

Disparities in Criminal Justice Outcomes After Beginning Treatment for Substance Use Disorders: The Influence of Race/Ethnicity and Place

ANDREA ACEVEDO, PH.D.,^{a,*} JENNIFER MILES, M.A.,^b LEE PANAS, M.S.,^b GRANT RITTER, PH.D.,^b
KEVIN CAMPBELL, DR.P.H.,^c & DEBORAH GARNICK, SC.D.^b

^a*Department of Community Health, Tufts University, Medford, Massachusetts*

^b*Institute for Behavioral Health, The Heller School for Social Policy and Management, Brandeis University, Waltham, Massachusetts*

^c*Research and Data Analysis, Washington State Department of Social and Health Services, Olympia, Washington*

ABSTRACT. Objective: This study examined whether racial/ethnic disparities exist in posttreatment arrests and assessed the extent to which community characteristics account for such disparities. **Method:** Administrative data on clients ($N = 10,529$) receiving publicly funded services in Washington State were linked with criminal justice and census data. Multilevel survival models were used for two outcomes measuring time (in days) to any arrest and to any substance-related arrest. Community characteristics included a factor measuring community economic disadvantage and the proportions of residents in the client's residential census tract who were Black, Latino, or American Indian/Alaskan Native. **Results:** When we controlled for age, sex, substance use, referral source, and prior criminal justice involvement, Black clients (hazard ratio [HR]

= 1.47, $p < .01$) had a higher hazard of any arrest compared with White clients, and Black (HR = 1.27, $p < .05$) and Latino (HR = 1.20, $p < .05$) clients had a higher hazard of a substance-related arrest. Clients living in census tracts with a higher proportion of Black residents had a higher hazard of any arrest (HR = 1.25, $p < .01$) as well as substance-related arrests (HR = 1.39, $p < .01$). Community characteristics did not account for racial/ethnic disparities in arrests but provided an independent effect. **Conclusions:** Disparities in arrest outcomes are influenced by both individual- and community-level factors; therefore, strategies for reducing disparities in this treatment outcome should be implemented at both levels. (*J. Stud. Alcohol Drugs*, 80, 220–229, 2019)

CRIME-RELATED COSTS make up more than half of the societal cost of illicit drug use (National Drug Intelligence Center, 2011). Many individuals entering substance use disorder (SUD) treatment have had some type of criminal justice involvement, and the criminal justice system is the most common referral source for outpatient treatment for SUDs (Substance Abuse and Mental Health Services Administration [SAMHSA], 2017). Involvement with the criminal justice system can result in long-term negative effects on an individual's social, health, and economic well-being. Having a drug-related conviction may limit access to jobs, housing, health benefits, and financial assistance for higher education (Iguchi et al., 2002). Given the high crime-related costs to both individuals and society, later criminal justice involvement is a commonly used outcome to measure the success of SUD treatment.

In general, SUD treatment is associated with improved criminal justice outcomes. Individuals with SUDs who enter treatment are significantly less likely to have an arrest or be convicted of a crime compared with those who need but do

not receive treatment (Luchansky et al., 2006). Treatment retention and engagement have also been associated with fewer arrests, incarcerations, and criminal convictions (Bukten et al., 2012; Garnick et al., 2014; Luchansky et al., 2006; Luciano et al., 2014).

With any treatment outcome it is crucial to examine whether clients of different demographic backgrounds benefit equally and to understand potential sources of any identified disparities so that they can be addressed. Moreover, racial/ethnic disparities in law enforcement exist in the general population, which may affect disparities in criminal justice outcomes for SUD treatment. Thus, this study focused on whether racial/ethnic disparities exist in the likelihood of future arrest among clients entering outpatient treatment. The effects of both clients' individual characteristics and their communities' characteristics are considered in these analyses.

Previous studies of criminal justice involvement after SUD treatment included race/ethnicity in their analyses, but disparities due to race/ethnicity were not the primary focus. In a study examining the impact of SUD treatment (inpatient or outpatient) on arrest outcomes in Washington State, Luchansky et al. (2006) found that Black clients were significantly more likely to be arrested and convicted compared with White clients. Examining the linkage between the quality indicator of outpatient treatment engagement and arrests in four states, Garnick et al. (2014) found that Black clients were significantly more likely to be arrested in the year after

Received: August 10, 2018. Revision: December 1, 2018.

This research was supported by National Institute on Alcohol Abuse and Alcoholism Award No. R03AA023390. The content is the sole responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or of Washington State.

*Correspondence may be sent to Andrea Acevedo at the Department of Community Health, Tufts University, 574 Boston Avenue, Suite 208, Medford, MA 02155, or via email at: andrea.acevedo@tufts.edu.

beginning outpatient treatment episodes for SUDs compared with White clients. Acevedo et al. (2015) found that although engagement in outpatient treatment resulted in reductions in arrests overall, this decrease was not consistently seen for Black, Latino, and/or American Indian clients.

Studies of criminal justice outcomes have not accounted for the effects of community characteristics, although conceptually where a client resides can have important implications on substance use behaviors and resulting issues. Galea and colleagues (2005) posit that area-level economic disadvantage, residential segregation, and income inequality are underlying factors by which urban environments may influence patterns in substance use and its consequences. Some of the mechanisms include increased psychosocial stress, disinvestment in resources, and decreased access to education and employment opportunities, all of which could lead to higher likelihood of posttreatment arrests independently, or through higher substance use. Several studies support the association between area-level factors and substance use, showing that neighborhood economic disadvantage and the proportion of racial/ethnic minority residents correlate significantly with substance use and its consequences (Jones-Webb & Karriker-Jaffe, 2013; Karriker-Jaffe, 2011, 2013; Karriker-Jaffe et al., 2016; Latkin et al., 2007; Molina et al., 2012). Based on these results, it is likely that community characteristics affect substance use and related outcomes after treatment.

Criminal justice disparities, particularly in drug-related convictions, have been suggested as an underlying cause of health disparities because of their potential impact on employment, housing, and other social benefits that might affect health (Iguchi et al., 2005). Here we assess whether racial/ethnic disparities in posttreatment arrests exist, whether clients' residential communities are associated with this outcome, and the extent to which community characteristics account for observed racial/ethnic disparities. Given the impact of criminal justice system involvement on health, we define "racial/ethnic disparities in arrests" in a similar way as *Healthy People 2020* defines disparities in health: Disparities are not just differences between groups but differences that adversely affect groups who have systematically experienced greater obstacles and that are considered unjust and historically linked to discrimination or exclusion (U.S. Department of Health and Human Services, 2018).

Method

Data sources

The study focused on adult clients receiving publicly funded treatment for SUDs in specialty settings in Washington State. These specialty settings comprised drug and/or alcohol rehabilitation facilities that receive Medicaid, state, or block grant funding for SUD treatment.

We used treatment, criminal justice, and community-level data to answer our research questions. Washington State's treatment and criminal justice data, linked by Washington State's Behavioral Health Administration (BHA), have previously been used to examine several research questions related to criminal justice outcomes among SUD treatment participants (Campbell, 2009; Garnick et al., 2014; Luchansky et al., 2006). When the study began, BHA maintained the Treatment Activity Report Generation Tool, a comprehensive data collection system that captured information on individuals receiving publicly funded SUD treatment. This tool was used by state administrators as well as researchers because of its high standards of accuracy and integrity (Campbell, 2009; Luchansky et al., 2007). Data on client demographics, substance use, referral source, and residential location collected at treatment admission were derived from this data system. Incarceration and arrest data were obtained by BHA from the Washington State Patrol and the Department of Corrections. Linkage was completed using an integrated probabilistic and deterministic matching algorithm with the Link King software (Camelot Consulting, 2018; Campbell, 2009; Campbell et al., 2008) based on name, Social Security number, date of birth, and sex. This study was approved by the Brandeis University and the Washington State Institutional Review Boards.

Community-level data were derived from the 2010 U.S. Census and the American Community Survey (U.S. Census Bureau, 2018; 5-year averages from 2009 to 2013) and linked to individual-level data based on census tract indicators. BHA assigned these indicators to the individual-level observations and removed addresses and other personally identifying information before sharing the data.

Sample

The sample consisted of adult clients ages 18–54 who received publicly funded treatment and who had a new outpatient treatment admission in Washington State in 2012. If a client had more than one outpatient admission during 2012, only the first outpatient admission was included in the analyses. A total of 12,506 clients ages 18 and over had an outpatient treatment admission in 2012. We excluded clients who had missing race/ethnicity data ($n = 219$) or who did not identify themselves as one of the four largest racial/ethnic groups in the treatment sample ($n = 792$): White, American Indian/Alaskan Native, Latino, or Black. Of those who were excluded, 192 were Asian, 71 Hawaiian/Pacific Islander, 278 multiracial, and 251 remaining racial/ethnic groups—all groups too small for which to conduct analyses separately. Clients ages 55 and over were not included because the arrest rate for this age group is substantially lower than for other age groups (Bureau of Justice Statistics, 2012; $n = 736$); however, our results did not change when we included those 55 and older. We also excluded clients who died after

treatment admission as noted on their discharge record ($n = 32$), and those who were incarcerated after the treatment admission without an arrest because they were likely to have been incarcerated due to previous involvement with the criminal justice system (e.g., for violation of probation or parole; $n = 44$). Because of missing information within the client treatment data ($n = 154$), our final analytic models were based on data from 10,529 clients. Exclusions due to death, incarcerations without arrests, or missing data made up a similar proportion of the samples in each of the four racial/ethnic groups (<2%).

Dependent variables

We focused on two outcomes, both measured in days: (a) time to any arrest and (b) time to substance-related arrest. Classification of arrests into more specific categories was performed in accordance with the Bureau of Justice Statistics' codebook for the 2004 Survey of Inmates in State and Federal Correctional Facilities (U.S. Department of Justice, n.d.). Drug-related or driving-under-the-influence arrests were then combined to form the substance-related category.

Key independent variables

Race/ethnicity. Our main independent variable is the client's race/ethnicity as indicated in the BHA admission form, a client self-report interview. The BHA form asks about Latino origin and 16 subgroups and national origins for race/ethnicity categories. Clients could choose all categories that applied, and we restricted the analyses in this study to the four largest groups that made up the client population: Latino, non-Latino White, non-Latino American Indian/Alaskan Native, and non-Latino Black clients. Clients who identified as Latino were categorized as Latino regardless of their race response.

Community characteristics. Census tracts were used to define communities. Census tracts are small, stable geographic units (U.S. Census Bureau, 2012) and have been recommended as the ideal unit for monitoring disparities in health outcomes (Krieger et al., 2003) and for examining neighborhood-level effects on substance use (Karriker-Jaffe, 2011). Our analyses included four community characteristics: three measures of racial/ethnic composition for the percentages of residents who were Latino, non-Latino American Indian/Alaskan Native, and non-Latino Black, and a fourth community measure of economic disadvantage. This last variable was generated using factor analysis, a procedure used to reduce a large set of available covariates to a smaller, more manageable number of factors representing an underlying concept. The variables subjected to factor analysis included the following community-level percentages: residents who are unemployed, residents living below the poverty level, residents in management/professional occupations (recoded;

for employed civilian population, ages ≥ 16), female-headed households with children, and households with annual income $> \$75,000$ (recoded). Previous studies demonstrated that these community-level variables were associated with substance use, treatment continuity, or treatment completion and thus might affect the outcomes of SUD treatment (Jacobson et al., 2007; Karriker-Jaffe, 2013; Karriker-Jaffe et al., 2012; Mennis et al., 2012; Molina et al., 2012). We performed principal factor analysis with squared multiple correlations to determine the prior communality estimates. In our factor analysis, the Kaiser criterion (Kaiser, 1960) led us to retain one factor, which loaded most heavily on income and occupation variables and more modestly on education and female head of household variables. A standardized transform of this retained factor became the fourth community-level characteristic used in our analyses.

Clients in our sample resided in a total of 1,341 census tracts. The percentage of residents in a census tract who were American Indians ranged from 0.4% to 87%, Latino ranged from 1% to 88%, and Black ranged from 0% to 39%. The derived community economic disadvantage ranged from -2.29 to 3.64. For ease of interpretation, community variables were dichotomized as follows: Census tracts were ranked by continuous proportions or scores for each community variable and were categorized as "higher" if they fell in the top quartile (i.e., the top 350 census tracts). Based on these cutoffs, American Indian residents made up between 3% and 87% of residents in the census tracts deemed "Higher proportion of American Indians," Latino residents made up between 11% and 88% of residents in the census tracts deemed "Higher proportion of Latino residents," and Black residents made up between 4% and 39% of residents in the census tracts deemed "Higher proportion of Black residents." For the economic disadvantage variable, the top quartile ranged between 0.64 and 3.64.

Covariates

Our analyses included client-level covariates that were chosen based on prior findings of their association with arrest outcomes (Garnick et al., 2014; Luchansky et al., 2006) and/or because they associated with race/ethnicity in our descriptive analyses. Using arrest and incarceration data, we created a variable indicating whether a client had been arrested or incarcerated (yes/no) during the year before the admission. Other covariates were demographic and socioeconomic characteristics (gender, age, marital status, education, homeless/at risk of, employment status), substance use (drug use during the past month: alcohol, marijuana, cocaine, methamphetamines, opiates, and other substances; age at first use of any substance). This self-reported information was collected by treatment staff at admission. Criminal justice system referral was determined on self-report and/or if clients' services were funded by the state's Criminal Justice

Treatment Account, a fund to pay for treatment services for offenders with an SUD.

Analyses

Descriptive analyses were performed to examine variation by race/ethnicity with respect to client covariates, residential community characteristics, and outcome variables. Differences by race/ethnicity were tested using chi-square tests for categorical variables, followed with pairwise comparisons using a Bonferroni correction for multiple comparisons.

For our main analyses, we used hierarchical time-to-event modeling with clustering of clients within communities (Therneau & Grambsch, 2000). The outcome variable was time to arrest since treatment admission, measured in days. In these models, our key independent variables were race/ethnicity indicators and community characteristics. In testing for multicollinearity in our model specifications, we found no concerns, as none of the correlations between pairs of independent variables exceeded $r = .40$.

To model the time-to-event outcome data we chose a form of parametric survival analysis that incorporated a limited time of observation, or censoring. Most clients (59% for any arrest, and 84% for substance-related arrests) had their outcomes censored at 365 days after the treatment admission or December 31, 2013, whichever occurred first, if no arrest was found before this time. However, as some clients were incarcerated ($n = 40$) or were admitted to residential SUD treatment ($n = 327$) during the year after their outpatient treatment admission, their likelihoods of arrest were temporarily curtailed. In these cases, the time to censoring was extended by the number of days the client was in residential treatment or incarcerated, again with December 31, 2013, as an alternative. For clients whose length of time in residential treatment and incarceration went beyond December 31, 2013, the times-to-event were censored at the beginning of the incarceration or residential stay.

We used two model specifications. The first focused on the examination of clients' race/ethnicity while we controlled for covariates. The second included clients' race/ethnicity and covariates, along with their community's characteristics. Using this second model allowed for the examination of how the inclusion of community characteristics affected estimates of the client race/ethnicity variables in the first model. Thus, we can evaluate whether community characteristics accounted for racial/ethnic disparities in arrests. We used Stata MP Version 15 (StataCorp LP, College Station, TX) to conduct the analyses.

Sensitivity analysis

Because our goal is to identify disparities in posttreatment arrests associated with race/ethnicity, our main models adjust for pre-treatment arrest or incarceration, one of the strongest

predictors of arrests after beginning treatment (Garnick et al., 2014). However, we recognize that racial/ethnic inequality in the criminal justice system before current treatment could instigate an indirect effect on posttreatment outcomes. To the extent that the pre-treatment arrest/incarceration variable in our models reflects this effect instead of the race/ethnicity indicator, we will underestimate the full effect of race/ethnicity on posttreatment arrests. To address this issue, we conducted sensitivity analyses by removing the prior-year arrest/incarceration indicator from our models. Increases in the estimated effects of race/ethnicity when prior-year arrest/incarceration is excluded from our models provide estimates of the indirect effects of racial/ethnic disparity.

Results

Client characteristics at treatment admission

White clients made up the largest proportion of the sample (68.7%), followed by American Indian (13.0%), Latino (10.2%), and Black clients (8.1%). Racial/ethnic groups differed in sociodemographic, referral source, and substance use characteristics at treatment admission (Table 1). At least half of the clients in each racial/ethnic group had been arrested or incarcerated in the prior year, with rates highest for Black clients and Latino clients. Racial/ethnic differences also existed in terms of the communities in which clients resided.

Unadjusted criminal justice outcomes

Approximately 40% of clients were arrested in the year following clients' outpatient treatment admission, and 16% of clients were arrested specifically for a substance-related charge (Table 2). Significant racial/ethnic differences existed in the proportion of clients who were arrested, with Black clients having the highest arrest rate (53%). Racial/ethnic differences also existed for substance-related charges.

Multivariate results

Any arrest. Table 3 shows the effects of race/ethnicity on any arrest in survival models after treatment admission. With individual-level characteristics controlled for (Model 1), Black clients had higher hazard of an arrest in the year following treatment admission compared with White clients (hazard ratio [HR] = 1.47, $p < .01$). Thus, at any point in time after beginning outpatient treatment, nonarrested clients had a 47% higher hazard of arrest if they were Black than if they were White. When community-level characteristics were added (Model 2), this HR declines but is still highly significant (HR = 1.36, $p < .01$). Additionally, clients residing in communities with a higher proportion of Black residents had significantly higher hazards of being arrested in the year fol-

TABLE 1. Client characteristics at treatment admission

Variable	Entire sample (<i>N</i> = 10,529) %	Whites (W) (<i>n</i> = 7,228) %	American Indian/ Alaskan Native (AI/AN) (<i>n</i> = 1,369) %	Latinos (L) (<i>n</i> = 1,078) %	Blacks (B) (<i>n</i> = 854) %	Racial/ethnic group differences ^c
Client demographics						
Female	39.6	41.6	44.6	27.9	29.2	AI, W > L, B
Age						
18–20	8.1	7.0	8.3	17.7	5.7	L > B, AI, W
21–25	18.2	18.2	19.4	20.4	13.8	AI, L, W > B
26–30	18.2	19.3	16.3	18.0	13.0	W, L > B
31–44	35.3	35.3	36.5	33.8	35.3	n.s.
45–54	20.1	20.3	19.4	10.1	32.2	B > W, AI > L
Married	22.9	21.0	31.7	29.6	16.7	AI, L > W > B
Socioeconomic status						
Education						
Less than H.S.	29.5	25.8	33.6	47.8	30.7	L > B, AI > W
H.S. graduate	56.6	58.5	57.5	42.1	57.3	AI, B, W > L
More than H.S.	7.4	8.4	5.4	5.2	5.4	W > B, L, AI
Vocational training	6.5	7.3	3.5	4.9	6.7	W, B > AI W > L
Homeless/at risk of Unemployed	17.0 81.7	18.2 84.5	9.3 74.8	11.1 67.3	26.9 87.5	B > W > L, AI W, B > AI > L
Treatment referral and substance use						
Referral source						
Criminal justice	58.3	55.0	69.6	66.2	58.1	AI, L > W, B
Past-month use ^a						
Alcohol						
	27.0	25.4	29.4	27.6	35.7	B > AI > W B > L
Marijuana	20.6	20.4	19.2	18.4	27.8	B > W, L, AI
Cocaine	3.6	2.7	2.2	2.4	14.9	B > W, L, AI
Methamphetamines	9.2	11.2	5.0	6.8	2.5	W > AI > B, W > B > L
Opiates	13.1	14.6	13.7	7.6	6.2	AI, W > B, L
Other substance	3.0	3.4	1.6	2.2	2.2	W > AI
Age at first use ^b						
<10	12.6	12.7	12.7	9.7	14.4	W, B > L
11–14	36.8	37.7	37.6	33.3	32.4	W > B, L
15–17	31.2	30.8	30.3	35.2	30.9	L > W
18–20	10.7	10.1	12.0	12.7	11.1	n.s.
≥21	7.6	7.3	7.2	8.5	9.7	n.s.
Arrest or incarceration in prior year	51.5	50.5	49.4	54.2	59.5	B > W, AI
Community characteristics						
Higher economic disadvantage	39.9	36.9	47.2	48.0	43.4	AI, L, B > W
Higher concentration of . . .						
American Indian residents	45.1	40.7	79.5	35.4	39.7	AI > W, > L AI > B
Latino residents	34.1	28.7	42.7	58.2	35.4	L > AI > B > W
Black residents	30.0	27.0	18.7	26.1	78.1	B > W, L > AI

Notes: n.s. = not significant; H.S. = high school. ^aSubstance was listed as a primary, secondary, or tertiary drug and frequency of use was one or more times in the past month. ^bEarliest age at first use of any of the substances reported as primary, secondary, or tertiary substance used. ^cDifferences at the overall $p < .05$ level, using a Bonferroni correction for multiple comparisons ($p < .008$).

lowing treatment admission (HR = 1.25, $p < .01$) compared with those living in communities with lower concentrations of Black residents.

Substance-related arrest. Table 4 shows the effects of race/ethnicity and community-level characteristics on any substance-related arrest in survival models after treatment admission (only key variables shown). With only individual-level characteristics controlled for (Model 1), both Latino

(HR = 1.20, $p < .05$) and Black clients (HR = 1.27, $p < .05$) had higher hazards of a substance-related arrest in the year following treatment admission compared with Whites. The model including community-level characteristics (Table 4, Model 2) indicates that clients who resided in communities with higher proportions of Black residents had a higher hazard of being arrested for a substance-related charge (HR = 1.39, $p < .01$). None of the other community character-

TABLE 2. Client arrest after beginning treatment by client's race/ethnicity, unadjusted

Arrests in year following beginning of treatment episode	Total sample (N = 10,529)		White (W) (n = 7,228)		American Indian (n = 1,369)		Latino (L) (n = 1,078)		Black (B) (n = 854)		Racial/ethnic group differences ^a
	n	%	n	%	n	%	n	%	n	%	
Any arrest	4,270	40.6	2,833	39.2	529	38.6	457	42.4	451	52.8	B > W, L, AI
Substance related, drug or driving under the influence	1,657	15.7	1,104	15.3	196	14.3	198	18.4	159	18.6	B, L > AI

^aDifferences at the overall $p < .05$ level, using a Bonferroni correction for multiple comparisons ($p < .008$).

TABLE 3. Survival analysis of any arrest after beginning a new episode of outpatient treatment

Variable	Model 1 Race/ethnicity and individual characteristics		Model 2 Race/ethnicity, and individual and community characteristics	
	HR	[95% CI]	HR	[95% CI]
Individual characteristics				
Race/ethnicity (ref.: White)				
American Indian	0.99	[0.88, 1.11]	1.02	[0.91, 1.15]
Latino	1.10	[0.99, 1.23]	1.12	[1.00, 1.25]
Black	1.47**	[1.31, 1.64]	1.36**	[1.21, 1.53]
Arrest/incarceration in prior year	2.67**	[2.47, 2.88]	2.66**	[2.46, 2.88]
Female	0.77**	[0.71, 0.83]	0.77**	[0.72, 0.83]
Age (ref.: ≥45)				
18–20	1.43**	[1.24, 1.65]	1.45**	[1.25, 1.67]
21–25	1.39**	[1.24, 1.55]	1.40**	[1.25, 1.56]
26–30	1.32**	[1.18, 1.47]	1.33**	[1.18, 1.48]
31–44	1.22**	[1.11, 1.35]	1.22**	[1.11, 1.35]
Married	0.87**	[0.80, 0.95]	0.88**	[0.81, 0.96]
Socioeconomic status				
Education (ref.: less than H.S.)				
H.S. graduate	0.94	[0.87, 1.01]	0.94	[0.87, 1.01]
More than H.S.	0.84*	[0.72, 0.98]	0.83*	[0.71, 0.97]
Vocational training	0.97	[0.84, 1.13]	0.97	[0.83, 1.12]
Homeless/at risk of	1.20**	[1.10, 1.31]	1.16**	[1.07, 1.27]
Unemployed	1.27**	[1.15, 1.40]	1.26**	[1.15, 1.39]
Treatment referral and substance use				
Referral source				
Criminal justice	1.36**	[1.26, 1.47]	1.36**	[1.26, 1.47]
Past-month use ^a				
Alcohol	1.02	[0.94, 1.10]	1.02	[0.94, 1.10]
Marijuana	1.09*	[1.00, 1.19]	1.09*	[1.00, 1.19]
Cocaine	1.31**	[1.11, 1.54]	1.26**	[1.07, 1.48]
Methamphetamines	1.43**	[1.29, 1.59]	1.43**	[1.29, 1.59]
Opiates	1.39**	[1.26, 1.54]	1.39**	[1.26, 1.53]
Other substance	1.17	[0.96, 1.41]	1.16	[0.96, 1.40]
Age at first use ^b (ref.: ≥21)				
<10	1.15	[0.98, 1.34]	1.15	[0.99, 1.35]
11–14	1.18*	[1.03, 1.36]	1.19*	[1.03, 1.36]
15–17	1.03	[0.90, 1.19]	1.04	[0.90, 1.19]
18–20	1.10	[0.94, 1.29]	1.10	[0.94, 1.30]
Community variables				
Higher economic disadvantage	–	–	0.94	[0.86, 1.03]
Higher concentration of . . .				
American Indian residents	–	–	0.97	[0.89, 1.05]
Latino residents	–	–	0.92	[0.85, 1.00]
Black residents	–	–	1.25**	[1.15, 1.36]

Notes: Community variables: “Higher” refers to top quartile of census tract distributions, compared with the bottom three quartiles. HR = hazard ratio; CI = confidence interval; ref. = reference; H.S. = high school. ^aSubstance was listed as a primary, secondary, or tertiary drug, and frequency of use was one or more times in the past month. ^bEarliest age at first use of any of the substances reported as primary, secondary, or tertiary substance used.

TABLE 4. Survival analysis of a substance related arrest (driving under the influence or drug) after beginning a new episode of outpatient treatment

Variable	Model 1 Race/ethnicity and individual characteristics		Model 2 Race/ethnicity, and individual and community characteristics	
	HR	[95% CI]	HR	[95% CI]
Individual characteristics				
Race/ethnicity (ref.: White)				
American Indian	0.92	[0.76, 1.12]	0.99	[0.82, 1.20]
Latino	1.20*	[1.00, 1.43]	1.22*	[1.02, 1.46]
Black	1.27*	[1.05, 1.54]	1.13	[0.93, 1.38]
Arrest/incarceration in prior year	2.45**	[2.15, 2.80]	2.44**	[2.14, 2.78]
Community variables				
Higher economic disadvantage	–	–	0.89	[0.77, 1.03]
Higher concentration of . . .				
American Indian residents	–	–	0.89	[0.77, 1.02]
Latino residents	–	–	0.93	[0.81, 1.06]
Black residents	–	–	1.39**	[1.21, 1.59]

Notes: Controlling for age, gender, education, marital status, age at first use, past-month use, referred by criminal justice system, homelessness, and unemployed at admission. Community variables: "Higher" refers to top quartile of census tract distributions, compared with the bottom three quartiles. HR = hazard ratio; CI = confidence interval; ref. = reference.

* $p < .05$; ** $p < .01$.

istics were significantly associated with the hazard of a substance-related arrest. Among individual characteristics, Latino clients' disparity in substance-related arrests remained significant (HR = 1.22, $p < .05$), but the previously identified disparity among Black clients was no longer significant (HR = 1.13, $p = .21$). This is probably attributable to the moderate correlation between residing in a community with a high percentage of Black residents and being Black ($r = .31$).

Sensitivity analyses. Results from our sensitivity analyses showed that for the most part, the inclusion of prior-year criminal justice system involvement did not have a significant effect on our race/ethnicity or community variables estimates. None of the HR values for these variables changed by more than 0.1 when prior-year criminal justice involvement was removed from each of our models.

Discussion

Our findings reflect that both a client's individual race/ethnicity and the composition of a client's community have effects on criminal justice outcomes after treatment. This is the case even after adjusting for socioeconomic variables, substance use, and prior criminal justice involvement. Black and Latino clients were at an increased risk of being arrested after beginning outpatient SUD treatment compared with their White counterparts. These findings are consistent with prior research examining criminal justice outcomes (Acevedo et al., 2015; Luchansky et al., 2006), but this is the first study we are aware of that focuses specifically on disparities regarding this criminal justice outcome and additionally examines the role of community characteristics.

Disparities in criminal justice outcomes could be attributable to racial/ethnic differences in the quality of treatment

received. Black and Latino clients could be receiving lower quality of substance use care than other groups, resulting in smaller reductions in substance use compared with other groups, and thus have higher risk of arrest. A recent study found that Black clients receiving outpatient treatment in Washington State were less likely to receive timely services that meet the criteria for the quality indicator of treatment engagement (Acevedo et al., 2018b). These differences in quality could result in worse outcomes, as outpatient treatment engagement has been associated with reduced substance use, improved employment, and reduced risk of arrest (Dunigan et al., 2014; Garnick et al., 2014; Harris et al., 2010).

In general, a substantial proportion of arrestees (estimated to be more than 40%) screen positive for potential SUD, and this estimate is even higher for substance-related charges (Kopak et al., 2014). The disparities in arrest/incarceration outcomes we found could be the result of inequalities in law enforcement. The use of different practices for questioning and arresting Black individuals in general, and for drug-related charges specifically, is well documented (Edwards et al., 2013; Hartney & Vuong, 2009; Mitchell & Caudy, 2015). Black and Latino individuals are significantly more likely to be stopped while driving (Miller, 2009) and are more likely to be searched after a stop compared with Whites (Eith & Durose, 2011; Task Force on Race and the Criminal Justice System, 2011). These experiences make it more likely that drugs would be found, resulting in an increased likelihood of arrest. Policing practices such as those that focus on crack cocaine compared with other drugs and that place greater emphasis on outdoor drug venues (Beckett et al., 2006) also likely lead to a higher chance of arrest for Black individuals with SUDs.

Our finding that clients living in communities with a higher concentration of Black residents were more likely to be arrested shows that where clients live also affects their treatment outcomes. In community samples, residents living in communities with higher proportions of Black residents have higher rates of substance use and worse consequences for their substance use (Jones-Webb & Karriker-Jaffe, 2013; Molina et al., 2012). Living in communities with a higher proportion of Black residents has also been associated with lower likelihood of receiving timely services in the early stages of treatment (Acevedo et al., 2018b), which has been associated with worse criminal justice outcomes (Garnick et al., 2014). Communities with a higher proportion of Black residents are also associated with a lower likelihood of employment after beginning SUD treatment (Acevedo et al., 2018a), and unemployment might lead to more substance use and/or criminal justice involvement. Segregated neighborhoods also tend to have a higher concentration of alcohol outlets (LaVeist & Wallace Jr., 2000) and fewer employment opportunities (VonLockette, 2010; Weinberg, 2000), both of which may increase the likelihood of relapse.

There is also evidence of increased police presence, traffic stops, and searches in neighborhoods with more Black residents (Fagan & Davies, 2000; Fagan et al., 2009; Roh & Robinson, 2009), what some call “community profiling” (Ramchand et al., 2006). In our study, the variable for percentage of Black residents in the community was significantly associated with both criminal justice outcomes, but interestingly did not greatly reduce the significance of individual-level racial/ethnic indicators. This is in contrast to a study among young adults who were not in treatment, in which the disparity in arrests between White and Black young adults disappeared after neighborhood racial/ethnic composition was controlled for (Gase et al., 2016).

Several limitations to the study should be noted. Client treatment records were merged with arrest records using a well-established methodology and software. Yet unmatched arrests could have resulted if arrests took place in a different state or could have been due to errors in data entry or missing data of identifiers used in the linkage. These issues would have resulted in lower arrest outcomes, although we do not think there is a systematic effect by race/ethnicity. We used information on the client’s residential census tract at the time of treatment admission, and some clients may have relocated to an area with different characteristics. Our findings may be specific to Washington State and generalizability to other states is not assured. Last, we did not have detailed information on the facilities in which clients were being treated, such as staff qualifications and cultural competence, or provision of evidence-based practices, each of which may influence treatment outcomes. Future research should explore these relationships across different states and explore the additional impact of agency variables on disparities in arrest outcomes.

Conclusions

This study contributes to our understanding of disparities in SUD treatment outcomes and to the small but growing body of research that examines the influence of community of residence on outcomes. Given the detrimental effects of criminal justice involvement, disparities in criminal justice outcomes after treatment are likely contributing to disparities in health and economic well-being among some racial/ethnic groups and need to be addressed. Clients’ community of residence also influences treatment outcomes. Our findings underscore the importance of monitoring outcomes by race/ethnicity and the need to consider place when examining treatment outcomes or testing interventions. Future research should examine what factors within treatment agencies, communities, and law enforcement practices influence disparities in criminal justice outcomes. This information could ultimately be used to address these inequities.

References

- Acevedo, A., Garnick, D. W., Dunigan, R., Horgan, C. M., Ritter, G. A., Lee, M. T., . . . Wright, D. (2015). Performance measures and racial/ethnic disparities in the treatment of substance use disorders. *Journal of Studies on Alcohol and Drugs*, *76*, 57–67. doi:10.15288/jsad.2015.76.57
- Acevedo, A., Miles, J., Garnick, D. W., Panas, L., Ritter, G., Campbell, K., & Acevedo-Garcia, D. (2018a). Employment after beginning treatment for substance use disorders: The impact of race/ethnicity and client community of residence. *Journal of Substance Abuse Treatment*, *87*, 31–41. doi:10.1016/j.jsat.2018.01.006
- Acevedo, A., Panas, L., Garnick, D., Acevedo-Garcia, D., Miles, J., Ritter, G., & Campbell, K. (2018b). Disparities in the treatment of substance use disorders: Does where you live matter? *Journal of Behavioral Health Services & Research*, *45*, 533–549. doi:10.1007/s11414-018-9586-y
- Beckett, K., Nyrop, K., & Pflingst, L. (2006). Race, drugs, and policing: Understanding disparities in drug delivery arrests. *Criminology*, *44*, 105–137. doi:10.1111/j.1745-9125.2006.00044.x
- Bukten, A., Skurtveit, S., Gossop, M., Waal, H., Stangeland, P., Havnes, I., & Clausen, T. (2012). Engagement with opioid maintenance treatment and reductions in crime: A longitudinal national cohort study. *Addiction*, *107*, 393–399. doi:10.1111/j.1360-0443.2011.03637.x
- Bureau of Justice Statistics. (2012). *Arrest in the United States, 1990–2010* (NCJ 239423). Washington, DC: Author.
- Camelot Consulting. (2018). *The Link King: Record linkage and consolidation software*. Retrieved from <http://www.the-link-king.com/index.html>
- Campbell, K. M. (2009). Impact of record-linkage methodology on performance indicators and multivariate relationships. *Journal of Substance Abuse Treatment*, *36*, 110–117. doi:10.1016/j.jsat.2008.05.004
- Campbell, K. M., Deck, D., & Krupski, A. (2008). Record linkage software in the public domain: A comparison of Link Plus, The Link King, and a ‘basic’ deterministic algorithm. *Health Informatics Journal*, *14*, 5–15. doi:10.1177/1460458208088855
- Dunigan, R., Acevedo, A., Campbell, K., Garnick, D. W., Horgan, C. M., Huber, A., . . . Ritter, G. A. (2014). Engagement in outpatient substance abuse treatment and employment outcomes. *Journal of Behavioral Health Services & Research*, *41*, 20–36. doi:10.1007/s11414-013-9334-2

- Edwards, E., Bunting, W., & Garcia, L. (2013). *Report: The war on marijuana in black and white*. Retrieved from <https://www.aclu.org/report/report-war-marijuana-black-and-white>
- Eith, C., & Durose, M. R. (2011). *Contacts between police and the public, 2008. Bureau of Justice Statistics (NCJ 234599)*. Retrieved from <https://www.bjs.gov/content/pub/pdf/cpp08.pdf>
- Fagan, J., & Davies, G. (2000). Street stops and broken windows: Terry, race, and disorder in New York City. *Fordham Urban Law Journal*, 28, 457–504. Retrieved from <https://pdfs.semanticscholar.org/6cb2/ff3c544f6e3aaa5b8966e53e3f9867e6d860.pdf>
- Fagan, J., Geller, A., Davies, G., & West, V. (2009). Street stops and broken windows revisited: The demography and logic of proactive policing in a safe and changing city. In S. K. Rice & M. D. White (Eds.), *Race, ethnicity, and policing: New and essential readings*. New York, NY: New York University Press.
- Galea, S., Rudenstine, S., & Vlahov, D. (2005). Drug use, misuse, and the urban environment. *Drug and Alcohol Review*, 24, 127–136. doi:10.1080/09595230500102509
- Garnick, D. W., Horgan, C. M., Acevedo, A., Lee, M. T., Panas, L., Ritter, G. A., . . . Wright, D. (2014). Criminal justice outcomes after engagement in outpatient substance abuse treatment. *Journal of Substance Abuse Treatment*, 46, 295–305. doi:10.1016/j.jsat.2013.10.005
- Gase, L. N., Glenn, B. A., Gomez, L. M., Kuo, T., Inkelas, M., & Ponce, N. A. (2016). Understanding racial and ethnic disparities in arrest: The role of individual, home, school, and community characteristics. *Race and Social Problems*, 8, 296–312. doi:10.1007/s12552-016-9183-8
- Harris, A. H., Humphreys, K., Bowe, T., Tiet, Q., & Finney, J. W. (2010). Does meeting the HEDIS substance abuse treatment engagement criterion predict patient outcomes? *Journal of Behavioral Health Services & Research*, 37, 25–39. doi:10.1007/s11414-008-9142-2
- Hartney, C., & Vuong, L. (2009). *Created equal: Racial and ethnic disparities in the US criminal justice system*. Retrieved from <http://www.nccdglobal.org/publications/created-equal-racial-and-ethnic-disparities-in-the-us-criminal-justice-system>
- Iguchi, M. Y., Bell, J., Ramchand, R. N., & Fain, T. (2005). How criminal system racial disparities may translate into health disparities. *Journal of Health Care for the Poor and Underserved*, 16, Supplement B, 48–56. doi:10.1353/hpu.2005.0081
- Iguchi, M. Y., London, J. A., Forge, N. G., Hickman, L., Fain, T., & Riehm, K. (2002). Elements of well-being affected by criminalizing the drug user. *Public Health Reports*, 117, Supplement 1, S146–S150.
- Jacobson, J. O., Robinson, P., & Bluthenthal, R. N. (2007). A multilevel decomposition approach to estimate the role of program location and neighborhood disadvantage in racial disparities in alcohol treatment completion. *Social Science & Medicine*, 64, 462–476. doi:10.1016/j.socscimed.2006.08.032
- Jones-Webb, R., & Karriker-Jaffe, K. J. (2013). Neighborhood disadvantage, high alcohol content beverage consumption, drinking norms, and drinking consequences: A mediation analysis. *Journal of Urban Health*, 90, 667–684. doi:10.1007/s11524-013-9786-y
- Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, 20, 141–151. doi:10.1177/001316446002000116
- Karriker-Jaffe, K. J. (2011). Areas of disadvantage: A systematic review of effects of area-level socioeconomic status on substance use outcomes. *Drug and Alcohol Review*, 30, 84–95. doi:10.1111/j.1465-3362.2010.00191.x
- Karriker-Jaffe, K. J. (2013). Neighborhood socioeconomic status and substance use by U.S. adults. *Drug and Alcohol Dependence*, 133, 212–221. doi:10.1016/j.drugalcdep.2013.04.033
- Karriker-Jaffe, K. J., Liu, H., & Johnson, R. M. (2016). Racial/ethnic differences in associations between neighborhood socioeconomic status, distress, and smoking among U.S. adults. *Journal of Ethnicity in Substance Abuse*, 15, 73–91. doi:10.1080/15332640.2014.1002879
- Karriker-Jaffe, K. J., Zemore, S. E., Mulia, N., Jones-Webb, R., Bond, J., & Greenfield, T. K. (2012). Neighborhood disadvantage and adult alcohol outcomes: Differential risk by race and gender. *Journal of Studies on Alcohol and Drugs*, 73, 865–873. doi:10.15288/jsad.2012.73.865
- Kopak, A., Vartanian, L., Hoffmann, N., & Hunt, D. (2014). The connections between substance dependence, offense type, and offense severity. *Journal of Drug Issues*, 44, 291–307. doi:10.1177/0022042613511439
- Krieger, N., Chen, J. T., Waterman, P. D., Rehkopf, D. H., & Subramanian, S. V. (2003). Race/ethnicity, gender, and monitoring socioeconomic gradients in health: A comparison of area-based socioeconomic measures—the public health disparities geocoding project. *American Journal of Public Health*, 93, 1655–1671. doi:10.2105/AJPH.93.10.1655
- Latkin, C. A., Curry, A. D., Hua, W., & Davey, M. A. (2007). Direct and indirect associations of neighborhood disorder with drug use and high-risk sexual partners. *American Journal of Preventive Medicine*, 32, Supplement, S234–S241. doi:10.1016/j.amepre.2007.02.023
- LaVeist, T. A., & Wallace, J. M., Jr. (2000). Health risk and inequitable distribution of liquor stores in African American neighborhood. *Social Science & Medicine*, 51, 613–617. doi:10.1016/S0277-9536(00)00004-6
- Luchansky, B., Krupski, A., & Stark, K. (2007). Treatment response by primary drug of abuse: Does methamphetamine make a difference? *Journal of Substance Abuse Treatment*, 32, 89–96. doi:10.1016/j.jsat.2006.06.007
- Luchansky, B., Nordlund, D., Estee, S., Lund, P., Krupski, A., & Stark, K. (2006). Substance abuse treatment and criminal justice involvement for SSI recipients: Results from Washington state. *American Journal on Addictions*, 15, 370–379. doi:10.1080/10550490600860171
- Luciano, A., Belstock, J., Malmberg, P., McHugo, G. J., Drake, R. E., Xie, H., . . . Covell, N. H. (2014). Predictors of incarceration among urban adults with co-occurring severe mental illness and a substance use disorder. *Psychiatric Services*, 65, 1325–1331. doi:10.1176/appi.ps.201300408
- Mennis, J., Stahler, G. J., & Baron, D. A. (2012). Geographic barriers to community-based psychiatric treatment for drug-dependent patients. *Annals of the Association of American Geographers*, 102, 1093–1103. doi:10.1080/00045608.2012.657142
- Miller, K. (2009). Race, driving, and police organization: Modeling moving and nonmoving traffic stops with citizen self-reports of driving practices. *Journal of Criminal Justice*, 37, 564–575. doi:10.1016/j.jcrimjus.2009.09.005
- Mitchell, O., & Caudy, M. S. (2015). Examining racial disparities in drug arrests. *Justice Quarterly*, 32, 288–313. doi:10.1080/07418825.2012.761721
- Molina, K. M., Alegria, M., & Chen, C. N. (2012). Neighborhood context and substance use disorders: A comparative analysis of racial and ethnic groups in the United States. *Drug and Alcohol Dependence*, 125, Supplement 1, S35–S43. doi:10.1016/j.drugalcdep.2012.05.027
- National Drug Use Intelligence Center. (2011). *The economic impact of illicit drug use on American society (No. 2011-Q0317-002)*. Washington, DC: Author.
- Ramchand, R., Pacula, R. L., & Iguchi, M. Y. (2006). Racial differences in marijuana-users' risk of arrest in the United States. *Drug and Alcohol Dependence*, 84, 264–272. doi:10.1016/j.drugalcdep.2006.02.010
- Roh, S., & Robinson, M. (2009). A geographic approach to racial profiling. *Police Quarterly*, 12, 137–169. doi:10.1177/1098611109332422
- Substance Abuse and Mental Health Services Administration. (2017). *Treatment Episode Data Set (TEDS): 2005–2015. National Admissions to Substance Abuse Treatment Services (HHS Publication No. (SMA) 17-5037)*. Rockville, MD: Author.
- Task Force on Race and the Criminal Justice System. (2011). *Preliminary report on race and Washington's criminal justice system*. Seattle, WA: Seattle University School of Law.
- Therneau, T. M., & Grambsch, P. M. (2000). The Cox model. In *Modeling*

- survival data: Extending the Cox model* (pp. 39–77). New York, NY: Springer-Verlag.
- U.S. Census Bureau. (2012). *Geographic terms and concepts - Census tract*. Retrieved from https://www.census.gov/geo/reference/gtc/gtc_ct.html
- U.S. Census Bureau. (2018). *American Community Survey*. Retrieved from <https://www.census.gov/programs-surveys/acs>
- U.S. Department of Health and Human Services. (2018). *Disparities. Healthy People 2020*. Retrieved from <https://www.healthypeople.gov/2020/about/foundation-health-measures/disparities#6>
- U.S. Department of Justice. (n.d.). *Survey of Inmates in State and Federal Correctional Facilities, 2004: Codebook*.
- VonLockette, N. D. (2010). The impact of metropolitan residential segregation on the employment chances of Blacks and Whites in the United States. *City & Community, 9*, 256–273. doi:10.1111/j.1540-6040.2010.01332.x
- Weinberg, B. A. (2000). Black residential centralization and the spatial mismatch hypothesis. *Journal of Urban Economics, 48*, 110–134. doi:10.1006/juec.1999.2159