons than men

(Lanza & Menéndez, 2013). Younger incarcerated women are more likely to leave treatment programs early as well. With some of these differences found in this study of just women, due to their higher levels of sexual and interpersonal problems, treatment programs can be geared for interventions that address those problems more than some treatment programs males may be enrolled in (Adams et al., 2011). It is important to note that female veterans may be more likely to initiate and engage in treatment programs relative to their male counterparts and may be more likely to benefit from treatment (Harris & Bowe, 2008). Gender differences in treatment outcomes will be discussed next.

### **Gender and Treatment Outcomes**

Gender comparisons can also be explored for outcomes of substance abuse treatment programs. One study looked at these gender differences at enrollment into a treatment program and at a 1-year follow-up. At enrollment, both males and females reported starting drug use around the same age range, but males reported greater drug use and greater criminal involvement at enrollment. At the 1-year follow-up there were no significant difference across genders in drug and alcohol use. For both males and females longer treatment retention was associated with drug abstinence at their follow-ups (Hser, Huang, Teruya, & Anglin, 2003). Although gender may play a role in predicting an individual's risk for substance abuse, there does not appear to be a clear significant difference between groups when men and women are enrolled and remain in the same treatment programs; both males and females show similar rates of reductions for drug use and criminal activity (Messina, Wish, & Nemes, 2000).

### **Racial and Ethnic Minority Status**

#### **Race, Ethnicity, and Substance Use**

The role of minority status has received ample attention in the study of substance use and misuse. Substance use is relatively high in the population of youths of color (Jackson & LeCroy, 2009). In fact, multiracial adolescents are at a higher risk to use substances relative to white adolescents. For example, Jackson and LeCroy (2009) examined how risky health behaviors among early adolescents are influenced by ethnicity, such that youths of color engage more frequently in use of alcohol, tobacco, and other drugs. Jackson and LeCroy (2009) noted also that peer factors have an important influence on problem behaviors in adolescents, but argued also that peer factors are critical across racial groups. Overall, findings about peer factors support the social development model for problem behavior, in that peers, family, and school factors can predict substance use (Jackson & LeCroy, 2009).

Furthermore, racial and ethnic status may interact with length of substance use in predicting treatment outcomes. Specifically, adolescents who are African American with longer use histories show a lower probability of successful treatment relative to their Latino adolescent counterparts (Rivaux, Springer, Bohman, Wagner, & Gil, 2006). Another contrast between African American adolescents and Latino adolescents is that African Americans demonstrate a strong positive relationship between substance use history and maximum offense weight (total offenses, most severe offenses, and severity of offenses), but the same association is not found for Latinos. In addition, findings indicate an association between family problems and recidivism among Latino youth, while psychological problems was associated with recidivism for African American adolescents. These findings can be used when forming treatment plans for minorities; for Latinos programs should perhaps be more concerned with family history than substance use history, and for African Americans there may need to be an emphasis on substance use history and psychological problems (Rivaux et. al., 2006). It is important to point out, however, that

individual substance use history, family history, and co-occurring psychological problems likely contribute to recidivism among all types of adolescent substance users, but specific ethnic and racial factors may be taken into consideration when determining the relative risk.

In addition, studies have examined gender differences within different ethnic groups. For example, Gottfredson & Koper (1997) examined black males, black females, white males, and white females for drug use risk and found that black females reported low levels of drug use, and overall Whites reported higher levels than Blacks. This finding could be due to sampling distribution not being equal across race and gender (White males N= 336, White females N= 356, Black males N= 574, and Black females N= 752) (Gottfredson & Koper, 1997), but may also be reflective of differences that do exist between males and females of different racial groups.

### **Minority Status and Treatment Outcomes**

Consistent with the literature on use, minority status has been found also to impact treatment outcomes. Specifically, when examining the effect of race on treatment outcomes some older studies have found that *not* being a minority increases the likelihood of having better treatment outcomes (Schuckit et al., 1997). More recently, Guerrero and colleagues (2013) found that African Americans and Latinos experienced lower odds of completing treatment relative to Caucasian participants, but within group differences suggested the importance of accounting for days of drug use before admission, and homelessness. Similarly for patients with cocaine use a study by Agosti et al. (1996) found that African Americans and Hispanics were less likely to complete treatment than Caucasians. Recent research has examined the effect of race on treatment outcomes for disorders like PTSD and eating disorders, but not much research has been conducted for substance use treatment programs.

Compared to research on other minority groups, Asian and Asian American populations have received significantly less attention in the substance use literature. Asians represent a small minority that differs significantly from other ethnic groups on variables such as income, primary language, treatment setting, and substance abuse. For example, using treatment and discharge data, Asian clients had the lowest rate of second admission compared to all other groups (i.e., White, Black, and Hispanic), but after a second admission the rate of readmission for the Asian group were closer to the other ethnic groups with each subsequent admission (Yu & Warner, 2013).

Overall, the general consensus of these studies is that ethnic and racial minorities, with the exception of Asians, are less likely to complete treatment or more likely to relapse than Whites. This could be due to their minority status affecting their treatment experience, which could yield poor results if they even complete their program. Feelings of inferiority or not being able to relate to the teachings or assignments of their programs could be factors affecting their treatment experience, which could support these findings.

### **Summary and Present Study**

Given the high rates of relapse among individuals with substance use disorders, research aimed at identifying risk factors among those who complete treatment is paramount. Demographic characteristics of substance users present one area of interest and importance to treatment providers, and a better understanding of variables that pose a risk for relapse post-treatment may help improve on existing assessment tools. Based on the literature reviewed above, and the nature of the data set, the demographic variables chosen for this study were age, employment, education, and marital status. Individually, these variables have been studied extensively in the literature, but little research has examined these variable together (relative

significance) as predictors of substance use treatment outcomes. Furthermore, few studies have examined the relative importance of these demographic variables across ethnicity, gender, and program type. Finally, although some variables have been associated consistently with poorer treatment outcomes (i.e., being younger, never married, and being unemployed), findings regarding other predictors (i.e., education) are mixed and warrant further examination in a large, diverse, clinical sample. Thus, through the examination of these demographic characteristics among substance users, the present study addresses a gap in the literature and could potentially generate important information for the assessment and treatment of substance use disorders.

## CHAPTER THREE: METHODS

This study uses data from the fourth version of the Comprehensive Addiction Treatment Outcome Registry (CATOR) system. The CATOR system was the largest independent evaluation service and compiled a thorough and comprehensive assessment of substance abuse treatment programs in the United States (Proctor & Herschman, 2014). The CATOR system evaluates different forms of treatment programs for their success rates in substance use abstinence and also collects demographic and clinical information that could correlate with recovery. The CATOR system began data collection in 1980 and the fourth version of the CATOR ended collection in 1995. This study focused primarily on demographic information, which was examined to determine indicators of treatment success. For this study treatment success was defined as abstinence at the 6 and 12-month follow-ups.

For this study, a total of 12,893 adult participants taken from a larger sample of 13,948 were used from the CATOR system. Participants were excluded if they were missing any data, were over 65 years of age, and/or did not have a substance dependence diagnosis. Participants in the CATOR system were treated in residential and outpatient programs located all over the United States. The CATOR system collected information on participants at admission to a substance use treatment program and post-treatment follow-up assessments at 6-months and 12-months. For this study, participants' information at admission and their 6-month and 12-month outcomes were analyzed to assess correlations between demographic risk factors, treatment completion, and one-year abstinence rates. Rationale for using abstinence is due to it being the clearest way to indicate treatment success. This is due to sustained remission being defined by the DSM-5 as a person having no positive outcomes other than craving in a 12-month period.

The demographic correlates of outcomes that were examined included age, employment status, education, and marital status. These outcome variables were coded with being under 25 years of age, being unemployed, having lower education (not graduating from high school or achieving a GED), and never being married as “1’s” and being over 25 years of age, employed, having at least a GED, and having been married as “0’s”. When compared across race, gender and program type these variables were coded with being nonwhite, female, and outpatient as “1’s” and being white, male, and inpatient as “0’s”. This expands on previous research of Zywiak, Hoffmann, and Floyd (1999) that used similar demographic indicators that may be predictors of AA meeting attendance. That study was limited because only outpatients were studied and it did not look at generalizability of the scale across treatment types, ethnicity, and gender. However, the current study is compatible with the findings of Fleury and colleagues (2014) who examined demographic predictors for alcohol and drug dependence finding age and gender being significant predictors alcohol and drug dependence.

### **Statistical Plan**

Archival data from the fourth version of the Comprehensive Addiction Treatment Outcome Registry (CATOR IV) was used and data collection ended in 1995. While the data may be seen as dated it still provides valuable and copious knowledge that is extremely comprehensive of its participants. Stata 11 statistical software was used to code and analyze the data. All personal identifiers were stripped from the data. Collection and use of the data was approved by the IRB through the Education Research foundation and Ramsey Clinic Associates.

For the present study, demographic risk factors were examined via multivariate logistic regression to assess the relative significance of the individual predictor variables and their combined predictive ability. Analyses were conducted to determine the predictive strength of the

demographic predictors with regard to how they influence abstinence after treatment, and were compared across gender, ethnic groups and program type through chi-square analysis. Logistic regression was conducted due to having a binary outcome (i.e. relapse/abstinence). By conducting a logistic regression the potential spurious relationships can be controlled. To determine if there was a significant relationship between treatment outcomes and risk factors chi-square analyses were conducted. These chi-squares were then compared across race, gender, and program type to examine any differences in relapse rates.

## CHAPTER FOUR: RESULTS

When examining demographic predictors of substance use treatment outcomes, the data revealed that being under 25 years of age, unemployed, lower education (not receiving a high school diploma or GED), and never being married were risk factors associated with higher relapse rates. When these risk factors were examined across gender, race, and program type the chi-square analysis resulted in all subgroups reaching significance with the exception of education and being nonwhite (Tables 1, 2, & 3).

Table 1: Descriptive and Bivariate Statistics for Gender

Variable	No relapse %(n)	Relapse %(n)
<b>Male</b>		
Age**		
Un25	42%(507)	58%(708)
Ov25	61%(4,786)	39%(3,122)
Education**		
Less than HS	52%(400)	48%(371)
HS or more	59%(4,893)	41%(3,459)
Employment**		
Unemployed	50%(852)	50%(844)
Employed	60%(4,441)	40%(2,986)
Marital Status**		
Never Married	49%(1,305)	51%(3,830)
Other	62%(3,988)	38%(2,449)
<b>Female</b>		
Age**		
Un25	48%(236)	52%(257)
Ov25	61%(1,983)	39%(1,294)
Education**		
Less than HS	48%(138)	52%(150)
HS or more	60%(2,081)	40%(1,401)
Employment**		
Unemployed	56%(905)	44%(708)
Employed	61%(1,314)	39%(843)
Marital Status**		
Never Married	52%(492)	48%(458)
Other	61%(1,727)	39%(1,093)

*Note.* Differences between outcome groups were tested using chi-square tests  
 \* $p < .05$ , \*\* $p < .001$

Table 2: Descriptive and Bivariate Statistics for Race

Variable	No relapse %(n)	Relapse %(n)
White		
Age**		
Un25	45%(697)	55%(857)
Ov25	62%(5,932)	38%(3,698)
Education**		
Less than HS	51%(403)	49%(394)
HS or more	60%(6,226)	40%(4,161)
Employment**		
Unemployed	55%(1,547)	45%(1,281)
Employed	61%(5,082)	39%(3,274)
Marital Status**		
Never Married	51%(1,561)	49%(1,510)
Other	62%(5,068)	38%(3,045)
Nonwhite		
Age**		
Un25	30%(46)	70%(108)
Ov25	54%(837)	46%(718)
Education		
Less than HS	52%(135)	48%(127)
HS or more	52%(748)	48%(699)
Employment**		
Unemployed	44%(210)	56%(271)
Employed	55%(673)	45%(555)
Marital Status**		
Never Married	42%(236)	58%(329)
Other	57%(647)	43%(497)

Note. Differences between outcome groups were tested using chi-square tests

\* $p < .05$ , \*\* $p < .001$

Table 3: Descriptive and Bivariate Statistics for Program Type

Variable	No relapse %(n)	Relapse %(n)
Outpatient		
Age**		
Un25	42%(149)	58%(207)
Ov25	60%(1,351)	40%(888)
Education**		
Less than HS	45%(105)	55%(126)
HS or more	59%(1,395)	41%(969)
Employment**		
Unemployed	54%(289)	46%(250)
Employed	59%(1,211)	41%(845)
Marital Status**		
Never Married	48%(392)	52%(421)
Other	62%(1,108)	38%(674)
Inpatient		
Age**		
Un25	44%(594)	56%(758)
Ov25	61%(5,418)	39%(3,528)
Education**		
Less than HS	52%(433)	48%(395)
HS or more	59%(5,579)	41%(3,891)
Employment*		
Unemployed	53%(1,468)	47%(1,302)
Employed	60%(4,544)	40%(2,984)
Marital Status**		
Never Married	50%(1,405)	50%(1,418)
Other	62%(4,607)	38%(2,868)

*Note.* Differences between outcome groups were tested using chi-square tests  
 \* $p < .05$ , \*\* $p < .001$

When examining these demographic risk factors across race all were consistent with the general sample and all factors were shown to have higher relapse rates among nonwhites than whites except for education. For education, nonwhite subjects without a diploma or GED had a lower relapse rates ( $\chi^2 = 0.0025$ ,  $df = 1$ ,  $p = .960$ ) than their white peers ( $\chi^2 = 26.9535$ ,  $df = 1$ ,  $p < .001$ ). Being nonwhite and under 25 led to higher relapse rates ( $\chi^2 = 32.2025$ ,  $df = 1$ ,  $p < .001$ )

than those who are white and under 25 ( $\chi^2 = 155.4609$ ,  $df = 1$ ,  $p < .001$ ). For employment, unemployed nonwhites had a 56% ( $\chi^2 = 17.1927$ ,  $df = 1$ ,  $p < .001$ ) relapse rate compared to unemployed whites with a 45% ( $\chi^2 = 32.7354$ ,  $df = 1$ ,  $p < .001$ ) relapse rate. For marital status, nonwhites who have never been married had a 58% ( $\chi^2 = 33.1115$ ,  $df = 1$ ,  $p < .001$ ) relapse rate compared to never married whites with a 49% ( $\chi^2 = 124.9759$ ,  $df = 1$ ,  $p < .001$ ) relapse rate.

When examining these demographic risk factors across sex, all were consistent with the general sample and all factors were shown to have higher relapse rates among males than females except for education. For education, male subjects without a diploma or GED had a lower relapse rates (48%,  $\chi^2 = 13.0245$ ,  $df = 1$ ,  $p < .001$ ) than their female peers (52%,  $\chi^2 = 15.4195$ ,  $df = 1$ ,  $p < .001$ ). Being male and under 25 led to higher relapse rates (58%,  $\chi^2 = 152.7051$ ,  $df = 1$ ,  $p < .001$ ) than those who are female and under 25 (52%,  $\chi^2 = 28.2853$ ,  $df = 1$ ,  $p < .001$ ). For employment unemployed males had a 50% ( $\chi^2 = 51.8019$ ,  $df = 1$ ,  $p < .001$ ) relapse rate compared to unemployed females with a 44% ( $\chi^2 = 8.8223$ ,  $df = 1$ ,  $p < .05$ ) relapse rate. For marital status males who have never been married had a 51% ( $\chi^2 = 139.0685$ ,  $df = 1$ ,  $p < .001$ ) relapse rate compared to never married females with a 48% ( $\chi^2 = 26.2157$ ,  $df = 1$ ,  $p < .001$ ) relapse rate.

When examining these demographic risk factors across program type, all were consistent with the general sample and all factors were shown to have higher relapse rates among outpatient programs than inpatient programs except for employment with unemployed inpatients having a relapse rate of 47% ( $\chi^2 = 45.2041$ ,  $df = 1$ ,  $p < .001$ ) compared to unemployed outpatients with a 46% relapse rate ( $\chi^2 = 4.8865$ ,  $df = 1$ ,  $p < .05$ ). For education outpatient subjects without a diploma or GED had a higher relapse rates (55%,  $\chi^2 = 15.8537$ ,  $df = 1$ ,  $p < .001$ ) than their inpatient peers (48%,  $\chi^2 = 13.7237$ ,  $df = 1$ ,  $p < .001$ ). Being in outpatient and under 25 led to

higher relapse rates (58%,  $\chi^2 = 43.0327$ ,  $df = 1$ ,  $p < .001$ ) than those who are inpatient and under 25 (56%,  $\chi^2 = 133.6570$ ,  $df = 1$ ,  $p < .001$ ). For marital status outpatients who have never been married had a 52% ( $\chi^2 = 44.6122$ ,  $df = 1$ ,  $p < .001$ ) relapse rate compared to never married inpatients with a 50% ( $\chi^2 = 118.6714$ ,  $df = 1$ ,  $p < .001$ ) relapse rate. Nonwhites under 25 years of age had the highest relapse rate than any group examined at 70% ( $\chi^2 = 32.2025$ ,  $df = 1$ ,  $p < .001$ ).

When examining relapse rates across race, gender, and program type, it was race that had the largest difference in relapse rates. That means when relapse rates were examined based on age, education, marital status, and employment status groups the greatest difference in relapse rates within those groups was race as opposed to gender or program type. Non-Whites had significantly greater relapse rates than their White peers in all factors except educations. Logistic regression was conducted due to having a binary outcome (i.e. relapse/abstinence) and to control for potential spurious relationships. Logistic regression analysis revealed that the four demographic risk factors examined (age, employment, education, and marital status) were significantly related to relapse rates (Table 2).

Table 4: Logistic Regression Results Predicting Relapse Within 1 Year of Discharge

Variable	$\beta$ (SE)	Wald's $\chi^2$	$p$	OR	95% CI	
					Lower	Upper
Constant	-1.04(0.04)		0.000	0.35	0.32	0.38
Under 25	0.46(0.06)	58.83	0.000	1.59	1.41	1.79
Female	-0.07(0.04)	2.96	0.085	0.93	0.86	1.01
Non-White	0.32(0.05)	35.19	0.000	1.37	1.24	1.53
Unemployed	0.20(0.04)	20.34	0.000	1.22	1.12	1.32
Never married	0.28(0.45)	39.36	0.000	1.33	1.22	1.45
Less than high school	0.19(0.07)	7.94	0.005	1.21	1.06	1.37
Substance use severity	0.11(0.01)	170.41	0.000	1.12	1.10	1.14

Being under 25 years of age, unemployed, having no high school diploma or GED, and never being married were all significant predictors of relapse in the sample examined. The odds ratio for relapse was 1.59 with a 95% confidence interval of [1.41, 1.79] for being under 25 years of age. This suggests that those who are under 25 years of age are approximately 59% more likely to relapse than those who are older. The odds ratio for relapse was 1.22 with a 95% confidence interval of [1.12, 1.32] for being unemployed. This suggests that those who are unemployed are approximately 22% more likely to relapse than those who are employed. The odds ratio for relapse was 1.21 with a 95% confidence interval of [1.06, 1.37] for having a lower education. This suggests that those who do not have a high school diploma or GED are approximately 21% more likely to relapse than those who received a diploma or GED. The odds ratio for relapse was 1.33 with a 95% confidence interval of [1.22, 1.45] for never being married. This suggests that those who were never married are approximately 33% more likely to relapse than those who are or were married.

Overall, the results revealed that the risk factors of being under 25, unemployed, never being married, and low education are individually related to having higher relapse rates. Additionally, when examining race alone there is a higher relapse rate among Non-Whites than Whites. However, through chi-square analysis it was revealed that when examining the risk factors (age, employment, marital status, and education) across race, gender, and program type, there is a compounding effect that reveals higher relapse rates than when just examining risk factors. This reveals that examining the relapse rates based on the risk factors alone does not depict the entire picture, but when you analyze these relapse rates further by comparing relapse rates of the risk factor groups based on race, gender, or program type higher relapse rates are found.

## CHAPTER FIVE: DISCUSSION

Substance use in the US and the treatment process that goes along with it has been the focus of numerous studies and remains an important focus today. The purpose of this study was to examine demographic risk factors as possible predictors of treatment outcomes, specifically relapse. This study adds value to the existing research in that the identified risk factors – and their ability to predict relapse – were then compared across race, gender, and program type.

It is important to note that treatment for substance abuse produced positive results with regard to abstinence for majority of the sample, but when examining individual demographic risk factors and comparing those findings across race, gender, and program type, some discrepancies are revealed. An example of this is demonstrated when age is examined across race. When just race is examined there is 40.1% relapse rate for whites and a 48.2% relapse rate for nonwhites. When just age is examined subjects who are 25 years of age or older have a relapse rate of 39.4% compared to those who are under 25 years of age have a relapse rate of 56%. When race and age are examined together, findings suggest a compounding effect on subjects. Specifically, the compounding effect is demonstrated by subjects who are nonwhite and under 25 years of age having a relapse rate of 70.1% (the highest of any cross examined group). This compounding effect was shown for all demographic risk factors when examined across gender, race, and program type.

Findings of the present study have clinical implications, and may help create better screening processes for substance abuse treatment programs. For example, by demonstrating that nonwhites who are under 25 years of age have a significantly higher relapse rate than their white peers, treatment programs may see better outcomes by balancing the groups in terms of racial

make-up and/or age to allow patients to relate more to their treatment group and lower any inferiority or minority complex they may have. This can be done for gender and program type as well.

Another aspect to consider is dealing with unemployed and/or never married patients in treatment. Based on the data from this study, those individuals who are unemployed are 22% more likely to relapse and those that have never been married are 33% more likely to relapse compared to their married counterparts. By assigning treatment groups based on these factors, the treatment plan may then be geared towards addressing limitations in these areas. Identifying employment opportunities for those who are out of work, for example, even if it is a part-time and/or minimum wage work, or by identifying sources of support for non-married or never married clients, may be beneficial.

Overall, by creating a more specified approach to treatment program placement, i.e., basing patient assignment on demographic factors other than just age or types of substance used, could yield lower relapse rates and better treatment outcomes. If such treatment programs were to become more common then they could be examined further to reveal if treatment programs that utilize demographic variables lead to even lower relapse rates than revealed in this study. This could change the treatment process for patients with substance use disorders and reduce the financial and emotional cost associated with it.

### **Limitations**

Although the current study relied on a large sample of individuals who had completed treatment for substance use problems, findings must be viewed in lieu of multiple limitations. First, only those who completed treatment were included. It is possible that different results would be found had the data set included also those individuals who dropped out of treatment

prior to completion. Examining demographic predictors of treatment drop-out may be of interest to clinicians and patients alike. Moreover, although risk factors examined in this study remained significant across race, gender, and program type, our findings does not allow for any conclusion about treatment effectiveness. Future studies may identify which programs utilize evidence-based approaches to treatment, and examine also the type of follow-up treatment (support groups, AA, etc.), that patients engage in upon discharge from the program. Additionally, although the data collection for this study was completed in 1995 this may seem dated but the information compiled from the CATOR system is extremely comprehensive and contains copious knowledge that can useful in this field. Despite these limitations, the present study adds to our understanding of the role that demographic factors play in predicting risk of relapse. This, in turn, could have clinical implications for treatment and discharge planning, and may aid also in the identification of patients who are at especially high risk for relapse, even upon completion of treatment. Additionally, although data collection was completed in 1995 and may seem dated, the information compiled from the CATOR system is extremely comprehensive and thus useful in examining more complex models of treatment outcomes. Future studies may examine the role of demographic variables in predicting psychosocial adjustment and treatment outcomes across time, and employ other statistical methods, such as structural equation modeling.

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