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Race/Ethnicity and Quality Indicators for Outpatient Treatment for Substance Use Disorders

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Abstract

Background and Objectives—Initiation and engagement, performance measures that focus on the frequency and timely receipt of services in the early stages of SUD treatment, are useful tools for assessing treatment quality differences across racial/ethnic groups. The purpose of this study was to examine whether there are racial/ethnic disparities in these quality indicators and to explore whether predictors of treatment initiation and engagement differ by clients' race/ethnicity.

Methods—This study used administrative data from outpatient treatment facilities licensed by the state of Massachusetts that receive public funding. The sample consisted of 10,666 adult clients (76% White, 13% Latino, 11% Black) who began an outpatient treatment episode in 2006. Client data were linked with facility data from the National Survey on Substance Abuse Treatment Services. Multilevel regressions were used to examine racial/ethnic disparities and to explore whether predictors for initiation and engagement differed by client's race/ethnicity.

Results—We did not find evidence of racial/ethnic disparities in treatment initiation or engagement. However, we found that predictors of initiation and engagement differed by client's race/ethnicity.

Conclusions and Scientific Significance—Disparities may be context specific, and thus it is important that they be examined at state or local levels. Our results point to the importance of examining predictors of quality indicators separately by group to better understand and address the needs of diverse client populations.

Introduction

The limited research literature on disparities in treatment for substance use disorders (SUD) suggests that the quality of treatment may differ based on a client's race/ethnicity,¹⁻³ Initiation and engagement, performance measures that focus on the frequency and timely

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

receipt of services in the early stages of SUD treatment, provide a useful means for assessing treatment quality differences across racial/ethnic groups. Using data from Massachusetts' publicly funded outpatient specialty SUD treatment services, this study assessed racial/ethnic disparities in treatment initiation and engagement and examined whether predictors of initiation and engagement differed based on client's race/ethnicity.

Race/Ethnicity and Substance Abuse/Dependence

Despite Latinos and Blacks having similar or lower rates of substance abuse and dependence than Whites,^{4,5} disparities in SUD treatment remain an important issue because their negative consequences of SUDs tend to be worse. Latinos tend to have higher severity of alcohol problems compared to Blacks and Whites⁶ and injection drug use impacts Blacks and Latinos disproportionately as a source of HIV transmission.⁷ Furthermore, Blacks have a threefold higher rate of arrest for drug possession, despite similar rates of reported past month drug use by both Blacks and Whites.^{4,8} It is critical that disparities in the quality of SUD treatment be identified so that policies and programs can be implemented to improve treatment, which may ultimately reduce these disproportionate consequences.

Quality Indicators for Treatment of Substance Use Disorders

Performance measures that assess the extent to which clinical practices conform to established guidelines,^{9,10} or "process measures," often are adopted as quality indicators, because they are easier to measure and can be acted upon sooner than outcomes which may not be known until much later. Treatment initiation and engagement, two well established quality indicators for SUD treatment, focus on the early stages of treatment and provide an assessment of the minimum services during the first weeks of treatment.

These measures have been adopted by the National Committee on Quality Assurance, endorsed by the National Quality Forum,¹¹ and used by the Veterans Administration.¹² The suitability of these measures for publicly funded specialty treatment has been evaluated.¹³ For treatment episodes beginning with outpatient services, *treatment initiation* is defined as an individual receiving a treatment visit within two weeks of the initial visit and *treatment engagement* is defined as an individual receiving two or more additional treatment services within 30 days of the initiation visit. Outpatient treatment engagement has been associated with decreased criminal justice involvement,¹⁴ improved alcohol outcomes,¹⁵ lower substance use among adolescents¹⁶ and improved employment outcomes among clients with past criminal justice involvement.¹⁷ Given the growing evidence that treatment engagement is associated with better outcomes, these measures are appropriate means for exploring racial/ethnic differences in SUD treatment.

Racial/Ethnic Disparities in Substance Abuse Treatment

Research is scarce on whether the quality of SUD treatment differs across racial/ethnic groups. Among SUD clients, American Indians are less likely to complete alcohol treatment than Whites, and both Blacks and Latinos are less likely than Whites to complete treatment for alcohol and drugs.¹ Additionally, Latinos and Blacks report lower satisfaction with treatment compared to Whites.^{18,19}

Racial/ethnic disparities in initiation and engagement have been found, although the minority groups most affected have differed across states.^{3,20} For example, disparities were found between American Indians and Whites in Washington state, whereas in Connecticut the disparities were found between Blacks and Whites and were limited to initiation.²⁰ Examining disparities at the state level is important because most policies and initiatives for quality improvement for publicly funded substance abuse treatment are carried out at the state level.

The goals of this study were to: 1) Examine whether there are racial/ethnic disparities in quality indicators of substance abuse treatment received in the public sector in Massachusetts, as measured by initiation and engagement in outpatient treatment; and 2) Explore whether predictors of initiation and engagement differ by clients' race/ethnicity.

Methods

Data Sources

Administrative data from clients who received publicly-funded outpatient substance abuse treatment services in specialty facilities in Massachusetts in Fiscal Year (FY) 2006 (July 1, 2005 to June 30, 2006) were obtained from the Bureau of Substance Abuse Services (BSAS) of the Massachusetts Department of Public Health. Data include client demographics, social characteristics, referral source, prior mental health treatment, substance use history, FY 2006 encounter data (types and dates of treatment services), and prior treatment based on FY 2005 encounter data. Data on facilities from the 2006 National Survey of Substance Abuse Treatment Services (N-SSATS) were linked to the client data.²¹

Analytic Sample

The analytic sample was made up of all adult clients (18 years of age and older at admission) beginning a new outpatient treatment episode in FY 2006. A new treatment episode was defined as receipt of outpatient treatment (the index visit), after of at least 60 days of no treatment services.

In FY 2006, 12,803 clients had at least one new outpatient treatment episode (only the first episode in the year was analyzed). Overall, 2,137 clients were excluded because of intake information collected more than 30 days before or after the index date making time-varying intake variables (e.g., recent substance use) inaccurate (839 clients), death or incarceration within 45 days from the index so there was insufficient time available to determine their engagement status (71 clients), members of groups too small (e.g., Asians) to be analyzed separately (416 clients), inability to link enrollment data to the N-SSATS data (743 clients), and other missing data (68 clients). The proportion of exclusions due to intake information collected more than 30 days from the index did not differ across racial/ethnic groups and was consistently 6-7%. A higher proportion of White clients (7%) were excluded due to a lack of a link to the N-SSATS data, compared to Latino (3%) or Black (2%) clients. The final analytic sample was made up of 10,666 clients in 51 facilities.

Variables

1. Dependent variables—Using public sector specifications¹³ *treatment initiation* is defined as a client receiving a treatment service within two weeks of the initial visit (outpatient index date). Following initiation, *treatment engagement* is defined as a client receiving at least two additional treatment services within 30 days of initiation.

2. Race/Ethnicity—The BSAS admission form has separate questions for race and for ethnicity/ancestry, and only one category can be chosen for each. We restricted analyses to three groups: non-Latino Whites, non-Latino Blacks, and Latinos. Clients with Latino ethnicities (e.g. Puerto Rican, Dominican) were categorized as Latino regardless of race.

3. Client covariates—Client covariates include gender, age, marital status, prior mental health treatment, source of referral, severity of substance use, and receipt of treatment in the prior year. Except for prior treatment, the source of client-level covariates was the admission record. Measures of substance use severity were created incorporating age of first use, last regular use, and frequency of last use for each substance.^{22,23} Values for these measures range from 0 to 1, with a higher number representing higher severity. Using encounter data, a dichotomous variable indicated the receipt of any treatment services in the year prior to their index visit.

4. Treatment processes—The number of days between the index and the initiation visit was included in the engagement analyses.

5. Treatment facility characteristics—The racial/ethnic make-up of the clients served at the facility was included in the models. After ranking facilities based on their proportion of Latino clients prior to exclusions, the 13 facilities (the top quartile) where Latinos made up the highest proportions of clients were categorized as “High Proportion of Latino clients.” In each of these facilities, Latinos made up between 17% and 74% of clients. Using the same method to create a variable “High Proportion of Black clients,” Black clients made up between 12% and 92% of clients. We tested the sensitivity using continuous variables and the results were qualitatively similar.

Due to the limited number of facilities and concerns of over-specification, we included only facility characteristics which satisfied the significance level of $p < 0.25$ in preliminary multilevel logistic models using one facility variable at a time.²⁴ In the initiation model, we included a variable for provision of medication assisted treatment (MAT). In the engagement models, we included variables for whether a program was operated in or by a hospital, provided MAT, provided mental health services, and provided services in languages other than English.

Analysis Plan

Bivariate descriptive analyses were conducted on client and facility characteristics and the dependent variables for the overall sample and for each of the three racial/ethnic groups. Differences in the means among racial/ethnic groups were tested for statistical significance

using one-way ANOVAs. Follow-up pair-wise comparisons to test for significant differences between each pair of the three racial/ethnic groups used a Bonferroni correction.

Our first multivariate analyses employed multilevel logistic regression models with random intercepts on the full sample to estimate racial/ethnic disparities in initiation and engagement adjusted for other client and facility characteristics. These models were run twice, with and without socioeconomic and insurance variables. These variables could correlate with race/ethnicity, and thus dampen the observed effects in models assessing disparities.²⁵⁻²⁷ By running the models with and without these variables, we are able to examine whether they mediate racial/ethnic disparities in initiation and engagement, provide an independent effect on these outcomes, or provide no significant effect at all.

The sample for the engagement models includes only those who had initiated, and the specification of the engagement models was similar to that of the initiation model but also included days to initiation.

Our second analyses re-ran these models separately by racial/ethnic group to determine the extent to which client- and facility-level predictors of initiation and engagement differed. These models included the socioeconomic related variables (education, employment, and homelessness status, and insurance), because these variables would no longer present a correlation issue in separate by racial/ethnic group analyses, and we wanted to explore whether they played a differential role in facilitating or hindering treatment services receipt for each sub-group. While the outcomes of these separate models can only be compared descriptively, in cases where a group difference appeared to be large enough (i.e., the odds ratio estimate of a variable in the model for Whites was outside the 95% Confidence Interval of the same variable as the model for Latinos or Blacks), we ran follow-up models to test for the significance of the interactions between the variable and the racial/ethnic indicators. As a sensitivity analyses, we also ran matching linear probability models using the same variables as in our logistic models and the results were similar in the variables chosen for the interactions. All analyses were conducted using SAS software (version 9.3) (SAS Institute, Cary, NC).

Results

Client Characteristics at Treatment Admission

Descriptions of the client characteristics for the overall sample and each of the three racial/ethnic groups are included in Table 1. The majority of clients were White (75.5%), while Latinos made up 13.4% and Blacks made up 11.1% of the sample. Racial/ethnic groups differed in almost all client characteristics at treatment admission.

Facility Characteristics

Table 2 shows the characteristics of the treatment facilities where clients began outpatient treatment episodes (N = 51). Half of the facilities had a mixed focus of substance abuse and mental health, and about 20% were in or operated by a hospital. Most (77%) facilities provided mental health services and about 40% provided MAT.

Performance Measures

The overall initiation rate was 53.5% and the engagement rate 34.0% (Table 1). Latino clients had the lowest initiation rate (49.3%), and Black clients had the highest rate (58.4%). The mean number of days from the index date to the date of the initiation visit was about 7 days. Among those meeting the initiation criteria, Whites had higher mean number of days between the index visit and the initiation visit than Latino or Black clients.

Race/Ethnicity and Treatment Initiation

In the model predicting treatment initiation using the entire sample (Table 3), the Black and Latino race/ethnicity indicator variables were not statistically significant; no evidence of disparities in treatment initiation between minority and White clients was found. Disparity estimates did not change a notable amount, when SES variables were added to the models (results not shown). In the models predicting treatment initiation for each racial/ethnic group separately, being female or having more years of education was predictive of treatment initiation only among Whites, being younger was predictive only among Latinos, and being married was predictive only among Black clients. Among both Whites and Latino clients, a referral from a SUD treatment program/service was significant, but not for Blacks. Being in a facility which had a higher proportion of Black clients had a significant effect on initiation among Latinos, but not among Blacks or Whites. In follow-up models with Whites as the reference group and interactions for variables, where the odds ratio for one racial/ethnic group was outside the confidence interval of another, only three interactions terms were significant at the $p < .05$ level: being Latino and the 18-25 age group indicator, and being Black and the two indicators for homelessness and marital status.

Race/Ethnicity and Engagement

The results of models predicting treatment engagement were limited to those who had initiated treatment (Table 4). The model using the full sample did not show statistically significant differences in the likelihood of engagement due to race/ethnicity.

Contrary to our expectations, the SES variables did not mediate the effects on our racial/ethnic indicators (non-significant as they were) to any large degree.

When the models were run separately for each individual race/ethnicity group, there were observed differences in the predictors of engagement. For example, among Whites, younger age was significantly associated with a lower likelihood of engaging in treatment, and among Blacks, being older (45 or older) was associated with a higher likelihood of engagement. Referral to treatment by the criminal justice system was associated with a higher likelihood of engagement for all groups, but a referral from SUD treatment was significantly associated with a higher likelihood of engagement only among Whites. Being homeless was associated with a significantly higher likelihood of engagement among Black clients, but not among Whites or Latinos. Having had SUD treatment in the prior year was associated with a higher likelihood of engagement among Whites, but not for the other two groups. In terms of facility characteristics, receiving treatment in a facility that also provided mental health services was significant only among Whites and Latinos. Among follow-up

interaction models, we found that only the interaction between being Black and the variable for age group 45 and older was statistically significant ($p < .05$).

Discussion and Conclusions

Although we did not find disparities in the quality indicators studied, we found that predictors of these indicators varied based on clients' race/ethnicity.

Likelihood of Treatment Initiation and Engagement by Race/Ethnicity

We did not find evidence of disparities in initiation or engagement after adjusting for facility and client level factors. These results are inconsistent with studies showing race/ethnicity disparities in initiation and/or engagement among adults in other states²⁰ and adolescents.²⁸ and with a national study, where minorities have lower likelihoods of treatment completion than White clients.¹ Our findings indicate that disparities in treatment may be context specific and point to the importance of examining disparities in the public sector by state or at more local levels. Massachusetts may be different in that even before health care reform, its uninsurance rate was substantially lower than the U.S. average.²⁹ Massachusetts may also differ in the ethnic subgroups of its minority residents. For example, Puerto Ricans make up the majority of Latino residents in Massachusetts, whereas as in the country overall, Mexicans are the largest Latino subgroup.³⁰ Racial/ethnic subgroups vary in socioeconomic, cultural, and immigration patterns, factors which may facilitate or create barriers for treatment engagement. For example, Puerto Ricans are U.S. Citizens by birth and a higher proportion of Puerto Ricans speak English proficiently compared to other Latinos, two factors which could facilitate access to and engagement in treatment compared to other Latino subgroups.³¹ Although we did not find disparities in Massachusetts' outpatient treatment programs, it is important that the state periodically monitor disparities since unequal care may arise in the future as population demographics change, the treatment system changes, and new policies are implemented which may inadvertently create disparities in care. Other states could also assess whether disparities exist in these measures, and if detected, through the leverage that States have as payers, promote high performance rates in all facilities and for all groups.

Differences in Predictors of Initiation and Engagement

Predictors of treatment initiation and engagement did vary across racial/ethnic groups. This variability is consistent with other research showing that predictors of treatment completion vary by racial/ethnic group.³² The fact that few predictors of treatment initiation and engagement differed in terms of significance among Black and Latino clients may be due to sample size limitations. In any case, these results highlight heterogeneity within groups and point to the importance of not only examining between group disparities, but also disparities within groups to better understand and address the specific needs of diverse client populations. Examining quality indicators within groups might also lead to targeted interventions for specific groups. For instance, we found that although Latinos were equally likely as Whites to receive a second service within the first two weeks of a treatment episode (initiation), Latinos who are young adults are especially vulnerable of not doing so. This result suggests the need for strategies to increase initiation rates among younger Latinos.

Days to Treatment Initiation

Another important finding is that among all racial/ethnic groups, clients who initiated, a higher number of days between the initial treatment visit and the initiation visit was associated with lower likelihood of engagement. Consistent with other studies,^{3,28} this finding is important in that it identifies for facilities an actionable goal, which might help increase treatment engagement. Outpatient treatment providers striving to improve client engagement could schedule second treatment visits as soon as possible after first visits, and make additional efforts to see that these visits are completed.

Study Limitations

The findings from this study should be interpreted with some caution due to choice of sample, and constraints on the ability to include some racial/ethnic groups and subgroups. The existence of disparities and the groups affected likely depends on which treatment systems are being assessed and when. Our data are limited to Massachusetts. In addition to policy and access differences across states, minority members' experience may differ. Additionally, in our sample, 42% of clients were uninsured when they began outpatient treatment. Given Massachusetts' success with insuring most of its population through health care reform beginning in the Fall of 2006, we expect most clients who are currently receiving treatment services to be insured, many through the expansion of Medicaid. This is not likely to have impacted the population receiving services in publicly funded treatment. However, this study offers a baseline assessment of disparities prior to health reform, and could be used to track changes in quality of care as individuals with SUDs become covered by insurance.

Additionally, due to the small number of clients from other population groups in Massachusetts, this study could only examine disparities in the three largest groups: Whites, Blacks and Latinos. It is critical to study disparities for other populations as well, such as American Indians and Asians, and to study disparities among subgroups within these broader racial/ethnic groups, such as Puerto Ricans and Dominicans. There are important differences among subgroups in substance use patterns³³ and access to treatment;³⁴ there also may be differences in quality of treatment within subgroups.

Scientific Significance

This study helps to address a knowledge gap regarding race/ethnicity disparities in substance abuse treatment. Although some researchers have focused on treatment completion^{1,32} few have focused on disparities at earlier stages of treatment.³⁵ There is emerging evidence that treatment engagement is associated with improved outcomes and thus, steps taken to increase the likelihood of engagement may also improve outcomes. State authorities should encourage facility administrators to provide timely services to their clients, explore factors that may predict engagement outcomes among the predominant racial/ethnic groups among their clients, and undertake actions to address specific groups' barriers to engagement.

Future research should explore whether additional disparities exist within racial/ethnic subgroups. Research is also needed in states with higher proportions of other racial/ethnic groups that could not be included in this study due to small sample size. Also, as SUD

treatment is moving to integration with medical care,³⁶ it will be important to assess disparities in those settings as well. Finally, it will be important to extend the investigation to additional measures of quality of treatment for individuals with SUDs.

The 2010 Patient Protection and Affordable Care Act (ACA) is expected to substantially increase access to treatment for SUDs.³⁷ It is critical that these improvements in access also result in care that is equitable. This study suggests that in Massachusetts, prior to the state's health reform implemented years before the ACA, disparities were not found in a performance measure assessing care in the early phase of treatment. It would be important to determine whether the increase in access to health insurance access may maintain equal care in the public sector in the state, as well as other states experiencing increased insurance coverage as a result of the ACA.

These results also show that the predictors of quality care for SUDs differ across race/ethnicity. Understanding which specific individual or facility characteristics influence receiving quality care for particular racial/ethnic groups allows policy makers and providers to identify disparities and pinpoint predictors associated with their increased likelihood. These are essential steps in efforts to simultaneously raise overall quality and reduce inequitable treatment.

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Table 1

Client Characteristics at Treatment Admission and Quality Indicators

	Entire Sample (N = 10,666)		Whites (W) (N = 8,052)		Latinos (L) (N = 1,430)		Blacks (B) (N = 1,184)		Racial/Ethnic Group Differences ²
	%	s.e.	%	s.e.	%	s.e.	%	s.e.	
CLIENT CHARACTERISTICS									
Race/Ethnicity									
White	75.5	0.4							
Latino	13.4	0.3							
Black	11.1	0.3							
Female	32.7	0.5	34.4	0.5	23.1	1.1	32.7	1.4	L < W, B
Age									
18-25	28.3	0.4	28.8	0.5	30.3	1.2	22.1	1.2	B < L, W
26-35	26.5	0.4	25.8	0.5	34.2	1.3	22.0	1.2	L > W > B
36-44	25.7	0.4	25.0	0.5	23.5	1.1	33.6	1.4	B > W, L
45+	19.5	0.4	20.4	0.4	12.0	0.9	22.2	1.2	L < W, B
Education									
Less than H.S.	28.2	0.4	22.0	0.5	57.8	1.3	34.1	1.4	L > B > W
H.S. Grad	50.8	0.5	53.9	0.6	34.6	1.3	49.1	1.5	L < B < W
More than H.S.	21.1	0.4	24.1	0.5	7.6	0.7	16.8	1.1	L < B < W
Married	13.9	0.3	14.5	0.4	12.4	0.9	11.2	0.9	B < W
Homeless	9.2	0.3	8.6	0.3	8.5	0.7	13.9	1.0	B > L, W
Employed	36.0	0.5	38.5	0.5	30.8	1.2	25.3	1.3	W > L > B
Speak a language other English most often	4.8	0.2	0.5	0.1	32.2	1.2	1.1	0.3	L > B, W
Referral Source									
Self/family	29.6	0.4	30.3	0.5	23.6	1.1	32.3	1.4	L < W, B
Health Professional	11.5	0.3	12.6	0.4	8.2	0.7	7.5	0.8	W > B, L
Criminal Justice	33.3	0.5	30.8	0.5	45.8	1.3	35.4	1.4	L > B > W
Substance Abuse Tx	16.2	0.4	16.8	0.4	13.8	0.9	14.9	1.0	W > L
Other	9.4	0.3	9.5	0.3	8.5	0.7	9.8	0.9	n.s.
Insurance									
None	41.9	0.5	40.0	0.5	52.2	1.3	42.9	1.4	L > W, B
Public	38.2	0.5	37.1	0.5	38.0	1.3	45.4	1.4	B > L, W
Private/Other	19.9	0.4	22.9	0.5	9.8	0.8	11.7	0.9	W > L, B
Prior mental health treatment	44.9	0.5	48.3	0.6	33.8	1.3	35.1	1.4	W > L, B
Substance Use Severity¹									
Alcohol (mean)	0.56	0.0	0.58	0.0	0.50	0.0	0.54	0.0	L < B < W
Cocaine/Crack (mean)	0.38	0.0	0.38	0.0	0.37	0.0	0.41	0.0	B > L
Heroin (mean)	0.20	0.0	0.20	0.0	0.23	0.0	0.11	0.0	L > W > B
Marijuana (mean)	0.41	0.0	0.41	0.0	0.43	0.0	0.44	0.0	B > W

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	Entire Sample (N = 10,666)		Whites (W) (N = 8,052)		Latinos (L) (N = 1,430)		Blacks (B) (N = 1,184)		Racial/Ethnic Group Differences ²
	%	s.e.	%	s.e.	%	s.e.	%	s.e.	
Substance Abuse Treatment in prior year	9.5	0.3	9.8	0.3	7.9	0.7	9.1	0.8	n.s.
PERFORMANCE MEASURES AND TREATMENT PROCESS									
Treatment Initiation	53.5	0.5	53.5	0.6	49.3	1.3	58.4	1.4	L < W < B
Treatment Engagement	34.0	0.5	33.5	0.5	31.5	1.2	40.1	1.4	L, W < B
Days to Initiation (mean)³	7.2	0.1	7.3	0.1	6.9	0.1	6.2	0.1	W > L > B

Notes:

¹ These measures range from 0-1, a higher score indicating higher severity.

² Differences at the p < .05 level using a Bonferroni correction for multiple comparisons.

³ Mean days to initiation was calculated only among those who initiated.

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Table 2

Characteristics of the Facilities where Clients Began their Outpatient Treatment Episode (N=51)

	N (%)
Treatment Focus	
Substance abuse	20 (39%)
Mental health/health care	5 (10%)
Mix of substance abuse and mental health	26 (51%)
Facility is in or operated by a hospital	10 (19%)
Provides of mental health services	39 (77%)
Provides Medication Assisted Treatment (MAT)	22 (43%)
Total # of ancillary services provided (mean/s.e.)	3.78 (.31)
Provides services in language(s) other than English	39 (77%)
Facility Proportion of Latino Clients	
High ¹	13 (26%)
Not High	38 (74%)
Facility Proportion of Black Clients	
High ¹	13 (26%)
Not High	38 (74%)

¹The top quartile of facilities with the highest proportion of Latino/Black clients

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Table 3

Multilevel Logistic Regression Models Predicting Treatment Initiation

<i>Fixed Effects</i>	Entire Sample N = 10,666		Whites N = 8,052		Latinos N = 1,428		Blacks N = 1,179	
	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI
Race/Ethnicity								
(ref.: White)								
Latino	0.94	(0.82,1.07)	---	---	---	---	---	---
Black	1.01	(0.87,1.17)	---	---	---	---	---	---
Covariates								
Female	1.20**	(1.10,1.32)	1.23**	(1.11,1.36)	1.07	(0.80,1.43)	1.12	(0.84,1.50)
Age								
(ref. : Ages 36-44)								
18-25	0.94	(0.84,1.06)	1.00	(0.87,1.14)	0.64*	(0.45,0.91)	1.00	(0.67,1.51)
26-35	0.98	(0.87,1.09)	1.00	(0.88,1.14)	0.73*	(0.53,0.99)	1.09	(0.77,1.55)
45+	1.04	(0.92,1.18)	1.00	(0.87,1.14)	1.08	(0.72,1.61)	1.35	(0.95,1.91)
Married	1.11	(0.98,1.24)	1.08	(0.94,1.24)	1.18	(0.83,1.66)	1.70*	(1.12,2.56)
Referral Source								
(ref.: self/family)								
Health Professional	0.92	(0.80,1.06)	0.89	(0.76,1.04)	0.90	(0.57,1.43)	1.25	(0.75,2.09)
Criminal Justice	0.96	(0.86,1.08)	0.93	(0.81,1.06)	1.11	(0.81,1.52)	1.03	(0.73,1.44)
Substance Abuse Treatment	1.25**	(1.10,1.42)	1.18*	(1.02,1.37)	1.70**	(1.14,2.53)	1.12	(0.75,1.67)
Other	1.09	(0.94,1.27)	1.02	(0.86,1.21)	1.45	(0.91,2.31)	1.05	(0.65,1.69)
Education								
(ref: not high school graduate)								
High school graduate	---	---	1.03	(0.91,1.15)	1.15	(0.90,1.46)	0.92	(0.69,1.21)
More than high school	---	---	1.20*	(1.04,1.38)	1.47	(0.95,2.29)	1.03	(0.71,1.50)
Homeless	---	---	0.94	(0.78,1.13)	0.79	(0.51,1.22)	1.39	(0.94,2.06)
Employed	---	---	0.89*	(0.80,0.98)	0.94	(0.72,1.22)	0.79	(0.59,1.06)
Insurance								
(Ref. : None)								
Public	---	---	0.93	(0.83,1.04)	0.79	(0.60,1.04)	1.04	(0.77,1.40)
Private/Other	---	---	0.93	(0.82,1.06)	0.85	(0.57,1.27)	0.83	(0.55,1.27)
Prior mental health treatment	0.97	(0.89,1.06)	0.96	(0.87,1.06)	1.09	(0.84,1.41)	0.83	(0.62,1.10)
Prior year substance abuse treatment	1.25**	(1.09,1.43)	1.21*	(1.03,1.41)	1.22	(0.80,1.86)	1.52	(0.96,2.39)
Substance Use Severity								
Alcohol	1.02**	(1.01,1.03)	1.02*	(1.00,1.03)	1.03	(1.00,1.06)	1.03	(0.99,1.06)
Cocaine	1.02**	(1.01,1.03)	1.01*	(1.00,1.03)	1.02	(0.99,1.05)	1.02	(1.00,1.05)
Heroin	1.00	(0.99,1.01)	0.99	(0.98,1.00)	1.01	(0.98,1.03)	0.98	(0.95,1.01)
Marijuana	1.00	(0.99,1.01)	1.00	(0.99,1.01)	1.01	(0.98,1.03)	1.00	(0.97,1.03)

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<i>Fixed Effects</i>	Entire Sample N = 10,666		Whites N = 8,052		Latinos N = 1,428		Blacks N = 1,179	
	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI
<i>Facility-Characteristics</i>								
Provision of MAT	1.30	(0.90,1.87)	1.13	(0.79,1.62)	1.36	(0.79,2.35)	1.19	(0.73,1.94)
High Proportion of Latino Clients in Facility	0.84	(0.55,1.26)	0.75	(0.50,1.13)	0.94	(0.54,1.61)	0.68	(0.40,1.14)
High Proportion of Black Clients in Facility	1.29	(0.86,1.95)	1.07	(0.71,1.62)	1.84*	(1.04,3.24)	1.18	(0.73,1.90)

Notes:

*
p < .05,

**
p < .01

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Table 4

Hierarchical Generalized Linear Models Predicting Treatment Engagement

<i>Fixed Effects</i>	Everyone N = 5,704		Whites N = 4,308		Latinos N = 703		Blacks N = 689	
	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI
Race/Ethnicity								
(ref.: White)								
Latino	1.00	(0.83,1.21)	---	---	---	---	---	---
Black	1.03	(0.83,1.27)	---	---	---	---	---	---
Covariates								
Days to Initiation	0.92**	(0.91,0.94)	0.92**	(0.90,0.94)	0.95*	(0.90,0.99)	0.95*	(0.90,1.00)
Female	1.12	(0.99,1.27)	1.12	(0.97,1.30)	1.35	(0.87,2.11)	1.24	(0.82,1.87)
Age								
(ref. : Ages 36-44)								
18-25	0.81*	(0.69,0.96)	0.77**	(0.64,0.94)	0.99	(0.59,1.66)	0.81	(0.44,1.49)
26-35	0.84*	(0.72,0.99)	0.80*	(0.67,0.96)	0.86	(0.55,1.34)	0.82	(0.49,1.36)
45+	1.02	(0.86,1.21)	0.91	(0.75,1.11)	1.56	(0.88,2.77)	1.75*	(1.05,2.90)
Married	0.87	(0.74,1.03)	0.86	(0.71,1.04)	1.22	(0.73,2.03)	0.95	(0.56,1.62)
Referral Source								
(ref.: self/family)								
Health Professional	1.01	(0.84,1.23)	1.05	(0.84,1.30)	1.27	(0.63,2.55)	0.54	(0.27,1.08)
Criminal Justice	1.43**	(1.22,1.67)	1.31**	(1.09,1.57)	1.98**	(1.24,3.17)	1.85*	(1.11,3.07)
Substance Abuse Treatment	1.36**	(1.14,1.62)	1.30**	(1.07,1.58)	1.75	(0.99,3.06)	1.29	(0.73,2.25)
Other	1.40**	(1.13,1.73)	1.42**	(1.11,1.82)	1.88	(0.96,3.68)	1.12	(0.56,2.25)
Prior mental health treatment	0.98	(0.87,1.10)	0.95	(0.83,1.09)	0.78	(0.43,1.41)	1.08	(0.60,1.96)
Education (ref: less than high school)								
H.S. Grad			1.12	(0.95,1.32)	1.00	(0.70,1.43)	1.15	(0.77,1.74)
> High School			1.02	(0.84,1.24)	1.07	(0.57,1.99)	1.40	(0.80,2.44)
Homeless			1.17	(0.89,1.54)	1.28	(0.65,2.51)	2.17**	(1.22,3.85)
Employed			1.01	(0.87,1.17)	0.96	(0.65,1.43)	1.19	(0.76,1.87)
Insurance								
(Ref. : None)								
Public			0.89	(0.75,1.04)	0.77	(0.51,1.15)	0.96	(0.62,1.49)
Private/Other			0.83	(0.69,1.00)	1.09	(0.60,1.99)	0.96	(0.50,1.83)
Prior year substance abuse treatment	1.32**	(1.09,1.60)	1.46**	(1.17,1.83)	1.21	(0.82,1.78)	1.25	(0.82,1.92)
Substance Use Severity¹								
Alcohol	0.99	(0.98,1.01)	1.00	(0.98,1.02)	0.98	(0.94,1.03)	0.96	(0.92,1.01)
Cocaine	1.01	(1.00,1.03)	1.01	(0.99,1.02)	1.04	(1.00,1.08)	1.00	(0.96,1.05)
Heroin	0.99	(0.98,1.01)	0.99	(0.98,1.01)	0.98	(0.95,1.02)	1.01	(0.96,1.06)

<i>Fixed Effects</i>	Everyone N = 5,704		Whites N = 4,308		Latinos N = 703		Blacks N = 689	
	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI	O.R.	95% CI
Marijuana	1.00	(0.99,1.02)	1.00	(0.98,1.02)	1.02	(0.98,1.06)	1.02	(0.98,1.06)
<i>Facility-Characteristics</i>								
Provision of MAT	1.39	(0.98,1.97)	1.32	(0.95,1.84)	1.58	(0.78,3.21)	1.04	(0.42,2.58)
Mental Health services provided	0.62**	(0.44,0.88)	0.63**	(0.45,0.88)	0.42**	(0.22,0.80)	0.70	(0.29,1.71)
Treatment provided by or in hospital	1.24	(0.87,1.77)	1.37	(0.99,1.90)	1.00	(0.48,2.11)	1.13	(0.44,2.92)
Provides services in other languages than English	1.11	(0.76,1.61)	1.26	(0.89,1.77)	0.62	(0.27,1.44)	0.86	(0.31,2.40)
High Proportion of Latino Clients in Facility	0.81	(0.56,1.18)	0.71	(0.49,1.02)	0.85	(0.43,1.66)	0.95	(0.38,2.40)
High Proportion of Black Clients in Facility	1.32	(0.95,1.83)	1.15	(0.82,1.60)	1.45	(0.80,2.64)	1.37	(0.67,2.81)

Notes:

* p < .05,

** p < .01

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