AN EXPLORATION OF THE RELATIONSHIP BETWEEN ADOLESCENTS' CHARACTERISTICS AND TREATMENT COMPLETION FOR SUBSTANCE USE DISORDER

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by
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ABSTRACT

This study investigated the relationship between selected adolescent characteristics and treatment completion in a large, national sample of adolescents receiving substance misuse treatment in 2011. Participants were de-identified adolescent entries between the ages of 12 and 17 in the Treatment Episode Dataset- Discharges (TEDS-D), which is a national census data system including persons discharged from public and private substance abuse treatment programs that received public funding. Chi-square tests of independence and logistic regressions were used to examine the relationships between adolescent characteristics and treatment completion. The results showed significant relationships between selected variables (sex, gender, primary substance problem, principal source of referral, frequency of use) and treatment completion, but with small to medium effect sizes. Implications, limitations and directions for future research are discussed.

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CHAPTER 1

INTRODUCTION

Statement of the Problem

In recent years, adult substance abuse, especially opioid addiction, has been frequently featured in mainstream media with the passing of the Affordable Care Act, police departments carrying Naloxone, a drug to prevent opioid overdose deaths, and the deaths of prominent public figures from drug overdoses (Nolan & Amico, 2016; Leinwald-Leger, 2014). In contrast, substance use during adolescence is often seen as developmentally appropriate experimentation, despite research showing solid links between adolescent substance use and abuse to adult substance use disorder and substances' negative impact on adolescents' quality of life (Dennis, Clark & Huang, 2014; Grant & Dawson, 1997; Lynskey et al., 2003).

Although over a million adolescents meet the Diagnostic and Statistical Manual, Fifth Edition's (DSM-5) criteria for Substance Use Disorder and thus likely require treatment, adolescent-specific treatment for substance use disorder is a relatively recent idea (Center for Behavioral Health Statistics and Quality, 2015; Liddle & Rowe, 2006). Approximately 20 years ago, adolescents received treatment for substance abuse from programs geared towards adult patients. The National Institute on Drug Abuse (NIDA) first began soliciting research in the area of treatment of adolescents for substance use disorder in the 1990s and subsequent research demonstrated the need for programs specifically geared towards adolescents (Dennis et al., 2002; Etheridge et al., 2001). Programs designed for adults were ineffective with adolescents and one study found that

substance use actually increased for adolescents attending adult programs (Schildhaus et al., 2000).

Researchers studying adults with substance use disorder have isolated factors and characteristics of patients that affect treatment entrance and retention; however, there is little in the adolescent substance abuse research body that has isolated the same factors that could impact treatment and long-term outcomes (Liddle & Rowe, 2006). There was a flurry of studies following the collection and availability of the Drug Abuse Treatment Outcome Study- Adolescents (DATOS-A) dataset in the 1990s; however, few studies have used national datasets after DATOS-A. Many adult substance abuse researchers have used the Treatment Episode Dataset (TEDS), but the adolescent population in this dataset is underutilized in research. In a review of all studies using the TEDS dataset since 1995, adolescent characteristics in substance misuse treatment have only been studied a handful of times.

Purpose of the Study

The purpose of this study was to explore the relationship between adolescents' characteristics and the completion of treatment for substance misuse and substance use disorder. By better understanding individual characteristics, treatment settings and referral sources that indicate a positive relationship with treatment completion, treatment providers and referral sources can be informed. Further, this study could facilitate an understanding of factors and characteristics that lead to premature termination of services. This study focused on adolescents between the ages of 12 and 17 completing treatment in 2011 using a large, national dataset. Overall, this study aimed to expand the substance abuse literature in the following ways:

1. This study aimed to explore the relationship between treatment settings for substance use disorder (inpatient, outpatient, etc) and treatment completion.
2. This study intended to identify the relationships between referral sources and treatment completion.
3. This study explored the relationship between adolescents' characteristics (age, race, sex, etc) and treatment completion.
4. This study identified whether adolescents who prematurely exit treatment do so because they are asked to leave or if they terminate treatment themselves.
5. This study determined if adolescents from specific referral sources are more likely to receive treatment within a certain treatment setting.

Studies using a large-scale dataset, such as the Treatment Episode Dataset (TEDS), have inherent strengths and weaknesses. For example, datasets such as TEDS are able to provide a wide-ranging and generalizable gauge of the current status of treatment in the United States. However, its breadth is also its weakness, as it is unable to look at the efficacy of specific treatment approaches treatment providers utilize and it is limited to the preset questions. Researchers have completed similar large-scale analyses of adolescents' characteristics and their impact on treatment completion; however, they utilized older datasets, such as Drug Abuse Treatment Outcomes Studies for Adolescents (DATOS-A). This study adds to the existing research on adolescents' characteristics with a more recent dataset that researchers infrequently use to isolate its adolescent population and serve as a benchmark on adolescents' outcomes at this point in time.

Definition of Terms

In 2004, the U.S. Department of Health and Human Services Substance Abuse and Mental Health Services Administration's (SAMHSA) Center for Substance Abuse Treatment (CSAT) created a language guide in collaboration with SAMHSA's *National Alcohol and Drug Addiction Recovery Month* Planning Partner Organizations, SAMHSA's *Partners for Recovery (PRF)* initiative and the *PFR* National Subcommittee on Reducing Stigma. The guide aims to highlight terms that cause "confusion and perpetuate stigma within the prevention/treatment/recovery workforce" and promote terminology that perpetuates understanding of substance use disorders (TASC, Inc., 2004, pg. 1). Literature published before the adoption of the most recent terms used in this language guide will be described using the updated language and terms.

In 2013, the American Psychiatric Association published an updated version of the Diagnostic and Statistical Manual of Mental Health Disorders with a new conceptualization of alcohol and drug use and abuse. The previous edition conceptualized substance use, abuse and dependence as separate entities. The current edition, Diagnostic and Statistical Manual of Mental Health Disorders, Fifth Edition (DSM-5), uses an overarching term, Substance Use Disorders (SUDs), with levels of severity: mild, moderate and severe. Substance Use Disorder is defined as "when the recurrent use of alcohol and/or drugs causes clinically and functionally significant impairment, such as health problems, disability, and failure to meet major responsibilities at work, school or home" (SAMSHA, 2015, pg. 1).

Misuse: "offers the same intended meaning as what has traditionally been termed as *abuse,* but without the stigma and judgmental overtones that *abuse* carries (TASC, Inc., 2004, pg. 8)."

Treatment: "the use of any planned, intentional intervention in the health, behavior, personal and/or family life of an individual suffering from alcoholism or from another drug dependency designed to enable the affected individual to achieve and maintain sobriety, physical and mental health, and a maximum functional ability (TASC, Inc., 2004, Pg. 8)."

Research Questions

The following research questions were examined:

1. Are adolescents more likely to complete treatment if they participate in a residential treatment program as compared to outpatient programs, after controlling for frequency of use and drug of use?
2. Are there differences in the likelihood of completing treatment based on the source of referral (e.g. school, community, criminal justice, etc.)?
3. Does treatment completion vary for adolescents depending on race, gender, primary drug use or frequency of drug use?
4. Of adolescents that do not complete treatment, are they more likely to terminate treatment themselves or be asked to leave by the facility?

5. Are adolescents from certain referral sources (e.g. school, community, criminal justice, etc.) more likely to participate in treatment within a certain setting (e.g. residential, intensive outpatient, outpatient)?

CHAPTER 2

REVIEW OF LITERATURE

Substance Use Disorder Overview

Substance use disorder is a chronic and debilitating problem in the United States, affecting approximately 27 million Americans, or 10% of the adult population (Center for Behavioral Health Statistics and Quality, 2015). Substance use disorder is linked to chronic and fatal health problems, criminal justice involvement, increased unemployment, and improper care of minors. Together, tobacco, alcohol, and drug use cost the United States over $700 billion in expenses related to health care, lost productivity and crime (National Institute of Drug Abuse, 2015).

The use of illicit drugs or misuse of prescription medication is related to numerous health concerns including cardiovascular disease, stroke, cancer, lung disease, and communicable diseases, such as human immunodeficiency virus (HIV), hepatitis, tuberculosis, and sexually transmitted diseases (NSDUH, 2014). The increased risk is especially high for those who inject illicit drugs, as they can receive direct exposure to blood-borne bacterial and viral diseases by sharing infected needles or drug preparation materials (Belani et al., 2012; NIDA, 2012). Fifty percent of new Hepatitis C cases and 9-12% of new HIV cases are associated with the injection of illicit drugs (Belani et al., 2012).

In addition to communicable diseases, substance misuse adds additional risks to individuals including chronic liver disease, certain types of cancers, cardiovascular disease, acute alcohol poisoning and overdose (U.S. Dept. of HHS, 2007). Drugs and

alcohol are also closely linked to tobacco use, which carries its own set of health risks. According to the National Survey of Substance Abuse Treatment Services Report (2013), approximately 22% of the typical United Stated population smokes cigarettes, whereas, over 70% of those seeking substance misuse treatment report smoking cigarettes (SAMHSA, 2013). Given this substantially higher rate, it is not surprising that those with Substance Use Disorders are more likely to die from tobacco-related disease including cardiopulmonary problems, emphysema, and cancer (SAMHSA, 2013). One study reported that those receiving substance misuse treatment were more likely to die from a tobacco related death than other substance misuse related deaths (Hurt et al., 1996).

Along with health risks associated with substance misuse, those struggling with addiction are frequently jailed for offenses related to their drug use. Related crimes include those committed while high, crimes committed to obtain money for drugs and drug-related offenses, such as drug dealing. According to a study completed by the Bureau of Justice Statistics, 53% of State prison inmates and 45% of Federal prison inmates met the criteria for a Substance Use Disorder (BJS, 2004). Further, approximately 50% of inmates had used drugs in the month prior to their offense leading to imprisonment and approximately 29% of inmates had been under the influence of drugs when they committed the crime. Of the prisoners meeting the criteria for a substance use disorder, 53% reported three or more prior offenses, suggesting a link between drug use and recidivism (Mumola & Karberg, 2007). Despite a large portion of the prison population having a substance use disorder, only 39.2% of state prisons and 45.3% of federal prisons reported having any drug treatment, with the majority of the

treatment being in the form of self-help groups or peer counseling (Mumola & Karberg, 2007).

Employment and substance misuse have a complex relationship, with researchers finding that unemployment increases substance misuse, and inversely, substance misuse leads to or maintains unemployment. As Comptom et al. (2014) said: "substance use and addiction can be both the cause and the outcome of economic stresses" (pg. 2). Relatedly, substance misuse has a negative impact on workplace attendance, with several studies finding a direct correspondence between alcohol use and absenteeism (Bacharach, Bamberger & Biron, 2010; Lennox et al., 1998; McFarlin & Fals-Stewart, 2002). Among those over the age of 18 who are currently unemployed, 16.9% are current illicit drug users, compared to 9% of those who are currently employed (SAMHSA, 2011). Alcohol abuse also leads to a lack of productivity through increased absenteeism, poorer performance and higher risk of injury (McFarlin & Fals-Stewart, 2002; Popocivi & French, 2013). Unemployment can also result in an increase in alcohol use with the increased free time and subsequent depression (Popocivi & French, 2013).

Though not a predictive relationship, there are strong links between substance misuse and child abuse and neglect. Parental substance misuse is a key risk factor for child abuse and neglect and subsequent placement in foster care (Barth, Gibbons, & Guo, 2006; Child Welfare Information Gateway, 2004; Dubowitz et al., 2011; Institute of Medicine and National Research Council, 2013). According to a Report to Congress by the Department of Health and Human Services (1999), 8.3 million children live with at least one parent who misuses alcohol or is in need of substance treatment and between one-third and two-thirds of substantiated child abuse and neglect cases involved

substance misuse. An estimated 12 percent of American children live with a parent who misuses alcohol or drugs (U.S. Dept. of HHS, 1999).

Adolescent Substance Misuse

Substance misuse and substance use disorder affect millions of adolescents each year. According to the most recent National Survey on Drug Use and Health (NSDUH), approximately 1.3 million adolescents meet the criteria for Substance Use Disorder, or 5.2% of all adolescents (SAMHSA, 2015). In 2013, 48.9% of 12th graders reported using an illicit drug at any point during their life, referred to as lifetime use (Johnston et al., 2016). In addition, 34.7% of tenth graders and 20.5% of eighth graders reported lifetime use. The study also reported 38.6%, 27.9%, and 14.8% of twelfth, tenth, and eighth graders, respectively, reported using any illicit drug within the last year. Daily marijuana use was reported by 6.0% of twelfth graders and 1.9% reported daily use of alcohol, which suggests active addiction (Johnston et al., 2016).

Adolescents are especially susceptible to drug use due to an underdeveloped prefrontal cortex, which leads to a decreased ability to problem-solve, make decisions and inhibit impulses (Andersen & Teicher, 2009; NIDA, 2014). Though drug use does not always lead to a substance use disorder, even occasional drug use can lead to serious problems, such as driving under the influence, decreased inhibitions and poor decision-making. Adolescents with a pattern of drug use have the potential to experience a variety of negative health risks, including impaired memory, the risk of an overdose, and an increased likelihood of contracting communicable diseases (NIDA, 2014).

Several studies have found strong links between adolescent substance use and adult substance misuse. More than 90% of adults struggling with substance misuse began using alcohol or drugs before the age of 18 and the age of onset of substance use is a powerful predictor of later substance misuse and dependence (Dennis, Clark & Huang, 2014; Grant & Dawson, 1997; Lynskey et al., 2003). In addition to predicting substance misuse in adulthood, adolescent substance misuse has profound impacts on adolescents' current quality of life that could have potential future impacts beyond substance misuse. For example, substance use in adolescence is related to low academic grades, high school dropout, truancy, long-term cognitive effects, and mental health conditions (Lynskey et al., 2003; Meier, et al., 2012; National Institute on Drug Abuse, 2015; Townsend, Fisher, & King, 2007).

In 1997, Grant and Dawson completed a landmark research study in the field of adolescent substance misuse and later effects of earlier initiation. In this study, direct face-to-face interviews were conducted with 42,862 adults in the United States as part of the National Longitudinal Alcohol Epidemiologic Survey (NLAES) in 1992. Grant and Dawson (1997) inferred from these analyses that age of onset was a powerful predictor of later use and the likelihood of later misuse was decreased for each year onset was delayed. In addition, the authors reported that 40% of all individuals who reported drinking before the age of 14 later developed an alcohol dependence disorder, which is 4 times the rate of those who reported initial drinking at age 20 or later (Grant & Dawson, 1997).

In 2000, DeWit et. al., again found that age of first use was a powerful predictor of later substance misuse. Of the 5,856 participants in their study, the group who began

drinking between 11 and 14 years of age were at greatest risk, with approximately 13% developing a substance use disorder in adulthood, while only 2% of those who began drinking after 19 years of age developed a substance use disorder (DeWit et al., 2000).

Another study finding this link is Lynskey et al., (2003), who drew a sample from the young adult cohort of the Australian Twin Register for a telephone interview regarding their drug use and history. A structured diagnostic interview was completed with 311 consenting twin pairs, or 622 individuals, that had one twin reporting marijuana use before 17 and the other reporting use at 17 or later. The authors reported that early initiation of marijuana was associated with increased use of, misuse of and/or dependence on other drugs. In this study, individuals who reported marijuana use before the age of 17 had a "2.3-3.9 fold increase in the odds of alcohol dependence and other drug misuse/dependence, relative to their co-twin had not used cannabis by age 17 years" (Lynskey et al., 2003, pg. 431).

Though not a causal relationship, "most researchers agree that there is an inverse relationship between adolescents' substance use and high academic grades. Adolescents with low academic grades are likely to have substance-use problems and vice versa" (Cox et al., 2007, pg. 110). In addition, increasing marijuana use is related to dropping out of high school, even when controlling for SES, family functioning and mental health (Townsend, Flisher & King, 2007). Additionally, with increasing marijuana use, a stronger relationship developed with dropping out of high school and truancy (Townsend, Flisher & King, 2007). Interestingly, when marijuana use was decreased, school attendance increased (Hunter, Godley & Godley, 2014). This further supports the need for substance misuse intervention for adolescents.

In addition to an impact on school attendance and academic performance, a high percentage of adolescents in substance misuse treatment have a co-occurring disorder. A co-occurring disorder "refers to two or more psychiatric conditions that may be present simultaneously or that may occur at different periods in an individual's lifetime" (Kaminer & Bukstein, 2008, pg. 43). The estimates of co-occurring disorders with substance misuse disorders varies widely, with estimates ranging from 19% to 83% (Brown & Ramo, 2006). In the Drug Abuse Treatment Outcome Study, 63% of participants were found to have a co-occurring disorder and another study reported that over half of adolescents in substance misuse treatment with a co-occurring disorder have three or more co-occurring disorders, indicating that incidence of co-occurring disorders in adolescents abusing substance is likely above 50% (Hser et al., 2001).

The prevalence of co-occurring disorders is important because "evidence is mounting that adolescents with comorbid substance use psychiatric diagnoses have poorer outcomes after treatment than substance-abusing youth without concomitant mental health disorders" (Brown & Ramo, 2006, pg. 93). In addition to having a psychiatric disorder, these adolescents are more likely to be dependent on the substance they are seeking treatment for, having starting use substances earlier, and have had a previous treatment episode (Grella et al., 2001). Further, a larger national outcome study, Drug Abuse Treatment Outcome Study- Adolescents (DATOS-A), reported that adolescents with a co-occurring psychiatric disorder were also more likely to have a parent struggling with substance misuse, report higher rates of family discord, and report higher rates of physical or sexual abuse history (Brown & Ramo, 2006). Co-occurring disorders can arise before, during or after substance misuse with adolescents. The most

common co-occurring disorders in adolescents are conduct disorder, attention deficit-hyperactivity disorder and mood disorders (Grella et al., 2001).

Treatment for Substance Use Disorder in Adolescence

Treatment specifically tailored to adolescents is a relatively new phenomenon in response to research from the 1990s that found adolescents who sought treatment from community-based programs for adults actually increased their drug and alcohol use following treatment (Rowe & Liddle, 2006). Adolescent's substance misuse is different than adult substance misuse in fundamental ways. For example, adolescents are more likely to misuse marijuana, engage in binge drinking and hide their substance misuse from others (NIDA, 2014). Also, adolescents are less likely to experience withdrawal symptoms and health symptoms because of their shorter period of use. With a decreased knowledge of substance use and less negative health effects, adolescents are less likely to believe they need treatment (NIDA, 2014).

The American Society of Addiction Medicine (ASAM) has developed guidelines for determining the appropriate length and intensity for adolescents in need of treatment based on an assessment of following areas: level of intoxication and potential for withdrawal, presence of other medical conditions, presence of other emotional, cognitive or behavioral conditions, readiness or motivation to change, risk of relapse or continued drug use, and their recovery environment. These guidelines are meant to give sufficient treatment in the least restrictive environment. The possible environments include outpatient treatment, intensive outpatient treatment, partial hospitalization and residential or inpatient treatment (NIDA, 2014).

The following is a description of the four primary treatment methods used with adolescents: The Minnesota approach, the therapeutic community (TC), family therapy, and cognitive behavioral therapy (Sussman, Skara & Ames, 2008). All four of these approaches focus on abstinence as the goal and can substantially overlap in the techniques used. The Minnesota approach involves inpatient or residential treatment and incorporates concepts from Alcoholics Anonymous (AA), including the "12 Steps." The TC approach focuses on residential treatment that encourages others receiving treatment to act as counselors for each other, in addition to having a primary therapist. Clients attend peer-led group meeting and receive additional privileges and freedom with continued abstinence. Family therapy views substance use as a family issue and seeks to work with the entire family during treatment. Family therapy attempts to improve communication among family members and provide parent training. Behavioral and cognitive-behavior therapy focuses on the thoughts and behaviors around drug use, increasing positive behaviors and thoughts, while decreasing negative thoughts and behaviors, such as drug use. Behavioral therapy may include training new behaviors through shaping, modeling, and role playing. Cognitive-behavioral therapy works to modify the client's inner speech or thinking, emotional regulation and anger management training, problem solving, and relapse prevention (Sussman, Skara & Ames, 2008).

Though there are several treatment options for adolescents, they are unlikely to seek and access needed treatment, with approximately 10% of adolescents meeting the criteria for a substance use disorder receiving treatment (Ozechowski & Waldron, 2010). According to Wagner and Macgowan (2006), there are several reasons for this disconnect. First, "substance-abusing adolescents rarely recognize the need for

treatment," leading parents and other adults to take the initiative (pg. 333). This is especially true for ethnic minorities and economically disadvantaged adolescents (Wagner & Macgowan, 2006, pg. 333). Further, there is a reliance on a "traditional service-delivery model," meaning that substance abuse treatment must be sought out by adolescents or adults, which are often located in hospitals, universities or other institutions. Wagner and Macgowan (2006) also cite the following reasons parents may be reluctant to seek treatment for their child: "time conflicts, lack of knowledge, estrangement from the adolescent, personal substance use problems, reluctance to accept the label of 'substance abuser' for their child" (pg. 333-334). Additional barriers to treatment may include uncertainty of where or how to access treatment, not having transportation to treatment and not having time to attend treatment (Hunter, Godley & Godley, 2014; SAMHSA, 2011).

Since there are many barriers to treatment, adolescents are often referred to treatment by a parent, community member, school or criminal justice provider. The largest treatment referral source for adolescents is from criminal justice, with almost half of all adolescents' ages 15-17 receiving their referral from this source in 2011 (TEDS, 2011). A criminal justice referral source can include a referral from any court of law, as a requirement for probation or parole, as a diversionary program, within a prison, or as a legal consequence from a DUI/DWI (United States Department of Health and Human Services, 2011). Other studies have found rates of criminal justice referrals for adolescents as high as 65% for substance misuse treatment (Rounds-Bryant et al., 1999; Shillington & Clapp, 2003; Tims et al., 2002). The model that many juvenile drug treatment courts emphasize are contracts between adolescents, their family, mental health

organizations and the court that requires adolescents to complete psychoeducational classes, counseling, urine screenings and attend school regularly over the course of a year. If adolescents complete this program, many of the drug courts will drop the charges (Stein, Deberard & Homan, 2011).

Despite the large number of adolescents receiving substance misuse treatment through this referral system, little research has been completed on the effects of such a referral source. There is positive research supporting the adult drug court model, but these do not necessarily generalize to the adolescent population. Two research studies conducted on adolescents found conflicting results. One study found better outcomes for adolescents who received a referral from any source besides criminal justice (Friedman, Terras & Ali, 1998). Another study found short-term impacts on substance use for adolescents who received a referral for treatment from criminal justice, but the initial motivation to avoid consequences imposed by the courts disappeared when the external checks were removed (Yeterian, Greene, Bergman & Kelly, 2013).

There is little research on the effects of other referral sources, such as parents, community members and schools, on treatment completion. Dakof, Tejeda and Liddle (2001) found a positive relationship between factors related to these referral sources, such as parental involvement and school connectedness.

Regardless of referral source, adolescents who complete treatment, in any setting, for substance use significantly reduce their substance use when compared to those who did not complete treatment (Winters et al., 2000). Adolescents who completed treatment show these reductions in substance use in both short-term and long-term follows (Kaminer & Bukstein, 2008). Liddle and Rowe (2006) found that adolescents who

attended treatment specifically geared for their age range, reduced their drug use and had fewer behavioral problems. Further Hser et al. (2001) found that treatment length led to better outcomes, regardless of problem severity.

Knowing that treatment completion is essential for long-term positive outcomes, identifying retention factors among different adolescents and treatment is hugely important. There is little research identifying if adolescents are more likely to complete treatment in a residential or outpatient setting. According to Shillington and Clapp's (2013) study, there is some indication that adolescents are more likely to complete in an outpatient setting. According to their study, a large percentage of adolescents completed treatment when in an outpatient treatment setting (45% completion rate vs. 22.7% completion rate); however this study was limited in that it consisted of approximately 4,500 participants from the San Diego area.

It is also important to identify variables that influence treatment completion, such as referral source, frequency of drug use, primary drug use, race and gender. Shillington and Clapp (2003) found that African American adolescents were significantly more likely to be discharged from treatment "unsatisfactorily" than White or Hispanic clients. The frequency of drug use's impact on treatment completion has mixed results in the literature, with some studies finding a negative impact (Moos, Finney & Cronkite, 1990; Williams & Chang, 2000) while others found no relationship (Latimer et al., 2000).

Summary

Thousands of adolescents use alcohol or illicit substances each year (Johnston et al., 2016). Several research studies have found compelling evidence of a link between

adolescent substance use and subsequent Substance Use Disorder in adulthood (Dennis, Clark & Huang, 2014; Grant & Dawson, 1997; Lynskey et al., 2003). This is problematic due to the increased potential for health problems, involvement in the criminal justice system, unemployment, and child abuse/neglect that is associated with substance misuse (Barth, Gibbons, & Guo, 2006; Belani et al., 2012, Mumola & Karberg, 2007; Popocivi & French, 2013). Adolescents' substance use can also have immediate impacts on their current quality of life, such as school attendance, grades, and social relationships (Cox et al., 2007, Townsend, Flisher & King, 2007).

These factors indicate a high level of need for effective substance use treatment for adolescents to intervene early; however, current adolescent substance abuse treatment research is limited compared to those focusing on adult treatment (Liddle & Rowe, 2006). Several studies have used the datasets from 1970s, 80s and 90s, but few researchers have utilized the adolescent population in the TEDS-D, which is updated annually (Grella, 2006). This study examined the relationship between characteristics and treatment completion for adolescents, which is used to inform policy and treatment, but using a recent dataset. Further, the research questions focus on characteristics influencing treatment completion, as treatment completion is significantly related to future abstinence (Kaminer & Bukstein, 2008; Winters et al., 2001).

CHAPTER 3

METHODS

The Treatment Episode Data Set (TEDS) is a national census data system of annual admissions and discharges from substance misuse treatment facilities. TEDS is publically available and contains de-identified data from an administrative data system used to track admissions, discharges, and patient characteristics from all substance misuse treatment facilities receiving public funding. Facilities labeled as receiving public funding may include, but are not limited to, those who accepted a federal grant, those who accepted patients with Medicare/Medicaid insurance, and state-licensed facilities. These treatment facilities must report both publically and privately funded clients if the facility receives any public funding.

Each treatment facility that receives public funding reports the required data to state substance misuse agencies, which in turn reports the data to the Substance Abuse and Mental Health Services Administration (SAMHSA, 2014). TEDS only collects data on patients aged 12 or older. Data have been collected each year since 1992 by the Substance Abuse and Mental Health Services Administration, as known as SAMHSA (United States Department of Health and Human Services, 2011). While SAMHSA collects other data, this is the only data set that reflects client-level data.

TEDS collects data at two endpoints: admission and discharge. TEDS defines an admission as: "the formal acceptance of a client into substance misuse treatment. An admission has occurred if, and only if, the client begins treatment. Events such as initial screening, referral, and wait-listing are considered to take place before the admission to treatment and should not be reported to TEDS as admissions" (SAMHSA, 2014, pg. 8).

TEDS defines a discharge as: “the termination of services in a service type, whether or not the client’s treatment episode will continue with treatment in another service type” (SAMHSA, 2014, pg. 9).

When a patient is admitted to a treatment facility, it is considered an admission to a treatment episode in TEDS. Since those experiencing substance misuse may be admitted to treatment more than one time in a year, each admission is coded separatedly. At the beginning of the admission process, treatment programs provide record a variety of information about the patient, including demographic information, education history, criminal history and drugs used. All information is self-reported at the time of admission through interview with agency staff, except for discharge reason and length of stay, which is recorded by treatment facility staff at discharge.

Treatment Episode Dataset, Discharges (2011) is the most recent dataset including discharge variables available for analysis. According to the codebook for this dataset, the total number of discharges, or unique entries, is 1,732,741. For this study, only adolescents between the ages of 12 and 17 were used. The total number of adolescents within this age range from this data set is 124,192.

Study Variables

The primary dependent variable for this study is “treatment completed,” which is coded by treatment facility staff when a patient successfully completes treatment. Treatment was considered incomplete as either “left against professional advice” or “terminated by facility.” The independent variables for this study included residential treatment (“rehab/res, hospital”, “rehab/res, short term”, and “rehab/res, long term”),

outpatient treatment ("ambulatory, intensive outpatient," "ambulatory, non-intensive outpatient"), source of referral ("individual," "school," "court/criminal justice referral/DUI/DWI"), race, gender, primary substance problem, ethnicity, and frequency of use. In addition to these variables, other variables were considered as possible predictors.

Analytic Plan

Before the analyses of the data could begin, the data were cleaned for the purposes of this study. The dataset was reduced to only those between the ages of 12 and 17 to eliminate all adults from the sample. Next the dataset variables were recoded as needed to fit the proposed analyses. A preliminary analysis of the data identified the frequencies of the different variables occurring within the reduced dataset. When analyzing the research questions stated above, treatment completion was coded as a dichotomous variable with "treatment completed" indicting treatment completion and "left against professional advice" and "terminated by facility" indicating treatment was not completed. The additional options within this variable ("incarcerated," "transferred to another treatment program or facility," "death," "unknown," and "other.") were omitted as they did not indicate whether treatment was completed or not. Research questions 1 and 3 were answered jointly using chi-square tests of independence and logistical regression; research question 2 and 5 were answered using chi-square tests of independence; and research question 4 was answered by frequency.

CHAPTER 4

RESULTS

Descriptive Statistics

Before preliminary statistics and frequencies were computed, entries for clients aged 12 to 17 were selected for all subsequent analyses. The remaining sample of adolescents included a total of 124,192 entries. Almost all variables, however, have missing entries. For example, "race" is missing 1936 entries and "education" is missing 1730 entries. The missing data will be noted whenever applicable in the following statistical analysis and descriptions.

The majority of the adolescent sample were between the ages of 15 and 17 (N=103,789), with a smaller number between ages 12 and 14 (N=20,403). The average age of the sample could not be calculated because the dataset did not code this as a continuous variable.

Table 4.1

Age (N= 124192)

	Frequency	Percent
12-14	20403	16.4
15-17	103789	83.6
Missing/Unknown	0	

The majority of this sample is male, representing 72.2% of the sample. It is also overrepresented by males when compared to the 2010 national census information (Census= 50.8% female, 49.2% male; Sample=27.8% female, 72.2% male).

Table 4.2

Sex (N= 124179)

	Frequency	Percent
Male	89607	72.2
Female	34572	27.8
Missing/Unknown	13	

This sample is also over-representative of Black/African Americans and under-representative of Whites when compared to the 2010 census data (Black/AA: Census= 12.6%, Sample= 20.7, White: Census=72.4%, Sample= 55.2)

Table 4.3

Race (N=122256)

	Frequency	Percent
Alaska Native	202	.2
American Indian	3268	2.6
Asian or Pacific Is	346	.3
Black or Af. Am.	25320	20.4
White	67443	54.3
Asian	1394	1.1
Other Single Race	18976	15.3
Two or More Races	3657	2.9
Missing/Unknown	1936	1.6

Over a quarter of the sample identifies as Hispanic, with 27.3% identifying as Puerto Rican, Mexican, Cuban or other Hispanic origin. When compared to the 2010 U.S.

Census data, this sample is overrepresentative of Hispanics (Census: 16.3%, Sample= 27.3%).

Table 4.4

Ethnicity (N=122966)

	Frequency	Percent
Puerto Rican	2277	1.9
Mexican	18014	14.6
Cuban	422	.3
Other	7131	5.8
Not Hispanic	89289	72.6
Unspecified His.	5824	4.7
Missing	1226	

Reason for Discharge is one of the few variables that is not a self-reported answer and coded by treatment facility staff at the end of the client's stay. The staff indicates that treatment was completed for a client when "all parts of the treatment plan or program were completed." *Left Against Professional Advice* is coded when a "client chose not to complete program, with or without specific advice to continue treatment." This includes clients who drop out of treatment when the reason is unknown or when a client stops showing up for services for some time. A client is considered *Terminated by Facility* when "treatment terminated by action of facility, generally because of client non-compliance or violation of rules, law or procedures." This variable is exclusive of those who dropped out of treatment or those who were incarcerated. For this study, these three variables were used and recoded to indicate whether or not a client completed treatment or not. The other variables, transferred to another substance abuse treatment program or

facility, incarcerated, death, other and unknown, were not included as their indication of treatment completion or noncompletion is more vague.

Table 4.5

Reason for Discharge (N=124182)

	Frequency	Percent
Treatment Completed	49073	39.5
Left Against	33907	27.3
Professional Advice		
Terminated by Facility	10811	8.7
Transferred	19016	15.3
Incarcerated	3441	2.8
Death	90	.1
Other	7844	6.3
Total	124182	100
Missing/Unknown	10	.0

Principal Source of Referral is the "person or agency referring the client to the alcohol or drug abuse treatment program" (TEDS Codebook, 2011). The *Individual* variable includes the reported referral sources of the client, a family member or friend. The variable, *Alcohol/Drug Abuse Care Provider*, includes any program, clinic, or other health-care provider whose principal objective is treating clients with substance abuse problems, or a program whose activities are related to alcohol or other drug abuse prevention, education, or treatment. The *Other Health Care Provider* variable includes a physician, psychiatrist, or other licensed health care professional; or general hospital, psychiatric hospital, mental health program, or nursing home. The *School (Educational)*

variable is the school principal, counselor, or teacher; or a student assistance program (SAP), the school system, or an educational agency. The *Employer/EAP* variable includes a supervisor or an employee counselor. *Other Community Referral* variable may be a community or religious organization or any Federal, State, or local agency that provides aid in the areas of poverty relief, unemployment shelter, or social welfare. Self-help groups such as Alcoholics Anonymous (AA), Al-Anon, or Narcotics Anonymous (NA) and defense attorneys are also included in this category. Finally, the *Court/Criminal Justice Referral/DUI/DWI* variable includes any police official, judge, prosecutor, probation officer, or other person affiliated with a Federal, State, or county judicial system. This may include a referral by a court for DWI/DUI, clients referred in lieu of or for deferred prosecution, or during pretrial release, or before or after official adjudication. Almost half of adolescents who participated in substance use treatment in 2011 were referred from a Criminal Justice source (45.4%).

Table 4.6

Principal Source of Referral

	Frequency	Percent
Individual	21025	17.2
DA Care Provider	7527	6.2
Other Health Care	5548	4.5
School (Educational)	16571	13.6
Employer/EAP	65	.1
Other Community	15881	13.0
Court/Criminal Justice	55473	45.4
Total	122090	100
Missing/Unknown	2102	1.7

The overwhelming majority of adolescent discharge entries in 2011 reported either *Alcohol* (14.6%) or *Marijuana/Hashish* (75.1%) as their primary substance problem.

Table 4.7

Substance Problem Code (Primary)

	Frequency	Percent
None	1474	1.2
Alcohol	18066	14.5
Cocaine/Crack	1052	.8
Marijuana/Hashish	93124	75.0
Heroin	1577	1.3
Methadone	32	.0
Other Opiates	2392	1.9
PCP	48	.0
Other Hallucinogens	341	.3
Methamphetamine	2352	1.9
Other Amphetamines	882	.7
Other Stimulants	473	.4
Benzodiazepines	569	.5
Other Tranquilizers	52	.0
Barbiturates	24	.0
Other Non-Barbiturate	148	.1
Inhalants	383	.3
Over-the-counter med.	263	.2
Other	705	.6
Missing/Unknown	235	.2

The largest percentage of frequency self-reported by adolescents was no use within the past month (30.6%), with other frequencies somewhat fairly distributed.

Table 4.8

Frequency of Use

	Frequency	Percent
No Use in the Past Month	38033	30.6
1-3 Times in the Past Month	24420	19.7
1-2 Times in the Past Week	17252	13.9
3-6 Times in the Past Week	17201	13.9
Daily	24425	19.7
Total	121331	97.7
Missing/Unknown/Not Collected/Invalid	2861	2.3

The majority of adolescents participated in treatment in an outpatient setting, with 13.8% in an intensive outpatient setting and 68.5% in a non-intensive outpatient setting. Approximately 15% participated in treatment in a residential setting and less than 3% participated in treatment in a detox setting.

Table 4.9

Service Setting at Discharge

	Frequency	Percent
Detox, Hospital	149	.1
Detox, Residential	2647	2.1
Rehab/Res, Hospital	28	.0
Rehab/Res, Short	9713	7.8
Rehab/Res, Long	9405	7.6
Ambulatory, Intensive	17171	13.8
Ambulatory, Non-Intensive	85043	68.5
Ambulatory, Detoxification	33	.0
Total	124189	100
Missing/Unknown	3	.0

Research Question 1 and 3

The first research question sought to answer if adolescents are more likely to complete treatment depending on the treatment setting, specifically residential or outpatient, taking into consideration the primary drug used and the frequency of use. This question was combined with the third research question, which explores the relationship between treatment completion and four adolescent characteristics: race, gender, primary drug used and frequency of use. Together, these questions were answered using a chi-square tests for independence for each predictor variable and a direct logistical regression with all variables included in the model.

First, two variables were recoded. The *Reason for Discharge* was recoded into a dichotomous variable, *Treatment Completed* and *Treatment Not Completed* (0=not completed, 1=terminated by facility, left against professional advice). For the following Chi-Square Tests for Independence, Cramer's V was used as a measure of effect size. Cramer's V can be interpreted in the following way: .01-.05 No relationship, .06-.10 Weak relationship, .11-.15 Moderate relationship, .16-.25 Strong relationship and >.26 is a Very Strong relationship.

Chi-Square Tests for Independence were run for each predictor variable with *Reason for Discharge*.

Table 4.10

Treatment Completion by Frequency of Use

	Not Completed	Completed
No Use in Past Month	56.1	43.9
1-3 times in past month	59.2	40.8
1-2 times in past week	63.2	36.8
3-6 times in past week	64.8	35.2
Daily	63.1	36.9

The chi-square test for independence indicated a significant association between *Frequency of Use* and *Treatment Completion*; however the effect size was small, $\chi^2(4, n=121322)= 584.387$, $p<.0001$, Cramer's V=.069. This also showed that percentage of adolescents' completing treatment decreased as the frequency of use at admission increased, with the exception of daily use, which had slightly higher rates of completion than 3-6 times in the past week.

Table 4.11

Treatment Completion by Primary Problem Substance

	Not Complete	Complete
Alcohol	62.7	37.3
Cocaine/Crack	60.9	39.1
Marijuana/Hashish	58.8	41.2
Heroin	61.8	38.2
Non-Prescription	57.4	42.6
Methadone		
Other Opiates and	58.4	41.6
Synthetics		
PCP	63.6	36.4
Other Hallucinogens	60.2	39.8
Methamphetamine	67.5	32.5
Other Aphetamines	61.3	38.7
Other Stimulants	63.1	36.9
Benzodiazepines	53.7	46.3
Other Non-Benzo	54.5	45.5
Barbiturates	71.7	28.3
Other Non-Barbiturate	64.9	35.1
Over-the-Counter Med	57.3	42.7
Other	59.1	40.9

The chi-square test for independence indicated a significant association between *Primary Problem Substance* and *Treatment Completion*; however the effect size was

small, χ^2 (18, n=123160) = 219.416, p<.0001, Cramer's V=.042. The highest rates of completion were for those adolescents who reported their primary problem substance as benzodiazepines (46.3%), other non-benzodiazepine tranquilizers (45.5%) and over-the-counter medications (42.7%). The lowest rates of treatment completion were among the adolescents who reported their primary problem substance as barbiturates (28.3%), methamphetamines (32.5%), and other non-barbiturate sedatives or hypnotics (35.1%). The two most reported primary problem substances, marijuana/hashish and alcohol, also had fairly low completion rates, with 41.2% and 37.3%, respectively.

Table 4.12

Treatment Completion by Service Setting

	Not Complete	Complete
Residential	50.9	49.1
Outpatient	63.3	36.7

Service Setting at Discharge was recoded into two categories: *Residential* and *Outpatient*. Three existing categories (Rehab/Res, Hospital; Rehab/Res, Short Term; Rehab/Res, Long Term) were recoded as *Residential* settings and two existing categories (Ambulatory, Intensive Outpatient and Ambulatory, Non-Intensive Outpatient) were recoded as *Outpatient* settings. Third category for Detox settings was not used due to a low percentage of adolescents that completed treatment in these settings (2.2% total). The chi-square test for independence (with Yates' Continuity Correction) indicated a significant association between *Service Setting at Discharge* and *Treatment Completion*; however, the effect size was small, χ^2 (1, n=121350)= 1042.792, p<.0001, phi=-.093. Over 12% more adolescents completed treatment in a residential setting than an outpatient setting.

Table 4.13

Treatment Completion by Sex

	Not Complete	Complete
Male	60.9	39.1
Female	59.5	40.5

The chi-square test for independence (with Yates' Continuity Correction) indicated a significant association between *Sex* and *Treatment Completion*; however, the effect size was small, χ^2 (1, n=124169)= 20.899, p<.0001, phi=-.013. There was little difference between treatment completion based on sex.

Table 4.14

Treatment Completion by Race

	Not Complete	Complete
Alaska Native	62.4	37.6
American Indian	58.5	41.5
Asian or Pacific Is	50.6	49.4
Black/Af. Am.	65.5	34.5
White	56.7	43.3
Asian	55	45
Other Single Race	69.9	30.4
Two or More Races	59.9	40.1
Native Hawaiian or Other Pacific Islander	46.1	53.9

The chi-square test for independence indicated a significant association between *Race* and *Treatment Completion* with a small to medium effect size, χ^2 (8, n=122246) = 1511.329, p<.0001, Cramer's V=.111. *Race* had the largest effect size of all of the predictor variables selected. The races with the lowest percentage of completers were Other Single Race (30.4%) and Black/African Americans (34.5%). The highest percentage of completers were Native Hawaiian or Other Pacific Islander (53.9%) and Asian or Pacific Islander (49.4%).

Next, a direct logistic regression was performed to assess the impact of these characteristics on treatment completion. The full model containing all predictors was statistically significant, N=124192, χ^2= 2016.518, df=5, p<.0001, suggesting that the model was able to distinguish between respondents who completed and did not complete treatment; however, this was disproved by the Homer and Lemeshow Test, which suggested a poor fit, χ^2= 108.385, df=7, p<.0001. The model as a whole explained between 2.4% (Cox & Snell R Square) and 3.2% (Negelkerke R Square) of the variance in treatment completion and correctly classified 57.2% of the cases.

Table 4.15

Logistic Regression Predicting Likelihood of Completing Treatment (Service Setting, Substance Problem, Frequency of Use)

							95% C.I. for Exp(B)	
	B	S.E.	Wald	Df	Sig.	Exp(B)	Lower	Upper
Frequency of Use (Recode)	-.150	.005	908.927	1	.000	.860	.852	.869
Substance Problem (Primary)	-.107	.010	122.755	1	.000	.898	.881	.916
Service Setting (Res/Outpatient)	-6.51	.021	994.519	1	.000	.522	.501	.543
Sex	.015	.016	.884	1	.347	1.015	.984	1.048
Race	-.016	.001	199.765	1	.000	.984	.982	.987
Constant	1.901	.055	1191.519	1	.000	6.693		

As shown in the table above, most of the independent variables made a statistically significant contribution to the model with the exception of sex; however, this should be interpreted with caution. In large samples, such as this one, *p* values or statistical significance, are not very useful. As Marden (2000) described, "when sample sizes are large enough, almost any null hypothesis will have a tiny *p* values, and hence will be rejected at conventional levels" (pg. 1318). In addition, there was only a slight improvement in the ability to correctly classify cases when the predictor variables were included (51.5% to 57.2%). According to the B values, Frequency of Use, Primary Substance used, Service Setting and Race had a negative relationship with treatment

completion. The odds ratios, as determined by the Exp(B) column, suggest that most of the variables had a small impact on treatment completion.

Research Question 2

The second research question examined the differences in treatment completion in relation to the source of referral. First, the *Reason for Discharge* variable was recoded to a dichotomous variable. The two variables, *Left Against Professional Advice* and *Terminated by Facility,* were recoded to "0" for treatment not completed in the new variable. *Treatment Completed* was recoded to "1" for treatment completed. Next, a Chi Square test for independence was run to compare the percentages of those who completed treatment and did complete treatment by referral source. This test indicated significant associations between referral source and treatment completion, but the effect size was small, χ^2 (6, n=122080) = 316.760, p<.0001, Cramer's V=.051.

Table 4.16

Treatment Completion by Referral Source

	Not Completed	Completed
Individual	63.7	36.3
DA Care Provider	58.1	41.9
Other Health Care	66.6	33.4
School (Educational)	62.5	37.5
Employer/EAP	58.5	41.5
Other Comm. Ref.	59.2	40.8
Court/Criminal Justice	58.6	41.4
Total	60.4	39.6

These results indicate that adolescents who were referred from *Alcohol/Drug Abuse Care Providers, Employer/EAPs, Other Community Referrals* and *Criminal Justice* sources were slightly more likely to complete treatment when compared to the total percentage rate of treatment completion.

Research Question 4

The fourth research question sought to determine if adolescents who did not complete treatment did so because they terminated treatment themselves or they were asked to leave the facility. To answer this question, the frequency of each reason was determined.

Table 4.17

Reason for Discharge	**Percent**
Treatment Completed	39.5
Left Against Professional Advice	27.3
Terminated by Facility	8.7
Transferred to Another Treatment Program or Facility	15.3
Incarcerated	2.8
Death	.1
Other	6.3

These results showed that adolescents were much more likely to leave a treatment facility against professional advice than to be terminated by the facility (27.3% vs 8.7%).

Research Question 5

Research question 5 sought to determine if adolescents from certain referral sources were more likely to participate in treatment within a certain treatment setting. First Chi square of independence tests were run for both the relationship between referral sources and treatment completion and service setting and treatment completion. Service settings were collapsed from nine variables to three: Detox, Residential and Outpatient.

Table 4.18

Service Setting and Principal Source of Referral

	Detox	Residential	Outpatient
Individual	3.3	16.3	80.5
Alcohol/Drug Abuse Care Provider	2.9	41.1	55.9
Other Health Care Provider	8.1	19.6	72.3
School (Educational)	0.2	1.7	98.1
Employer/EAP	6.2	24.6	69.2
Other Community Referral	2.0	12.5	85.4
Court/Criminal Justice/DUI/DWI	1.9	16.1	82.0

The chi-square test for independence indicated a significant association between *Principal Source of Referral* and *Service Setting at Discharge* and the effect size was approaching medium, χ^2 (12, n=122087) = 7964.602, p<.0001, Cramer's V=.181. The

majority of adolescent entries completed treatment in outpatient settings, so it was expected that all referral sources had more adolescents completing treatment within an outpatient setting. There were adolescents from certain referral sources that had a greater chance of participating in treatment within an outpatient setting, such as *School* (98.3%) and *Other Community Referral* (87.2%). Adolescents referred from *Alcohol/Drug Abuse Care Providers* were the least likely to complete treatment in outpatient setting (57.6%).

Secondary Analyses

A secondary analysis was explored between principal source of referral and the two adolescent age categories (12-14, 15-17) to determine if there was a difference in the likelihood of receiving a referral from a certain source depending on the adolescent's age. The chi-square test for independence indicated a significant association between *Primary Problem Substance* and *Treatment Completion*; with a small to medium effect size, χ^2 (6, n=122090) = 2345.968, p<.0001, Cramer's V=.139.

Table 4.19

Principal Source of Referral by Age

	12-14	15-17
Individual	21.2%	16.4%
DA Care Provider	4.9%	6.4%
Other Health Care	4.8%	4.5%
School (Educational)	22.0%	11.9%
Employer/EAP	0.0%	0.1%
Other Community Ref	13.8%	12.9%
Court/Criminal Justice	33.3%	47.8%
Total	100%	100%

This analysis indicates that younger adolescents, were more likely to receive a referral from their school than older adolescents (22.0% v 11.9%) and older adolescents were more likely to receive a referral from a criminal justice source than younger adolescents (47.8% v 33.3%).

Summary Analysis

Finally, a direct logistic regression was performed to assess the impact of all predictor variables used in this study on treatment completion. In this model, *Service Setting at Discharge* was recoded into *Residential* and *Outpatient* treatment settings and *Reason for Discharge*, which is the dependent variable, was recoded into *Treatment Complete* and *Treatment Not Complete*, where *Treatment Complete* is *Left Against Professional Advice* and *Terminated by Facility*. The full model containing all predictors was statistically significant, N=87103, χ^2= 2704.233, df=6, p<.0001, suggesting that the model was able to distinguish between respondents who completed and did not complete treatment; however, this was disproved by the Homer and Lemeshow Test, which suggested a poor fit, χ^2= 103.591, df=8, p<.0001. The model as a whole explained between 3.1% (Cox & Snell R Square) and 4.1% (Negelkerke R Square) of the variance in treatment completion and correctly classified 57.6% of the cases.

Table 4.20

Logistic Regression Predicting Likelihood of Completing Treatment (All Predictor Variables)

							95% C.I. for Exp(B)	
	B	S.E.	Wald	Df	Sig.	Exp(B)	Lower	Upper
Sex	.066	.015	18.136	1	.000	1.068	1.036	1.101
Race	-.013	.001	133.501	1	.000	.987	.985	.990
Service Setting at Discharge (Res/Out)	.712	.020	1296.925	1	.000	2.037	1.960	2.118
Principal Source of Referral	.059	.003	397.288	1	.000	1.061	1.055	1.067
Substance Problem (Primary)	-.028	.003	79.860	1	.000	.972	.966	.978
Frequency of Use	-.152	.005	1002.651	1	.000	.859	.851	.867
Constant	.180	.034	27.297	1	.000	1.197		

Of interest in this analysis is relationship between treatment completion and treatment setting and reported frequency of drug use and treatment completion. In the recoded variable for treatment setting, residential and outpatient settings were compared in relation to treatment completion. The relationship was significant ($p < .0001$), and the odds ratio showed that adolescents who completed treatment in a residential treatment

setting were twice as likely to complete treatment (Exp (B)= 2.037). Also, the B value for Frequency of Use indicates that as frequency of use increases, the likelihood of completing treatment decreases (B= -.152), with an odds ratio of .859.

CHAPTER 5

DISCUSSION

The primary objective of this study was to identify the characteristics of the adolescents who received substance abuse treatment within this sample and examine their relationship with treatment completion. More specifically, the research was intended to ascertain if gender, race, primary problem substances, principal source of referral, service settings for treatment, and frequency of use of those receiving treatment had relationships with treatment completion. Of particular interest was the relationship between referral source, service setting for treatment and treatment completion, as most referrals for substance misuse treatment are from criminal justice sources.

The following discussion will place the results of this study within the context of existing literature and consider practical applications and possible implications, with a particular focus on the field of school psychology. Finally, the limitations of this study are acknowledged and possible future research directions are discussed.

Summary and Meaning of Results

Demographics of the Sample

The sample of adolescents, between the ages of 12 and 17, in the 2011 Treatment Episode Dataset included a total of 124,192 subjects. This number may appear large, but recent estimates indicate that approximately 1,300,000 adolescents meet criteria for Substance Use Disorder (SAMHSA, 2015). The discrepancy between adolescents who potentially need treatment and the actual number of adolescents who received treatment

is consistent with Ozechowski and Waldon's (2010) estimate that approximately 10% of adolescents who potentially require treatment actually receive it. In addition, the sample size in this dataset may also be an underestimate of the number of adolescents who received treatment, as adolescents who received two different types of treatment in 2011 (such as detox and outpatient treatment) would be counted as two separate entries. Also, adolesents who sought treatment twice within the same year would also be counted twice.

The majority of adolescents in the sample were between the ages of 15 and 17, comprising 83.6% of the sample. This sample was also overly represented by males (72.2%) and African Americans (20.4%). Many of the adolescents were referred for treatment by a criminal justice source (45.4%), followed by self-referrals (17.2%) and school referrals (13.6%). Marijuana was overwhelmingly the substance reported as the primary problem substance by adolescents (75%), followed by alcohol (14.5%). The primary substance problems found in this sample are consistent with a recent national survey, Monitoring the Future, which reports marijuana and alcohol as the most frequently used substances in adolescence (Johnston et al., 2016). The frequency of substance use was varied, with most adolescents reporting some use in the month before entering treatment; however, approximately 30% reported no use in the month leading up to treatment. The treatment setting most used by adolescents was outpatient treatment (82.3%), with a minority receiving treatment in a residential or detoxification settings.

Treatment Completion

Treatment completion was used as the primary dependent variable in this study. Due to the limitations of this dataset, this variable is the best available to use as an

indicator of successful treatment. Treatment completion is related to a reduction in substance use, both short-term and long-term, and related to fewer behavioral problems (Hser et al., 2001; Kaminer & Bukstein, 2008; Liddle & Rowe, 2006; Winters et al., 2000).

Among adolescent entries in 2011, only 39.5% successfully completed treatment. This is consistent with recent research that found an average of 38% of adolescents abstained from substances after treatment (Williams & Chang, 2000). It should be noted, however, that 15.3% of the sample transferred to another treatment program or facility. This was not included in the treatment completion variable, as it cannot be verified that the new program was completed. Of those who were unsuccessful with treatment, 36% of adolescent entries left treatment against professional advice or were asked to leave by the facility. An additional 2.8% were incarcerated at the end of the their treatment episode.

Treatment Completion and Referral Source

The second research question examined the relationship between *Principal Source of Referral* and *Treatment Completion.* Overall, there was little variability among referral sources when comparing treatment completion rates. The average overall rate of treatment completion was 39.6% and treatment completion rates by referral source ranged from 33.4% to 41.5%. Further, the effect size of this variable on treatment completion was small, so the results likely have little clinical impact.

Reasons for Discharge

Research question 4 examined the reasons adolescents left treatment. This question is limited by the dataset, which consists of entries rather than individuals. For example, an adolescent who attended treatment twice within one year, once leaving against professional advice and one completing treatment, will be entered as two separate entries. With this in mind, 39.5% of adolescents successfully completed treatment, while 36% left prematurely, either against professional advice or were terminated by the facility. The majority of adolescents who left treatment prematurely were not asked to leave by the facility, but rather terminated treatment themselves. Over 15% of the entries could not be determined, as they transferred to another facility.

Service Setting and Source of Referral

The fifth research question looked at the relationship between sources of referral and the service setting where treatment was received. The large majority of this sample received treatment within an outpatient setting (82.3%). Those who received their referral for treatment from a school or educational source almost always received treatment in an outpatient setting (98.1%), while almost half of those referred from an alcohol/drug abuse care provider received treatment in a residential setting (41.1%).

Adolescents' Characteristics and Treatment Completion

The first and third research questions were combined to examine the relationships between different adolescent characteristics (Sex, Race, Frequency of Use, Primary Substance Problem, and Principal Source of Referral) and their relationship with treatment completion. Chi-Square tests for independence provided input into the

relationship between each variable and treatment completion; however, the logistical regression preformed with all the variables showed limited utility of the variables as predictors of treatment completion.

Implications

One of the major implications of this study is the continuously low treatment completion rate, independent of adolescent characteristics. Only 39.5% of adolescents completed treatment in this dataset, which is a nationally representative sample. In addition, this already low rate does not account for long-term outcomes or abstinence. For example, if an adolescent completed treatment as part of their participation with adolescent drug treatment court, but began using marijuana the next day, this would still be reflected as a successful completion in the dataset.

Further, criminal justice referrals comprise the majority of treatment referrals for adolescents, yet this study found the difference in treatment completion rate for these adolescents is not clinically significant compared to other referral sources. With such a large number of adolescents participating in drug treatment court, it is important to verify efficacy of such treatment to justify public funding and continued use.

Another implication from this study is the disappointingly small relationship between adolescent characteristics' and treatment completion. Of the variables examined in this study, none had a strong effect size on the relationship with treatment completion. This demonstrates a need for additional studies regarding treatment completion and a need for studies focusing primarily on adolescents.

Limitations

Though this data set is a large, national sample, it also has numerous inherent limitations. First, most of the variables include in the data set are self-reported. This is

problematic for all studies that use self-report data, but especially for adolescents. According to one study, 28% of adolescents' reports of substance use or non-use were not corroborated by an urinalysis, indicating that self-report data, especially with adolescents, should be interpreted with caution (Williams & Nowatzki, 2005). Additionally, using an extant data set requires that research questions conform to the existing coding structure. For example, age of clients were not coded as a continuous variable, but rather categorically with age ranges (i.e. 12-14, 15-17). Further, research questions must also be molded to fit with the existing questionnaire used, with a limited set of questions and nonparametric data. Nonparametric data limits the number of statistical analyses can be conducted.

The size of this data set is also a limitation in analyses conducted. With a sample size of over 124,000, *p* values become a poor indicator of actual significance. Nearly all statistical analyses in this study were statistically significant, so effect sizes were used instead as an indicator of significance.

Future Directions

Moving forward, this study generates several potential ideas for change in the future. First, SAMHSA may reconsider how their data are collected to include more continuous variables or soliciting input from researchers regarding questions and formatting.

For researchers, there is call to further investigate the effects of criminal justice-referred treatment on adolescents. For example, more research is needed on the long-term outcomes for these adolescents and impacts of noncompliance with treatment when referred from criminal justice sources. Further, schools are not likely to refer adolescents to substance abuse treatment, especially for those between the ages of 15 and 17. Though adolescents who are struggling with drugs are more likely to be truant from school, schools still have potential access to these students to provide outreach and referrals.

Another potential consideration for research is to examine more closely the differences between adult and adolescents receiving treatment for substance misuse. There is already a body of research that acknowledges the differences between these two populations, but additional research may further fuel the need for different treatment options and referral options.

Another research need in this area is further study the long-term outcomes of adolescents who complete treatment as part of the drug treatment court model. Studies are inconsistent in the outcomes for these adolescents and initial motivation to avoid consequences may be short-term (Friedman, Terras & Ali, 1998; Yeterian, Green, Bergman & Kelly, 2013). Though treatment may provide a more appealing option compared to incarceration, perhaps the justice system may be better served by researching the global factors precipitating the arrest of minors for drug offenses.

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