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Racial and Ethnic Disparities, Referral Source and Attrition From Outpatient Substance Use Disorder Treatment Among Adolescents in the United States

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Abstract

The following study examined the association between race, ethnicity, referral source, and reasons for attrition from substance use treatment in a sample of 72,643 discharges of adolescent youth in the United States from 2014 to 2016. Black and Hispanic adolescents were more likely to be discharged due to incarceration and termination by the facility compared to White adolescents. Adolescents referred by probation, diversion, other juvenile justice organizations, health care providers, community agencies, and individual referrals were significantly more likely to be discharged due to incarceration and terminated by the treatment facility compared to youth who were referred by schools. Findings suggest that enhancing linkage to treatment from systems in the social environment may play a role in attenuating racial and ethnic disparities in rates of attrition from substance abuse treatment among adolescent youth in the United States.

Keywords

race/ethnicity; African-American; alcohol and drug use/abuse/addiction

Introduction

It is estimated that out of the 1.03 million adolescents between 12 and 17 years old who have a substance use disorder (SUD) in the United States, 969,000 or 75% did not receive substance use treatment (SUT). Prior literature points to racial and ethnic disparities in

SUT outcomes in which Black youth are less likely to complete SUT than their White counterparts (Alegria et al., 2011; Campbell et al., 2006; Guerrero et al., 2013; Jacobson et al., 2007; Saloner & Cook, 2013; Saloner et al., 2014). Black and Hispanic adolescents may be at greater risk of discharge from SUT due to re-arrest and incarceration from greater exposure to the juvenile justice system and socioeconomic disparities (Acevedo et al., 2012; Ewing et al., 2011). None of these prior studies examined associations between racial and ethnic background and the specific reasons for not completing SUT. Identifying racial and ethnic differences in the specific reasons for discharge could illuminate new strategies to attenuate disparities in completion rates between Black, Hispanic, and White adolescent youth.

Racial and Ethnic Differences in Engagement in Treatment Among Adolescents

Prior literature suggests that Black and Hispanic populations are significantly less likely to complete SUT due to socioeconomic factors (Jacobson et al., 2007; Saloner et al., 2014; Saloner & Cook, 2013). Saloner et al. (2014) examined discharge data from SUT episodes among adolescents and found that sex, age, poly-substance use, daily use, education, homelessness, treatment setting, referral source, and social contextual factors explained 12.7% of the alcohol treatment gap between black and white youth and 57.4% of the Hispanic-white alcohol treatment gap. Saloner and Cook (2013) found that Black and Hispanic adults were 3.5% and 8.1% less likely to complete SUT and these differences were explained by lower socioeconomic status, housing status, and unemployment. Christie et al. (2018) used clinical service data and found substance use severity, living situation, sex age, and ethnicity predicted retention in outpatient alcohol and other drug treatment for adolescents. Alegria et al. (2011) reviewed literature on behavioral health services and found that compared to White adolescents, Black, and Hispanic adolescents were less likely to report receiving specialty SUT due poor matching of minority youth to clinical need and preferred treatments such as individual treatment, and poor access to services for co-occurring psychiatric disorders. Among Hispanic youth, prior literature suggests that cultural barriers may result in lower rates of retention in SUT and yet studies are limited that examine service use among Hispanic adolescents (Guerrero et al., 2013).

Although prior studies have identified significant racial and ethnic disparities in retention in SUT among adolescents, research is limited that considers specific reasons for not completing SUT. Studies are yet to examine racial and ethnic disparities in discharge from SUT due to incarceration, breaking clinic rules, and leaving against medical advice. Racial and ethnic minorities disproportionately encounter the juvenile justice system and are incarcerated compared to white adolescents. Research is yet to examine racial and ethnic disparities in discharge from SUT due to incarceration. Prior research suggests that racial and ethnic minority adolescents are disproportionately punished at school resulting in greater risk of engagement in the juvenile justice system (Marchbanks et al., 2018; Smith, 2015). Research is lacking that examines if these patterns exist in treatment settings in which racial and ethnic minority adolescents may be at greater risk of being discharged from SUT due to breaking clinic rules. Identifying racial and ethnic disparities in reasons for discharge from SUT could identify new strategies to increase retention in SUT for racial and ethnic minority adolescents.

Referral to Treatment for Adolescents With Substance Use Disorders

Early intervention through referral to SUT for youth is a crucial strategy to avert economic and human costs imposed by substance use among adolescents (Dauria et al., 2018; Margret & Ries, 2016; Williams & Chang, 2000). Saloner et al. (2014) found that referral from the juvenile justice system, schools, and SUT providers was associated with Black-White and Hispanic-White disparities in completion of SUT among adolescents. Linkage to SUT among adolescents occurs through referral from systems in the social environment including schools, family members, healthcare providers, and juvenile justice agencies consisting of courts, probation, and diversion from detention. Figure 1 illustrates systems in the social environment that provide referrals to SUT for adolescent youth. Juvenile justice systems account for 43% of all referrals to adolescent SUT programs (SAMSHA, 2019). This represents the largest proportion of referrals to adolescent SUT services in the United States (Mutter et al., 2015). Youth referred by the juvenile justice system may be at greater risk of attrition because of stigma, re-arrest or not complying with the conditions of supervision in the community (Burnett & Roberts, 2013). Although prior research finds rates of retention are higher among juvenile justice referrals, adolescents who are involved in the justice system return to drug use and are reincarcerated at higher rates leading to worse SUT outcomes (Cicourel, 2017; Cooper, 2002; Kaminer et al., 2019).

Family members may recognize changes in behavior such as diminished school engagement, altered personality, new peer groups, and disengagement from extracurricular interests which prompt family referrals to SUT (Haine-Schlagel & Walsh, 2015; Spoth & Redmond, 2000; Thompson et al., 2007). In addition to family members, screening and assessment by health care practitioners including pediatricians and family health practitioners may identify substance use problems and refer youth to SUT (Harris et al., 2012, 2016; Pilowsky & Wu, 2013; Shrier et al., 2003). Finally, school-based referrals to treatment play a crucial role in linking youth to SUT and are shown to increase engagement and retention (Champion et al., 2013; SAMSHA, 2019).

Despite the importance of numerous social systems in linking adolescents to SUT, research is lacking that examines the role of referral sources in shaping risk of specific reasons for not completing SUT among adolescents. Referral to SUT from multiple systems of the social environment including schools, families, and health care providers facilitate early intervention for addictive disorders (Henggeler, 2017; Henggeler & Schaeffer, 2016; Henggeler et al., 1992; Stockings et al., 2016; Winters et al., 2018). To address these gaps, this study examined the relationship between race/ethnicity referral source (i.e., criminal justice, schools, family) and risk of discharge from SUT due to incarceration, termination by the facility, and leaving against professional advice among adolescents aged 12 to 17 who were discharged from SUT programs in the US between 2014 and 2016.

The Current Study

The following study addresses gaps in existing literature by examining the association between racial and ethnic composition, referral source, and reasons for discharge after adjusting for potential confounders. Hypotheses expected that youth who were male, Black, Native American, and Hispanic would be more likely to not successfully complete treatment

due to incarceration, termination by the facility for breaking clinic rules, and leaving against professional advice compared to White youth. This study also hypothesized that youth who were referred by juvenile justice organizations, particularly courts and detention centers, would be more likely to be discharged due to incarceration and for breaking clinic rules compared to youth who were referred by schools. This study hypothesized that shorter length in treatment would be associated with increased risk of discharge due to incarceration, leaving against professional advice, and termination by the facility.

Methods

Data

Data for this study comes from Treatment Episode Dataset-Discharges (TEDS-D) which includes information on demographic, primary, secondary, and tertiary substances used at admission, frequency of drug use, referral type (i.e., health care provider, school, criminal justice system, substance use provider, self-referral), type of services received, number of prior treatment episodes, length of stay, type of services received (i.e., residential, outpatient and inpatient), and reason for discharge (i.e., incarceration, termination due to breaking facility rules, and leaving against professional advice) (SAMSHA, 2014, 2015, 2016). The unit of analysis in the TEDS-D consists of discharge from a federally-funded facility that is state licensed or certified to deliver SUT in the US. Data were collected by the Center for Behavioral Health Statistics and Quality (CBHSQ) administered by the Substance Abuse and Mental Health Services Administration (SAMSHA) of the United States Department of Health and Human Services (DHHS). Data for this study consists of 72,643 discharges of adolescents ages 12 to 17 years and occurring in 2014, 2015, and 2016. Data was recorded by clinical and administrative facility staff members through administrative documents (referral source, length of treatment, number of treatment episodes) and self-report by clients (substance use, race/ethnicity) and reported to SAMSHA annually by facility staff. Prior arrest was recorded depending on the policies of the substance use facility and could include self-report, notification of arrest by court documents, probation officers or other mandating agencies.

Measures

Dependent variable.—*Reason for discharge* included a categorical variable measuring if the discharge from SUT was due to completion, leaving against professional advice, termination by the facility or incarceration. Treatment completion was indicated if the client completed all parts of the treatment plan or program. Leaving against professional advice was indicated if the client left SUT for unknown reasons, clients who disengaged from treatment for a period, clients who left despite specific advice to continue treatment and clients who were discharged from treatment for administrative reasons. Discharges due to transfer to another treatment program or facility, death, and other reasons were excluded from this study. The dependent variable consisted of a categorical nominal variable measuring reasons for treatment completion that was coded as follows: (0) completed treatment, did not complete treatment due to (1) incarceration, (2) breaking facility rules, and (3) leaving against professional advice. The TEDS dataset classifies reasons for discharge due to leaving against professional advice if the client left the treatment program

voluntarily with or without specific advice to continue treatment, leaving for an unknown reason, and missing treatment for a prolonged period. Termination by facility was indicated if the client's enrollment was terminated due to violation of procedures, rules or laws and by action of the facility. Incarceration was indicated if clients' enrollment in the treatment ended because of admission to jail, prison or a house of confinement.

Independent variables.—*Referral source* consisted of a multinomial categorical variable measuring the agency that issued a referral to SUT. The coding of the referral source variable included (1) courts, (2) probation, (3) diversion, and (4) other juvenile justice organizations (detention, DUI/DWI, other juvenile justice and family justice agencies), (5) schools, (*teacher, guidance counselor, school principal, student assistance program or another educational agency*), (6) self/family referral, (7) health care provider *(a licensed health care professional or from another facility consisting of a mental health program, nursing home, general hospital or psychiatric hospital)*, (8) alcohol or drug use providers *(clinics or programs staffed by health care provider whose primary occupational responsibility is to deliver treatment for clients who are diagnosed with substance use disorders, educational services or the prevention of substance use)*, and (9) other community-based organization (poverty relief, unemployment, shelter, social welfare, NA/AA). The reference category was referral from schools.

Race included a categorical variable measuring whether the client identified as White (1 = reference) Black (2), Asian (3), Native American (4), other or more than one race (5). A second categorical variable identified if clients identified as Hispanic ethnicity (1 = yes, 0 = no). Race and ethnicity were two separate variables.

Juvenile justice involvement included a dichotomous variable indicating one or more prior arrests (1 = yes, 0 = no) in the 30 days preceding the date of admission to the treatment program.

Substance use at admission consisted of six binary variables that referred to use of the particular drug (1 = yes, 0 = no) that included: (1) heroin, (2) other opioids (synthetic and methadone), (2) benzodiazepines, (3) methamphetamines, (4) amphetamines, (5) marijuana, and (6) alcohol. The substance use categories consisted of dichotomous variables that referred to use of the particular drug (e.g., methamphetamines). The reference category for each substance consisted of not using the particular drug.

Current and prior substance use treatment included one dichotomous variable (1 = yes, 0 = no) measuring if the client had one or more treatment episodes prior to admission to this alcohol or drug treatment program. *Prior Substance use treatment* (SUT) included one dichotomous variable (1 = yes, 0 = no) measuring if the client had one or more treatment episodes prior to admission to this alcohol or drug treatment program. *Length of treatment.* A categorical variable measured the length of the treatment episode based on the date of admission to treatment and the last contact with the treatment program. Categories were coded as (1) 0 to 29 days, (2) 30 to 90 days, (3) 90 days to 6 months, (4) 6 months to 364 days, and (5) more than a year.

Psychiatric problems indicated if the client reported a comorbid psychiatric problem in addition to use of alcohol or other substance use at the time of admission (1 = yes, 0 = no).

Sociodemographic covariates consisted of age (1 = 12–14, 0 = 15–17 years of age at the time of admission), biological sex (1 = female, 0 = male), and employment status (1 = employed, 0 = unemployed/part time employed/not in labor force). A categorical housing status variable included (1) homeless (*no fixed address or shelter*) in (2) dependent living (*residential institution, halfway house, foster care institutions or living with parents or other guardians*), and (3) independent living.

Statistical analysis.—Descriptive analyses consisted of proportions and counts of independent variables of source of referral, sex, age, race, ethnicity, employment, living arrangements, prior arrest, length of current SUT episode, prior treatment, a variable measuring daily drug use of any drug, types of drugs used at admission, comorbid psychological problems, and geographic region. Multinomial regression modeling estimated the relative risk of membership in the 4-class nominal dependent variable measuring reasons for discharge from treatment (Gu et al., 2013; Hamilton, 2012; Hilbe, 2009; Kwak & Clayton-Matthews, 2002). Multinomial modeling produced regression coefficients in the form of log-odds on the logit scale and were converted to relative risk ratios (RR) (Gu et al., 2013; Rabe-Hesketh & Everitt, 2010). The multinomial regression model estimated associations between independent variables and relative risk of discharge due to incarceration, leaving against professional advice, and termination by the facility with treatment completion as the referent group. Relative risk ratios greater than 1 suggest that the risk of the comparison group is greater for each value of the independent variable. Relative risk ratios that are less than one suggests that the risk of the comparison group is less than the risk in the referent group for each value of the independent variable (Böhning, 1992; Campbell & Donner, 1989; Kwak & Clayton-Matthews, 2002; Rabe-Hesketh & Everitt, 2010). All standard errors use robust estimation of variance developed by Huber (1967) to adjust for potential bias (Camey et al., 2014). All regression models adjusted for clustered nature of the data using indicators of living within nine geographic divisions.

Results

Descriptive Results

Reason for discharge.—Out of the entire sample, 43.07% (*n* = 31,285) successfully completed treatment (Table 1). The greatest proportion of discharges consisted of leaving against professional advice accounting for 44.47% (32,305) followed by being terminated by the facility accounting for 8.65% (6,282), and being discharged due to incarceration accounting for 3.81% (2,771) of the discharges.

Source of referral.—The most prevalent source of referral for the clients was the juvenile justice system accounting for 42.57% (24,750) of discharges. Referral from probation and parole accounted for 12.21% (8,868), court referrals accounted for 9.53% (6,923), diversion programs accounted for .69% (*n* = 501) and other juvenile justice organizations accounted for 11.64% (8,458) of the discharges. In addition to the juvenile justice system, self or family accounted for 23.08% (16,763), schools accounted for 18.71% (13,587), health care

providers accounted for 5.51% (3,999), alcohol or drug use treatment services accounted for 4.36% (3,167), and other community referral sources accounted for 14.28% (10,377) of all discharges.

Multinomial Models of Relative Risk of Reasons for Treatment Non-Completion

Risk of discharge due to incarceration versus completion

Referral sources.: Compared to referral from schools, referral from another alcohol/drug use counselor (RRR = 2.78, $CI_{95\%}$ = 2.12, 3.64, $p < .001$), health care provider (RRR = 3.21, $CI_{95\%}$ = 2.44, 4.24, $p < .001$), other community referral (RRR = 3.68, $CI_{95\%}$ = 3.02, 4.48, $p < .001$), and individual/family referrals (RRR = 1.95, $CI_{95\%}$ = 1.59, 2.40, $p < .001$) were more likely to be discharged due to incarceration (Table 2). Compared to referral from schools, referrals from courts (RRR = 3.74, $CI_{95\%}$ = 3.00, 4.68, $p < .001$), probation/parole (RRR = 6.72, $CI_{95\%}$ = 5.58, 8.09, $p < .001$), detention diversion (RRR = 3.00, $CI_{95\%}$ = 1.66, 5.41, $p < .001$), and other juvenile justice agencies (RRR = 6.70, $CI_{95\%}$ = 5.58, 8.03, $p < .001$) had a greater relative risk of discharge due to incarceration.

Sociodemographic factors.: Black youth were significantly more likely to be discharged due to incarceration compared to White youth (RRR = 1.95, $CI_{95\%}$ = 1.74, 2.19, $p < .001$). Native American youth were less likely to be discharged due to incarceration (RRR = .71, $CI_{95\%}$ = .55, .90, $p < .001$) compared to White youth. Youth who were between 12 and 14 years of age (RRR = 1.14, $CI_{95\%}$ = 1.02, 1.29, $p < .05$) had a greater relative risk of discharge due to incarceration compared to youth who were 15 to 17 years old. Adolescent girls were less likely to be discharged due to incarceration compared to boys (RRR = .50, $CI_{95\%}$ = .45, .56, $p < .001$). The relative risk of discharge due to incarceration of youth with one or more prior arrests was significantly greater compared to youth with no arrests (RRR = 1.99, $CI_{95\%}$ = .78, .92, $p < .001$).

Current and prior substance use treatment.: The relative risk of discharge due to incarceration of youth who spent fewer than 30 days in treatment (RRR = 5.87, $CI_{95\%}$ = 4.57, 7.55, $p < .001$) and 30 to 89 days in treatment (RRR = 2.18, $CI_{95\%}$ = 1.70, 2.78), $p < .001$) were significantly greater than the relative risk of discharge due to incarceration of youth who spent a year or more in treatment. Youth with more than one prior treatment episode (RRR = 2.12, $CI_{95\%}$ = 1.94, 2.31, $p < .001$) were more likely to be discharged due to incarceration compared to youth with one or no prior treatment episodes.

Substance use at admission.: The types of drugs used at admission that were significantly associated with increased risk of discharge due to incarceration included heroin (RRR = 1.42, $CI_{95\%}$ = 1.01, 2.00, $p < .05$), synthetic opioids (RRR = 1.28, $CI_{95\%}$ = 1.03, 1.57, $p < .05$), methamphetamines (RRR = 2.19, $CI_{95\%}$ = 1.87, 2.56, $p < .001$), benzodiazepines (RRR = 1.25, $CI_{95\%}$ = 1.01, 1.60, $p < .001$), and cannabis (RRR = 1.63, $CI_{95\%}$ = 1.39, 1.92, $p < .001$).

Psychiatric problems.: Youth with co-occurring psychiatric problems at admission (RRR = 1.30, $CI_{95\%}$ = 1.17, 1.44, $p < .001$) were more likely to be discharged due to incarceration compared to youth with no psychiatric problems at admission.

Discharge due to leaving against professional advice

Referral source.: Compared to referral from schools, referrals from alcohol/drug use counselors (RRR = 1.39, $CI_{95\%}$ = 1.26, 1.52, $p < .001$), health care providers (RRR = 1.76, $CI_{95\%}$ = 1.61, 1.93, $p < .001$), other community referrals (RRR = 1.32, $CI_{95\%}$ = 1.24, 1.39, $p < .001$), and individual/family referrals (RRR = 1.69, $CI_{95\%}$ = 1.60, 1.78, $p < .001$) was significantly associated with increased risk of discharge due to leaving against professional advice. Regarding referral from juvenile justice agencies, discharge due to probation and parole (RRR = 1.26, $CI_{95\%}$ = 1.18, 1.34, $p < .001$) was associated with an increased risk of leaving treatment against professional advice. Discharges of adolescents referred from court referrals (RRR = .85, $CI_{95\%}$ = .78, .92, $p < .001$), diversion (RRR = .62, $CI_{95\%}$ = .49, .78, $p < .001$), and other juvenile justice agencies (RRR = .89, $CI_{95\%}$ = .84, .95, $p < .001$) were less likely to leave treatment against professional advice compared to discharges of adolescent youth referred by schools. Discharges of adolescents who used alcohol at admission were less likely to be discharged due to leaving treatment against professional advice (RRR = .85, $CI_{95\%}$ = .78, .92, $p < .001$).

Sociodemographics.: Black youth (RRR = 1.43, $CI_{95\%}$ = 1.36, 1.51, $p < .001$) were significantly more likely to be discharged due to leaving against professional advice compared to White youth. Native American (RRR = .71, $CI_{95\%}$ = .65, .76, $p < .001$) and Asian (RRR = .74, $CI_{95\%}$ = .66, .83, $p < .001$) youth were significantly less likely to be discharged from treatment due to leaving against professional advice. Hispanic ethnicity was associated with increased risk of being discharged due to leaving against professional advice (RRR = 1.10, $CI_{95\%}$ = 1.05, 1.15, $p < .001$). Discharges of adolescents who were 12 to 14 years old were significantly less likely to be discharged due to leaving against professional advice (RRR = .89, $CI_{95\%}$ = .85, 93, $p < .001$).

Current and prior treatment history.: The relative risk of being discharged due to leaving against professional advice was greater for discharges of adolescents whose treatment episode was less than 30 days (RRR = 2.72, $CI_{95\%}$ = 2.37, 3.12, $p < .001$), 30 to 89 days (RRR = 1.23, $CI_{95\%}$ = 1.08, 1.40, $p < .001$), and significantly less for discharges of adolescents whose treatment episode lasted 90 to 179 (RRR = .56, $CI_{95\%}$ = .49, .64, $p < .001$), 180 to 364 days (RRR = .47, $CI_{95\%}$ = .41, .54, $p < .001$). One or more prior treatment episodes was significantly associated with increased risk of leaving against professional advice compared to discharges of adolescents with one or fewer prior treatments (RRR = 2.12, $CI_{95\%}$ = 1.94, 2.31, $p < .001$). Compared to intensive outpatient treatment, discharges of adolescents who received non-intensive outpatient treatment was significantly associated with increased risk of discharge due to leaving against professional advice (RRR = 1.12, $CI_{95\%}$ = 1.05, 1.18, $p < .001$).

Substance use at admission.: Use of methamphetamines (RRR = 1.55, $CI_{95\%}$ = 1.43, 1.68, $p < .001$), benzodiazepines (RRR = 1.26, $CI_{95\%}$ = 1.15, 1.38, $p < .001$), cocaine (RRR = 1.17, $CI_{95\%}$ = 1.05, 1.30, $p < .01$), and cannabis (RRR = 1.62, $CI_{95\%}$ = 1.53, 1.72, $p < .001$), was associated with greater risk of leaving against professional advice compared to participants who did not use the particular drug. Discharges of adolescents who used alcohol at intake were less likely to be discharged due to leaving against medical advice compared to

discharges of adolescents who did not use alcohol at intake (RRR = .95, CI$_{95\%}$ = .92, .98, *p* < .001).

Comorbid psychiatric problem.: Discharges of adolescents with co-occurring psychiatric conditions were significantly more likely to be discharged due to leaving against professional advice compared to discharges of adolescents without co-occurring psychiatric conditions (RRR = 1.11, CI$_{95\%}$ = 1.07, 1.16, *p* < .001).

Discharge due to termination by facility

Referral source.: Discharges of adolescents who were referred by alcohol/drug use counselors (RRR = 1.51, CI$_{95\%}$ = 1.28, 1.77, *p* < .001), health care providers (RRR = 1.97, CI$_{95\%}$ = 1.71, 2.28, *p* < .001), other community organizations (RRR = 1.74, CI$_{95\%}$ = 1.54, 1.96, *p* < .001), and individual/family members (RRR = 2.09, CI$_{95\%}$ = 1.87, 2.33, *p* < .001), were associated with being discharged due to termination compared to adolescents referred by schools. Regarding the criminal justice system, adolescents who were referred by courts (RRR = 1.61, CI$_{95\%}$ = 1.42, 1.82, *p* < .001), probation (RRR = 1.48, CI$_{95\%}$ = 1.31, 1.68, *p* < .001), and other juvenile justice agencies (RRR = 1.18, CI$_{95\%}$ = 1.03, 1.36, *p* < .05) were at greater risk of being discharged due to termination by the facility.

Sociodemographics.: Discharges of Black (RRR = 1.87, CI$_{95\%}$ = 1.73, 2.03, *p* < .001), Native American (RRR = 2.28, CI$_{95\%}$ = 2.01, 2.58, *p* < .001), Asian (RRR = 1.54, CI$_{95\%}$ = 1.23, 1.94, *p* < .001), and other races (RRR = 1.68, CI$_{95\%}$ = 1.51, 1.86, *p* < .001) had a greater risk of discharge due to termination by facility. Discharges of girls were less likely to be terminated by the facility compared to boys (RRR = .88 CI$_{95\%}$ = .83, .94, *p* < .001).

Current and prior treatment history.: Discharges of adolescents who were in treatment for less than 30 days (RRR = 4.64, CI$_{95\%}$ = 4.25, 5.07, *p* < .001), and 30 to 89 days (RRR = 1.61, CI$_{95\%}$ = 1.49, 1.75, *p* < .001), was associated with increased risk of discharge due to termination by the facility compared to discharges of adolescents who received treatment for a year or longer. Discharges of adolescents whose duration of treatment was between 90 to 179 days (RRR = .68, CI$_{95\%}$ = .62, .73, *p* < .001), and 180 to 364 (RRR = .51, CI$_{95\%}$ = .47, .55, *p* < .001) were less likely to be discharged due to termination by the facility. Discharges of adolescents who had more than one prior treatment episode were significantly more likely to be discharged due to leaving against professional advice compared to discharges of adolescents who had one or fewer prior treatment episodes (RRR = 1.42, CI$_{95\%}$ = 1.33, 1.51, *p* < .001). Participants who received intensive outpatient treatment were less likely to be discharged due termination by the facility.

Substance use at admission.: The risk of discharge due to termination by the facility were greater among adolescents who used methamphetamines (RRR = 1.42, CI$_{95\%}$ = 1.22, 1.65, *p* < .001), benzodiazepines (RRR = 1.39, CI$_{95\%}$ = 1.22, 1.58, *p* < .001), and cannabis (RRR = 1.57, CI$_{95\%}$ = 1.40, 1.76, *p* < .001) compared to adolescents who did not report using the particular drug to facility staff.

Comorbid psychiatric condition.: Youth who reported a co-occurring psychiatric problem were more likely to be discharged due to termination by the facility compared to adolescents without psychiatric problems (RRR = 1.34, CI$_{95\%}$ = 1.26, 1.43, p < .001).

Discussion

The following study elucidated relationships between referral source, race, ethnicity, sex as well as prior treatment history, substance use, co-occurring psychiatric condition and reasons for not completing SUT in a sample of discharges of adolescents between the ages of 12 to 17 in the US. Multinomial regression analyses compared reasons for discharge using the referent category of treatment completion compared to not completing treatment due to incarceration, termination by the facility and leaving against medical advice. Findings supported several hypotheses put forth in this study. This study identified racial and ethnic disparities in risk of being discharged due to incarceration, leaving against professional advice, and termination by the SUT facility for discharges of Black adolescents. Analyses revealed discharges of Native American and Asian adolescents was associated with greater relative risk of discharge due to termination compared to White adolescents. Hispanic adolescents were more likely to be discharged due to leaving against professional advice.

Findings from this study expanded on prior literature by Saloner et al. (2014) that identified significant racial and ethnic disparities in which Black, Native American, Hispanic, and other races are less likely to complete treatment. Prior literature neglects to incorporate reasons for discharge into examining racial and ethnic disparities and factors associated with attrition from substance use treatment. The present study addressed a significant gap in prior literature by including reasons for not completing treatment and found that Black and Hispanic youth were more likely to be discharged due to incarceration, leaving against medical advice and being terminated by the facility compared to White adolescents. Native American, Asian, other race and more than one race were more likely to be discharged due to termination by the facility. Findings from this study are consistent with prior literature suggesting that racial and ethnic minorities are disproportionately policed and punished for substance use and delinquency which may lead to disparities in discharges due to incarceration and termination by the facility compared to White adolescents (Crutchfield et al., 2012; Hagan et al., 2005; Wu et al., 2015).

Compared to schools, discharges of adolescents who were referred by juvenile justice agencies were at greatest risk of not completing treatment due to incarceration, with completing treatment as a referent category as well as other types of attrition including termination by the facility and leaving against professional advice. The risk of discharge due to incarceration was more than six times greater for referrals from probation and from other juvenile justice agencies compared to school referrals with completing treatment, termination by facility and leaving against professional advice as referent categories. In addition to the juvenile justice system, referral from community-based health care providers were significantly associated with increased risk of incarceration, leaving against professional advice and termination by the facility compared to school-based referrals. Co-morbid psychological problems were significantly associated with increased risk of discharge from substance use treatment due to incarceration, termination by facility, and

leaving against professional advice. In addition to co-morbid psychiatric problems, the types of substances used particularly methamphetamines are associated with increased risk of discharge due to incarceration and termination by the facility.

Implications for Future Research on Multi-Systems Interventions to Improve Retention in Treatment

Findings from this study present implications for future research into redressing disparities in linkage, engagement, and successful completion of SUT programs for youth. Multisystemic interventions emphasize the importance of enhancing resources and changing relationships between systems in the social environment including schools, health care providers, and juvenile justice programs to promote resilience against substance use (Sexton & Lebow, 2015). Multisystemic approaches emphasize the importance of coordination between social systems including referrals to SUT for adolescents with substance use problems (Henggeler, 2017; Henggeler & Schaeffer, 2016). Youth are embedded in social systems that provide opportunities for prevention and treatment through directing youth with substance use problems to treatment agencies. Future research must investigate if addressing vulnerabilities to attrition from SUT by referral source could enhance the effectiveness of multi-systems approaches to delivering psychosocial interventions to adolescents.

Health care practitioners including primary care and family medicine providers are often the first professionals to screen, assess and identify need for specialized care. Future research must investigate if implementing motivational interviewing techniques by practitioners prior to issuing referrals may increase engagement in treatment and reduce risk of not completing treatment of adolescence. In addition to referral source, findings from this study suggest that opioid, methamphetamine, and cannabis use may increase risk of disengaging from treatment due to incarceration compared to completing treatment. These findings support existing research that suggests illicit use may be associated with increased risk of engaging in crimes to sustain drug use which may result in increased risk of disengaging from treatment due to incarceration.

Regarding SUT, shorter duration of treatment was significantly associated with increased risk of discharge with the greatest risk of discharge for treatment lasting less than 30 days compared to treatment longer than a year. These findings are consistent with prior literature suggesting that youth are most vulnerable to attrition early in treatment (Johnston et al., 2019). Barriers to engaging in treatment are most prominent early on in SUT including ongoing drug use, delinquency, risky peer groups, inconsistent parenting, and school disruptions. The longer youth are engaged in treatment could signify stabilization of chaotic social systems, and reengagement in school, employment, family stability thus attenuating risk of discharge from treatment. Future research must investigate the benefits of providing additional wrap-around services in outpatient treatment settings including home visits and peer mentorship in the first 30 to 90 days of treatment to ensure retention in treatment during the initial engagement in substance use treatment.

Untreated adolescent mental health problems are a major barrier to engaging in SUT. Unpleasant affective states increase the risk of ongoing drug use due to self-medication to cope with psychological distress. Co-occurring psychiatric problems may lead to greater

negative consequences due to rule-breaking behaviors at substance use clinics resulting in discharge from substance use treatment. Additionally, adolescents with mental health needs may feel stigmatized or have negative attitudes toward SUT that result in increased risk of leaving against medical advice. Integrated treatments that coordinate and co-locate psychiatric services within the same service delivery settings may increase engagement. Moreover, prior literature suggests that people with serious and persistent mental illness are disproportionately involved in the juvenile justice system because police may interpret their behavior as threatening or aggressive leading to increased risk of discharge due to incarceration (Alegria et al., 2011; Peters et al., 2015; Shufelt & Cocozza, 2006; Underwood & Washington, 2016; Zajac et al., 2015).

Similarly, SUT providers may interpret behaviors by adolescents with psychiatric problems as threatening and rule-breaking resulting in termination from treatment programs.

Limitations.—Several limitations are worth noting and provide fruitful avenues of future behavioral health and psychological research with adolescents to increase treatment retention. The cross-sectional design of this study precludes causal inference. Future research with longitudinal study designs of nationally representative samples could shed more rigorous insights into how systems provide referrals to youth for SUT, including consideration of repeated referrals for the same adolescents who cycle in and out of treatment. The dependent variable measured incarceration but did not differentiate what type of juvenile justice involvement led to incarceration. Similarly, the outcome variable did not differentiate why the youth left against professional advice or specific reasons for termination by the facility. This study did not measure termination from treatment due to structural barriers such as lack of health insurance or lack of transportation which may disproportionately impact adolescents whose parents do not have employer-based insurance or insurance that covers substance use treatment. Additionally, there is some possibility that youth may have had contact with multiple juvenile justice systems that may present unique barriers and challenges to retention whereas the dataset only measured the referring agency. Finally, this study only measured youth who were provided a referral from juvenile justice agencies which are often provided as a condition of release into the community. Future research should consider comparing outcomes among youth who are punished without the option of treatment to youth who are provided opportunities for diversion to identify the role of criminalization in shaping treatment outcomes among youth.

Conclusion

This study examined how referrals from social systems shape risk of disengaging from SUT. Youth are embedded within intersecting social systems that play a critical role in linkage and engagement in substance use treatment. Interventions that coordinate services across multiple systems are critical to substance use prevention and treatment among youth in the US. Practitioners must consider interventions such as peer navigators to assist young people in linkage to care particularly from referrals that are associated with higher risk of attrition from treatment such as the juvenile justice. Practitioners working within specialized substance use facilities should consider implementing policies that do not discharge youth during brief periods of detention and incarceration. Additional research is

needed evaluating the impact of providing interventions as alternatives to terminating youth due to violating clinic rules such as motivational enhancement, peer support, and problem solving. Identifying factors associated with reasons for attrition could inform new research and interventions to increase retention in substance use treatment programs in the United States.

Funding

Biographies

Phillip L. Marotta, PhD, is an assistant professor at the Brown School Washington University in St. Louis. His research examines the social and behavioral factors that predict engagement in substance use treatment for adolescents and adults who are involved in the criminal justice system.

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Renee M. Cunningham-Williams, PhD, is an associate professor in the Brown School at Washington University in St. Louis. Renee Cunningham-Williams is a leading expert in the epidemiology and comorbidity of problem gambling, substance use/abuse, and mental and behavioral health, particularly among African-American youth and emerging adults.

Durrell Malik Washington Sr, MSW, is a PhD student at University of Chicago School of Social Service Administration. Durrell Malik Washington research interest lies in understanding the intersections between juvenile justice and systems of care. Durrell is also interested in using network and spatial analysis to understand patterns of incarceration in urban neighborhoods.

Dexter Voisin, PhD, is dean of the Factor-Inwentash School of Social Work and the Sandra Rotman chair in Social Work at the University of Toronto. A central focus of Voisin's scholarship is examining the impact of structural, neighborhood and police violence on the life chances and behavioral trajectories of urban youth and the protective factors that protect youth in the presence of such adversities.

References

Acevedo A, Garnick DW, Lee MT, Horgan CM, Ritter G, Panas L, Davis S, Leepar T, Moore R, & Reynolds M (2012). Racial and ethnic differences in substance abuse treatment initiation and engagement. Journal of Ethnicity in Substance Abuse, 11(1), 1–21. [PubMed: 22381120]

Alegria M, Carson NJ, Goncalves M, & Keefe K (2011). Disparities in treatment for substance use disorders and co-occurring disorders for ethnic/racial minority youth. Journal of the American Academy of Child & Adolescent Psychiatry, 50(1), 22–31. [PubMed: 21156267]

Böhning D (1992). Multinomial logistic regression algorithm. Annals of the Institute of Statistical Mathematics, 44(1), 197–200.

Burnett R, & Roberts C (Eds.). (2013). What works in probation and youth justice. Routledge.

Camey SA, Torman VBL, Hirakata VN, Cortes RX, & Vigo A (2014). Bias of using odds ratio estimates in multinomial logistic regressions to estimate relative risk or prevalence ratio and alternatives. Cadernos de saude publica, 30, 21–29. [PubMed: 24627010]

Campbell MK, & Donner A (1989). Classification efficiency of multinomial logistic regression relative to ordinal logistic regression. Journal of the American Statistical Association, 84(406), 587–591.

Campbell CI, Weisner C, & Sterling S (2006). Adolescents entering chemical dependency treatment in private managed care: ethnic differences in treatment initiation and retention. Journal of Adolescent Health, 38(4), 343–350.

Champion KE, Newton NC, Barrett EL, & Teesson M (2013). A systematic review of school-based alcohol and other drug prevention programs facilitated by computers or the Internet. Drug and Alcohol Review, 32(2), 115–123. [PubMed: 23039085]

Christie GI, Bavin LM, & Wills S (2018). Can we predict which adolescents will engage in outpatient substance abuse treatment? Substance Abuse: Research and Treatment, 12, 1178221818762802.

Cicourel A (2017). The social organization of juvenile justice. Routledge.

Cooper CS (2002). Juvenile drug treatment courts in the United States: Initial lessons learned and issues being addressed. Substance Use & Misuse, 37(12–13), 1689–1722. [PubMed: 12487239]

Crutchfield RD, Skinner ML, Haggerty KP, McGlynn A, & Catalano RF (2012). Racial disparity in police contacts. Race and Justice, 2(3), 179–202.

Dauria EF, McWilliams MA, & Tolou-Shams M (2018). Substance use prevention and treatment interventions for court-involved, non-incarcerated youth. In

Monti PM, Colby SM, & Tevyaw TO (Eds.), Brief interventions for adolescent alcohol and substance abuse (pp. 213–241). The Guilford Press.

Ewing SWF, Venner KL, Mead HK, & Bryan AD (2011). Exploring racial/ethnic differences in substance use: A preliminary theory-based investigation with juvenile justice-involved youth. BMC Pediatrics, 11(1), 71. [PubMed: 21846356]

Gu Y, Hole AR, & Knox S (2013). Fitting the generalized multinomial logit model in Stata. The Stata Journal, 13(2), 382–397.

Guerrero EG, Marsh JC, Khachikian T, Amaro H, & Vega WA (2013). Disparities in Latino substance use, service use, and treatment: Implications for culturally and evidence-based interventions under health care reform. Drug and Alcohol Dependence, 133(3), 805–813. [PubMed: 23953657]

Haine-Schlagel R, & Walsh NE (2015). A review of parent participation engagement in child and family mental health treatment. Clinical Child and Family Psychology Review, 18(2), 133–150. [PubMed: 25726421]

Hagan J, Shedd C, & Payne MR (2005). Race, ethnicity, and youth perceptions of criminal injustice. American Sociological Review, 70(3), 381–407.

Harris B, Shaw B, Lawson H, & Sherman B (2016). Barriers to addressing adolescent substance use: Perceptions of New York school-based health center providers. Journal of School Health, 86(2), 96–104. [PubMed: 26762820]

Harris SK, Csemy L, Sherritt L, Starostova O, Van Hook S, Johnson J, Boutler S, Brooks T, Carey P, Kossack R, Kulig JW, Van Vranken N, & Knight JR (2012). Computer-facilitated substance use screening and brief advice for teens in primary care: An international trial. Pediatrics, 129(6), 1072. [PubMed: 22566420]

Hamilton LC (2012). Statistics with Stata: Version 12. Cengage Learning.

Henggeler SW, Melton GB, & Smith LA (1992). Family preservation using multisystemic therapy: An effective alternative to incarcerating serious juvenile offenders. Journal of Consulting and Clinical Psychology, 60(6), 953. [PubMed: 1460157]

Henggeler SW (2017). Multisystemic therapy. The Wiley Online Encyclopedia of Juvenile Delinquency and Justice, 1–5.

Henggeler SW, & Schaeffer CM (2016). Multisystemic therapy®: Clinical overview, outcomes, and implementation research. Family Process, 55(3), 514–528. [PubMed: 27370172]

Hilbe JM (2009). Logistic regression models. Chapman and Hall/C

Huber PJ (1967). The behavior of maximum likelihood estimates under nonstandard conditions. Proceedings of the fifth Berkeley symposium on mathematical statistics and probability (Vol. 1, No. 1, pp. 221–233). University of California.

Jacobson JO, Robinson PL, & Bluthenthal RN (2007). Racial disparities in completion rates from publicly funded alcohol treatment: Economic resources explain more than demographics and addiction severity. Health Services Research, 42(2), 773–794. [PubMed: 17362217]

Johnston LD, Miech RA, O'Malley PM, Bachman JG, Schulenberg JE, & Patrick ME (2019). Demographic subgroup trends among adolescents in the use of various licit and illicit drugs, 1975–2018 (Paper No. 92). Monitoring the Future Occasional Paper Series. Institute for Social Research.

Kwak C, & Clayton-Matthews A (2002). Multinomial logistic regression. Nursing Research, 51(6), 404–410. [PubMed: 12464761]

Kaminer Y, Ohannessian C, & Burke R (2019). Retention and treatment outcome of youth with cannabis use disorder referred by the legal system. Adolescent Psychiatry, 9(1), 4–10. [PubMed: 31403025]

Marchbanks MPT III, Peguero AA, Varela KS, Blake JJ, & Eason JM (2018). School strictness and disproportionate minority contact: Investigating racial and ethnic disparities with the "School-to-Prison Pipeline". Youth Violence and Juvenile Justice, 16(2), 241–259.

Margret CP, & Ries RK (2016). Assessment and treatment of adolescent substance use disorders: Alcohol use disorders. Child and Adolescent Psychiatric Clinics, 25(3), 411–430.

Mutter R, Ali M, & Strashny A (2015). Profile of adolescent discharges from substance abuse treatment (The CBHSQ Report). Substance Abuse and Mental Health Services Administration (US).

Peters RH, Wexler HK, & Lurigio AJ (2015). Co-occurring substance use and mental disorders in the criminal justice system: A new frontier of clinical practice and research. Psychiatric Rehabilitation Journal, 38(1), 1–6. [PubMed: 25799301]

Pilowsky DJ, & Wu LT (2013). Screening instruments for substance use and brief interventions targeting adolescents in primary care: A literature review. Addictive Behaviors, 38(5), 2146–2153. [PubMed: 23454877]

Rabe-Hesketh S, & Everitt B (2010). Handbook of statistical analyses using Stata. Chapman and Hall/CRC.

Saloner B, & Cook BL (2013). Blacks and Hispanics are less likely than Whites to complete addiction treatment, largely due to socioeconomic factors. Health Affairs, 32(1), 135–145. [PubMed: 23297281]

Saloner B, Carson N, & Lê Cook B (2014). Explaining racial/ethnic differences in adolescent substance abuse treatment completion in the United States: A decomposition analysis. Journal of Adolescent Health, 54(6), 646–653.

Shrier LA, Harris SK, Kurland M, & Knight JR (2003). Substance use problems and associated psychiatric symptoms among adolescents in primary care. Pediatrics, 111(6), e699–e705. [PubMed: 12777588]

Shufelt JL, & Cocozza JJ (2006). Youth with mental health disorders in the juvenile justice system: Results from a multi-state prevalence study (pp. 1–6). National Center for Mental Health and Juvenile Justice.

Sexton TL, & Lebow J (Eds.). (2015). Handbook of family therapy. Routledge.

Smith ML (2015). A generation at risk: The ties between zero tolerance policies and the school-to-prison pipeline. McNair Scholars Research Journal, 8(1), 10.

Spoth R, & Redmond C (2000). Research on family engagement in preventive interventions: Toward improved use of scientific findings in primary prevention practice. Journal of Primary Prevention, 21(2), 267–284.

Stockings E, Hall WD, Lynskey M, Morley KI, Reavley N, Strang J, Patton G, & Degenhardt L (2016). Prevention, early intervention, harm reduction, and treatment of substance use in young people. The Lancet Psychiatry, 3(3), 280–296. [PubMed: 26905481]

Substance Abuse and Mental Health Services Administration. (2014). Treatment Episode Data Set (TEDS). Discharges, Rockville (MD): Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration. (2015). Treatment Episode Data Set (TEDS). Discharges, Rockville (MD): Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration. (2016). Treatment Episode Data Set (TEDS). Discharges, Rockville (MD): Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration. (2019) Treatment Episode Data Set (TEDS). Discharges, 2018. Rockville (MD): Substance Abuse and Mental Health Services Administration.

Thompson SJ, Bender K, Lantry J, & Flynn PM (2007). Treatment engagement: Building therapeutic alliance in home-based treatment with adolescents and their families. Contemporary Family Therapy, 29(1–2), 39–55. [PubMed: 20556209]

Underwood LA, & Washington A (2016). Mental illness and juvenile offenders. International Journal of Environmental Research and Public Health, 13(2), 228. [PubMed: 26901213]

Williams RJ, & Chang SY (2000). A comprehensive and comparative review of adolescent substance abuse treatment outcome. Clinical Psychology: Science and Practice, 7(2), 138–166.

Winters KC, Botzet AM, Stinchfield R, Gonzales-Castaneda R, Finch AJ, Piehler TF, Ausherbauer K, Chalmers K, & Hemze A (2018). Adolescent substance abuse treatment: A review of evidence-based research. Adolescent substance abuse (pp. 141–171). Springer.

Wu Y, Lake R, & Cao L (2015). Race, social bonds, and juvenile attitudes toward the police. Justice Quarterly, 32(3), 445–470.

Zajac K, Sheidow AJ, & Davis M (2015). Juvenile justice, mental health, and the transition to adulthood: A review of service system involvement and unmet needs in the US. Children and Youth Services Review, 56, 139–148. [PubMed: 26273119]
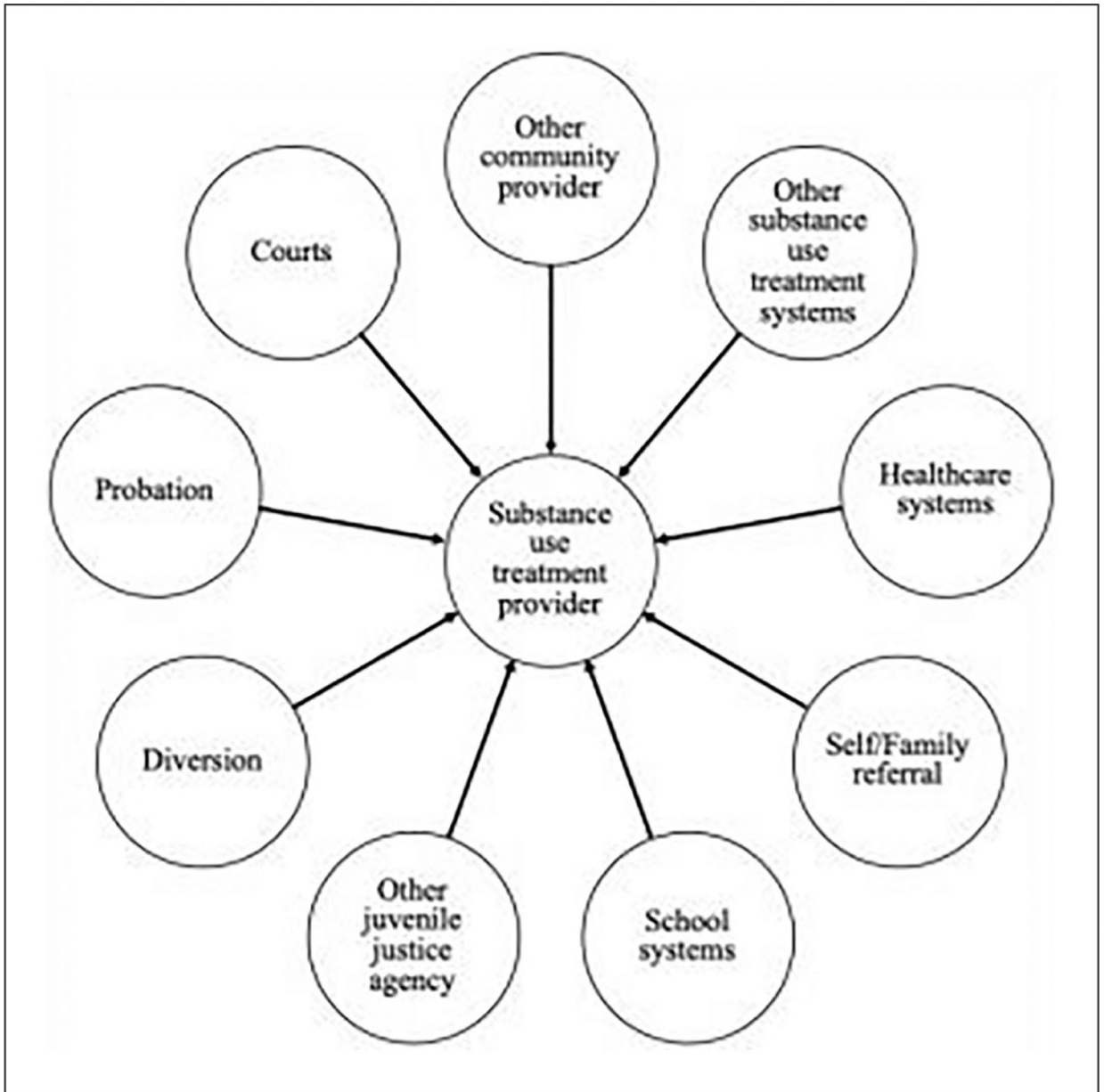
Figure 1.
Multi-systems model of referral of adolescents to substance use treatment.

Table 1.

Descriptive Statistics of Independent Variables and Treatment Noncompletion for Incarceration and Other Reasons (72,643).

	Overall	
	%	**n**
Sociodemographics		
Race		
White	51.27	(37,243)
Black	15.52	(11,275)
Native American	5.69	(4,130)
Asian	2.06	(1,498)
Other	21.42	(15,559)
> 1 race	4.04	(2,938)
Hispanic	36.82	(26,749)
Women	31.44	(22,837)
Reason for discharge		
Treatment completed	43.07	(31,285)
Left against professional advice	44.47	(32,305)
Terminated by facility	8.65	(6,282)
Incarcerated	3.81	(2,771)
Source of referral		
School	18.71	(13,587)
Alcohol/drug use counselor	4.36	(3,167)
Healthcare provider	5.51	(3,999)
Other community referral	14.28	(10,377)
Individual/family/parents	23.08	(16,763)
Juvenile justice system	42.57	(24,750)
Courts	9.53	(6,923)
Probation/parole	12.21	(8,868)
Diversion	0.69	(501)
Other juvenile justice organization	11.64	(8,458)
Prior arrest	8.50	(6,176)
Current and prior substance use treatment		
Length of treatment		
<30 days	18.47	(13,414)
30 to 90 days	29.34	(21,317)
90 to 179 days	29.69	(21,566)
180 to 364 days	17.53	(12,737)
>364 days	4.97	(3,609)
Non-intensive outpatient treatment	88.08	(63,979)
> 1 prior treatment episodes	29.11	(21,147)
Substance use at admission		

	Overall	
	%	**n**
Heroin	1.37	(995)
Synthetic opiates	3.68	(2,670)
Methamphetamines	5.30	(3,853)
Benzodiazepines	3.92	(2,850)
Cocaine	2.88	(2,091)
Amphetamines	1.26	(918)
Cannabis	89.47	(64,997)
Alcohol	42.03	(30,535)
Comorbid psychiatric condition	28.59	(20,771)
Geographic region		
New England	1.75	(1,271)
Mid-Atlantic	20.69	(15,032)
East North Central	5.59	(4,063)
West North Central	11.01	(7,998)
South Atlantic	6.67	(4,848)
East South Central	2.58	(1,875)
West South Central	2.25	(1,633)
Mountain	9.34	(6,782)
Pacific	40.12	(29,141)

Table 2.

Multinomial Regression of Factors Associated With Attrition From Treatment Due to Incarceration and Other Reasons Compared to Treatment Completion Among Adolescent Youth Aged 12 to 17 years of Age (72,643).

	Incarceration vs. completion		Left against professional advice vs. completion		Termination by facility vs. completion	
	aRRR	CI95%	aRRR	CI95%	aRRR	CI95%
Referral source (ref: School)						
Community based providers						
Alcohol/drug use counselor	2.78 ***	(2.12, 3.64)	1.39 ***	(1.26, 1.52)	1.51 ***	(1.28, 1.77)
Health care provider	3.21 ***	(2.44, 4.24)	1.76 ***	(1.61, 1.93)	1.97 ***	(1.71, 2.28)
Other community referral	3.68 ***	(3.02, 4.48)	1.32 ***	(1.24, 1.39)	1.74 ***	(1.54, 1.96)
Individual/family referral	1.95 ***	(1.59, 2.40)	1.69 ***	(1.60, 1.78)	2.09 ***	(1.87, 2.33)
Court/criminal justice system						
Court referral	3.74 ***	(3.00, 4.68)	0.85 ***	(0.78, 0.92)	1.61 ***	(1.42, 1.82)
Probation/parole	6.72 ***	(5.58, 8.09)	1.26 ***	(1.18, 1.34)	1.48 ***	(1.31, 1.68)
Diversion	3.00 ***	(1.66, 5.41)	0.62 ***	(0.49, 0.78)	0.88	(0.61, 1.26)
Other CJ agency	6.70 ***	(5.58, 8.03)	0.89 ***	(0.84, 0.95)	1.18 *	(1.03, 1.36)
Sociodemographics						
Race						
Black	1.95 ***	(1.74, 2.19)	1.43 ***	(1.36, 1.51)	1.87 ***	(1.73, 2.03)
Native American	0.71 **	(0.55, 0.90)	0.71 ***	(0.65, 0.76)	2.28 ***	(2.01, 2.58)
Asian	0.73	(0.49, 1.07)	0.74 ***	(0.66, 0.83)	1.54 ***	(1.23, 1.94)
Other	1.62 ***	(1.42, 1.84)	1.31 ***	(1.24, 1.38)	1.68 ***	(1.51, 1.86)
More than one	1.20	(0.99, 1.47)	1.02	(0.94, 1.11)	1.18	(0.99, 1.40)
Ethnicity						
Hispanic	1.08	(0.96, 1.21)	1.10 ***	(1.05, 1.15)	0.93	(0.86, 1.01)
Sex	0.50 ***	(0.45, 0.56)	0.97	(0.93, 1.01)	0.88 ***	(0.83, 0.94)
Age (ref: 15–17)						
12 to 14	1.14 *	(1.02, 1.29)	0.89 ***	(0.85, 0.93)	1.16 ***	(1.07, 1.26)

	Incarceration vs. completion		Left against professional advice vs. completion		Termination by facility vs. completion	
	aRRR	CI$_{95\%}$	aRRR	CI$_{95\%}$	aRRR	CI$_{95\%}$
Prior arrest	1.99 ***	(1.78, 2.23)	1.00	(0.94, 1.07)	1.06	(0.95, 1.17)
Current and prior treatment history						
Length of treatment (ref: > 1 year)						
<30 days	5.87****	(4.57, 7.55)	2.72 ***	(2.37, 3.12)	4	(4.25, 5.07)
30 to 89 days	2.18 ***	(1.70, 2.78)	1.23 **	(1.08, 1.40)	1.61 ***	(1.49, 1.75)
90 to 179 days	0.88	(0.68, 1.13)	0.56 ***	(0.49, 0.64)	0.68 ***	(0.62, 0.73)
180 to 364 days	0.76 *	(0.59, 0.99)	0.47 ***	(0.41, 0.54)	0.5.1 ***	(0.47, 0.55)
> 1 prior treatment episodes	2.12 ***	(1.94, 2.31)	1.34 ***	(1.29, 1.40)	1.42 ***	(1.33, 1.51)
Non-IOP (ref: intensive)	1.10	(0.96, 1.25)	1.12 ***	(1.05, 1.18)	0.66 ***	(0.61, 0.72)
Substance use at admission						
Heroin	1.42 *	(1.01, 2.00)	1.14	(0.97, 1.33)	1.20	(0.95, 1.51)
Synthetic opiates	1.28 *	(1.03, 1.57)	1.05	(0.95, 1.15)	0.92	(0.79, 1.07)
Methamphetamines	2.19 ***	(1.87, 2.56)	1.55 ***	(1.43, 1.68)	1.42 ***	(1.22, 1.65)
Benzodiazepines	1.25 *	(1.01, 1.60)	1.26 ***	(1.15, 1.38)	1.39 ***	(1.22, 1.58)
Cocaine	1.08	(0.85, 1.37)	1.17 **	(1.05, 1.30)	1.08	(0.91, 1.28)
Amphetamines	1.37	(0.97, 1.98)	1.05	(0.90, 1.22)	1.02	(0.80, 1.29)
Cannabis	1.63 ***	(1.39, 1.92)	1.62 ***	(1.53, 1.72)	1.57 ***	(1.40, 1.76)
Alcohol	1.01	(0.93, 1.10)	0.95 **	(0.92, 0.98)	1.00	(0.94, 1.06)
Comorbid psychiatric condition	1.30	(1.17, 1.44)	1.11 ***	(1.07, 1.16)	1 34 ***	(1.26, 1.43)

Note. IOP = intensive outpatient program.

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.