Racial Disparities in Completion Rates from Publicly Funded Alcohol Treatment: Economic Resources Explain More Than Demographics and Addiction Severity

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Objectives. To assess racial and ethnic differences in rates of completion from publicly funded alcohol treatment programs, and to estimate the extent to which any identified racial differences in completion rates are related to differences in patient characteristics.
Data Sources. Administrative intake and discharge records from all publicly funded outpatient and residential alcohol treatment recovery programs in Los Angeles County (LAC) during 1998–2000. Study participants ($N = 10,591$) are African American, Hispanic, and white patients discharged from these programs, ages 18 or older, who reported alcohol as their primary substance abuse problem.
Study Design. Bivariate tests identified racial and ethnic differences in rates of treatment completion and patient characteristics. Logistic regression models assessed the contribution of differences in patient characteristics to differences in completion.
Principal Findings. Significantly lower completion rates by African Americans (17.5 percent) relative to whites (26.7 percent) (odds ratio [OR] = 0.58, 95 percent confidence interval [CI]: 0.50–0.68) are partially explained (40 percent) by differences in patient characteristics in outpatient care (adjusted OR = 0.75, 95 percent CI: 0.63–0.90), mostly by indicators of economic resources (i.e., employment, homelessness, and Medi-Cal beneficiary). In residential care, only 7 percent of differences in completion (30.7 versus 46.1 percent) could be explained by the patient-level measures available (OR = 0.52, 95 percent CI: 0.45–0.59; AOR = 0.55, 95 percent CI: 0.47–0.65). Differences in completion rates between Hispanic and white patients were not detected.
Conclusions. Large differences in rates of outpatient and residential alcohol treatment completion between African American and white patients at publicly funded programs in LAC, the nation's second largest, publicly funded alcohol and drug treatment system, are partially because of economic differences among patients, but remain largely unexplained. These racial disparities merit additional investigation and the attention of health professionals.
Key Words. Health disparities, alcohol, addiction, treatment retention

Reducing racial and ethnic disparities in health is a national priority with large potential benefits to the nation (U.S. Department of Health and Human Services 2000). Reducing mortality among African Americans to levels experienced by white Americans would have prevented over 880,000 deaths between 1991 and 2000 (Woolf et al. 2004). Racial disparities in alcohol-related morbidity and mortality are of special concern given the relationship between alcohol consumption and numerous other health conditions. Alcohol consumption is causally related to more than 60 medical conditions and responsible for about 4 percent of the global burden of disease, roughly the same share of death and disability attributable to hypertension or tobacco consumption (Room et al. 2005). In the United States, approximately 8.5 percent of adults meet Diagnostic and Statistical Manual of Mental Disorders 4th Edition criteria for alcohol abuse or dependence (Grant et al. 2004). The considerable burden of alcohol-related health problems falls disproportionately on African American and other minority populations, who have two to five times the rate of alcohol morbidity and mortality than whites, despite similar lifetime prevalence of frequent problem drinking (Group for the Advancement of Psychiatry 1996; Caetano 2003; Grant et al. 2004).

Racial disparities in adverse drinking consequences to health are not well understood and could result from a number of factors, including differences in access to health care, economic resources generally, social and cultural practices, and drinking preferences and patterns (Blendon et al. 1989; Mayberry et al. 2000; Williams and Collins 2001; Caetano 2003; Fiscella and Williams 2004; Bluthenthal et al. 2005). Differences in alcohol treatment services are another potential explanation. Generally, treatment for alcohol abuse and dependence has been shown to reduce medical problems and medical care expenditures (Holder and Blose 1992; Holder et al. 2000). However, rates of publicly funded treatment utilization among African Americans and Hispanics were already nearly twice the rate of whites in the United States as of the mid-1990s, reversing a pattern of comparatively lower utilization in earlier decades (Group for the Advancement of Psychiatry

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1996). Whether racial differences in the effectiveness of treatment exist has yet not been adequately studied. The few studies that have examined the issue have produced mixed results. For example, in Project Match, a clinical trial that randomized alcohol treatment clients to three psychosocial therapies, racial differences in treatment adherence were eliminated after controlling for occupation (Tonigan 2003). A small number of naturalistic studies have also found lower retention for African Americans compared with whites, but in no case have these findings prompted adequate discussion or a follow-on research study (Wickizer et al. 1994; Veach et al. 2000; Hser et al. 2001).

In this article, we compare rates of treatment completion among white, African American, and Hispanic patients with alcohol problems at all publicly funded outpatient and residential treatment programs in Los Angeles, which, after New York, is home to the largest publicly funded system of drug and alcohol treatment services in the nation (U.S. Department of Health and Human Services 2003).[1] We aim to establish whether significant differences in completion of alcohol treatment exist and whether differences in patient characteristics are related to any racial differences in treatment completion rates identified. Three research questions guide our analysis:

1. Are African American and Hispanic patients less likely to complete treatment than white patients?
2. Do African American, Hispanic, and white patients differ in ways that would be expected to lead to differences in treatment completion based on the treatment literature?
3. If so, to what extent can differences in patient factors explain differences in completion?

We hypothesize that four sets of characteristics previously associated with treatment outcomes are related to racial/ethnic differences in treatment completion: demographics; addiction severity; economic resources; and source of referral, particularly when resulting from legal involvement. While particular studies have documented associations between each of these characteristics and retention (e.g., McClellan et al. 1994; Wickizer et al. 1994; Young and Belenko 2002), findings in the retention literature have varied from sample to sample. To date no set of predictors that is consistent across samples has been identified. The positive effect of legal coercion into treatment on treatment retention is probably the most consistent finding in this literature (Anglin and Hser 1990).

METHODS

Sample

Data are from standardized patient intake and discharge forms routinely completed by treatment counselors at all alcohol and drug treatment programs in Los Angeles County (LAC) that receive county, state, or federal funds. Programs in LAC are required to collect and report information on all patients whose treatment is funded by these sources, as part of the Los Angeles County Participant Reporting System (LACPRS), which is administered by the LAC Alcohol and Drug Programs Administration (ADPA). Patients funded by other sources, such as out-of-pocket and third-party payment, are generally limited at these programs. LACPRS data are collected by treatment counselors based on self-report from patients. Data include demographics, substance abuse problems, source of referral, legal status (an indicator of being on parole or probation), employment, program completion, and other information collected at admission and discharge. We analyzed LACPRS data on patients discharged from any of the 170 publicly funded outpatient or residential recovery (i.e., not detoxification) programs in LAC during fiscal years 1998–2000 who were 18 years or older at admission and reported alcohol as their primary substance abuse problem. Two patients prescribed methadone for a secondary opiate problem were omitted from the analysis because methadone maintenance is a pharmacological treatment often of indeterminate duration.

The sample is restricted further to African American, Hispanic, and white patients. Patients self-report their race and ethnicity to the treatment counselor administering the intake/discharge questionnaire, based on the following definitions:

- White—A Caucasian person having ancestry among the people of Europe, North Africa, or the Middle East.
- Black/African American—A person whose ancestry is among the black racial groups of sub-Saharan Africa.
- Hispanic—People with origins in Mexico, Cuba, Puerto Rico, Central or South America or any other Spanish culture (including Spain).

Patients also self-report their "ethnicity/cultural group." Like the race item, this is a closed form question. Responses refer to nations of origin or ancestry (e.g., Cuban, Mexican, Japanese, Asian Indian) and include the catchall categories "Other Hispanic/Latino" and "None." Patients who

reported their "race" as Hispanic or their "ethnicity/cultural group" as Cuban, Mexican, Puerto Rican, or Other Hispanic/Latino were classified for this study as Hispanic. Patients who reported their race as Asian, Pacific Islander, Native American, or Other and did not report a Hispanic ethnic group were not included because of small sample size.

Many patients in the sample were treated more than once during 1998–2000. To permit generalization of findings to the population of patients rather than episodes, only the first episode for each patient during 1998–2000 that did not end in transfer or referral to another program is included in the analysis. The final sample of 5,795 outpatient and 4,796 residential discharges comprises the vast majority (94 percent) of patients discharged from public programs during this period.

Measures

Completion status is coded at discharge by treatment counselors as follows: (1) "completed treatment/recovery plan, goals"; (2) "left before completion with satisfactory progress"; or (3) left before completion with unsatisfactory progress." We created a dichotomous indicator coded 1 if the patient unambiguously completed treatment and 0 otherwise because what constitutes "satisfactory" versus "unsatisfactory" progress is not defined in instructions provided to counselors. Determination of a patient's "recovery plan" and "goals" is also inherently subjective, but in our view less subject to racial bias because treatment programs typically have clear and established guidelines regarding what patients must achieve to graduate treatment. Completion rates are not used by ADPA to determine funding levels or other incentives or disincentives to contracted programs.

Demographics are represented by age (in years), sex, and highest school grade completed. Economic resources are represented by homelessness, employment status, and Medi-Cal beneficiary status. Employment is reported as full-time (≥ 35 h/week), part-time (< 35 h/week), unemployed, or not in the labor force (not seeking work in the past 30 days).

Addiction severity measures include indicators of any secondary and tertiary, nonalcohol substances reported as problems at admission, injection drug use, whether the patient has ever received prior treatment, age at first use or intoxication (in years), and approximate days of alcohol and nonalcohol use during the month before admission. We approximate days of past-month use by recoding the latter item for each substance as follows: "no past month use" = 0 days; "1–3 times in past month" = 2 days; "1–2 times per week" = 6

days; "3–6 times per week" = 18 days. Days of nonalcohol drug use is then calculated as the sum of days of use of any secondary and tertiary substances reported. Whether the patient has ever been diagnosed with a chronic mental illness is included as a severity measure because psychiatric problems complicate recovery from addiction (McLellan et al. 2000). Together, these measures capture most of what is included in scientific instruments such as the Addiction Severity Index (ASI) (McLellan et al. 1992). An important component of the ASI absent from LACPRS is the patient's perception of the gravity of his/her alcohol and drug problems.

Finally, source of referral into treatment is classified as court or criminal justice, school or employer, self-referral, or other. The latter captures referrals from health care providers, 12-step groups, and other community organizations. Legal status is an indicator coded 1 if the patient was on parole or probation at admission.

Statistical Analyses

We addressed the study's first research question by comparing rates of completion, incomplete with satisfactory progress, and incomplete with unsatisfactory progress among African Americans and Hispanics to rates for white patients. The outpatient and residential samples were analyzed separately because of likely differences between modalities with respect to the relationship between patient characteristics and treatment completion. Two-sample, two-sided tests of proportions indicate whether any African American–white and Hispanic–white differences observed might be due to chance.

To address the second research question, African American–white and Hispanic–white differences in patient characteristics previously linked to treatment outcomes in the treatment literature were identified using χ^2 tests for dichotomous indicators and *t*-tests for continuous variables. Wilcoxon rank sum tests of median differences produced similar results. Effect sizes of group differences with respect to continuous variables were computed using Cohen's *d* (Cohen 1992).

To assess the extent to which differences in patient characteristics are related to differences in completion, four logistic multiple regression models were estimated by treatment modality. Model 0 predicts completion (the dichotomous measure) as a function of African American and Hispanic indicators with white as the reference group. Estimated odds ratios (OR) from this model provide unadjusted measures of racial differences in

completion. Ratios less than 1 indicate lower odds of completion relative to whites. In three additional models, blocks of explanatory variables (demographics, economic resources, addiction severity, referral and legal status) are added successively. Estimated OR from race indicators in each model are compared with those from the previous model to determine the contribution of each block of variables to racial differences in treatment completion.

Specifically, the proportion of the total difference in completion explained by the block of variables introduced in Model 1 is summarized by a ratio:

$$(R_i - R_{i-1})/|1 - R_0| \tag{1}$$

where R_i is the estimated OR on the African American (or Hispanic) indicator from Model i, R_o is the OR estimate from the unadjusted model, and the denominator is the magnitude of the difference before accounting for any covariates. For example, Model 0 controls only for race/ethnic group and Model 1 adds controls for demographics (age, sex, and education). If, hypothetically, the estimated OR on the Hispanic indicator was estimated as 0.8 in Model 0 and 0.9 in Model 1, then the percent reduction in the difference in completion that would be attributable to demographic differences between Hispanic and white patients would be (0.9–0.8)/|1–0.8| = 0.5, or 50 percent. If instead, also hypothetically, the ratio was estimated at 0.7 in Model 0 and decreased to 0.65 in Model 1, then the percent reduction would be negative ([0.65–0.7]/|1–0.7| = −0.17), indicating that differences in completion are actually 17 percent *larger* than indicated by the unadjusted completion rates, after controlling for differences in demographic characteristics that are also associated with completion. In addition to the proportion of racial differences in completion explained, the number of percentage points explained by each block of variables was also calculated. Ninety-five percent confidence intervals for both estimates were computed using the nonparametric, bias-corrected bootstrap (BCa) (Efron and Tibshirani 1993).

To reduce skew and facilitate interpretation, continuous variables were centered by subtracting their sample means. An estimated OR on a centered continuous covariate represents the change in the log odds of completion that would be expected from a unit increase over the covariate's sample mean. Quadratic terms of the continuous covariates were also considered, but likelihood ratio tests showed that none improved the models significantly. Variance inflation factors from linear versions of the models were all under three, indicating the absence of multicolinearity problems.

RESULTS

From Table 1, African American patients are significantly less likely to complete treatment than white patients in outpatient (17.5 versus 26.7 percent; $p < .01$) and residential (30.7 versus 46.1 percent; $p < .01$) settings and more likely to end treatment prematurely before making satisfactory progress toward treatment goals as judged by treatment staff. In residential settings, African Americans are also more likely than whites to terminate prematurely with satisfactory progress. In contrast, Hispanic patients are more likely to complete than white patients (29.7 versus 26.7 percent; $p < .05$) in outpatient care and have statistically equivalent completion rates in residential care (46.1 versus 42.9 percent; $p = .10$). Hispanic–white differences in rates of incomplete with unsatisfactory progress are also nonsignificant in both modalities. For brevity, our description of remaining findings focuses on understanding the larger African American–white differences. Additional results relevant to Hispanic patients can be found in the remaining tables.

The African American and white patient subpopulations differ in a number of ways that could explain differences in completion to some degree (Table 1). African American patients are significantly more likely than white patients to be homeless, unemployed, have fewer years of educational attainment, a secondary cocaine or crack problem, and higher levels of past month drinking and secondary drug use. Although statistically significant, in terms of effect size African American–white differences in education and addiction severity are relatively small (≤ 0.2), with the exception of secondary drug use (0.56) in the residential sample. Moreover, African American patients are less than half as likely to have a diagnosed chronic mental illness and less likely to inject drugs than white patients. In residential care, African American patients are also more likely to be in treatment for the first time than whites.

Table 2a presents results from the logistic models for outpatients, with labels in the title row of the table to describe the block of control variables introduced by each model (e.g., Model 1 adds "Demographics"). The unadjusted relative OR of completion for African American compared with white outpatients is 0.58 (Table 2a, Model 0). This estimate remains unchanged after addition of demographic controls (Model 1), but moves closer to parity at 1 as variables related to addiction severity (Model 2), economic resources (Model 3), and source of referral and legal status are added (Model 4). From Table 3, these blocks of variables are associated with 4.1, 31.8, and 6.1 percent of the 9.2 percentage point absolute difference in completion between African American and white outpatients. However, only economic resources and

Table 1: Discharge Status and Patient Characteristics of African American and Hispanic Patients Compared with White Patients: Unadjusted Sample Percents and Means

Variables	Outpatient Settings			Residential Settings		
	White (N = 1,537)	African American (N = 2,270)	Hispanic (N = 1,988)	White (N = 1,793)	African American (N = 1,871)	Hispanic (N = 1,132)
Discharge status (%)†						
Completed treatment	26.7	17.5***	29.7**	46.1	30.7***	42.9
Incomplete—satisfactory progress	14.6	13.3	11.6***	12.9	22.5***	13.6
Incomplete—unsatisfactory progress	58.7	69.2***	58.8	41.0	46.8***	43.5
Patient characteristics (%)‡						
Male	62.9	61.3	69.7***	73.6	62.5***	79.1***
Ever received prior treatment	53.8	53.8	45.6***	67.0	71.8***	55.4***
Additional drug problems§						
Heroin	5.6	1.7***	6.1	9.5	2.3***	12.3**
Amphetamines	19.7	1.3***	11.4***	23.0	2.0***	18.4***
Cocaine/crack	24.5	39.9***	27.3	27.7	79.3***	39.9***
Marijuana	28.4	26.3	22.1***	24.3	36.6***	22.3
Other not listed above	7.2	3.4***	6.3	6.7	3.2***	4.7**
No other drug	40.7	42.9	44.9**	39.1	12.3***	32.1***
Injection drug use	10.0	6.7***	7.8**	14.0	3.0***	13.9
Chronic mental illness	17.4	8.2***	4.4***	11.9	5.1***	4.7***
Employment						
Not in labor market	37.9	42.4***	30.9***	89.4	87.0**	91.9**
Unemployed	35.5	48.0***	38.5	7.7	11.6***	6.4
Part-time (5–34 h/week)	7.9	4.0***	9.1	0.6	0.4	0.4
Full-time (>34 h/week)	18.7	5.7***	21.5**	2.3	1.0***	1.3
Homeless	15.9	22.1***	14.1	54.9	58.7**	49.3***
Medi-Cal beneficiary	18.2	13.7***	11.5***	8.0	7.1	5.7**
Under legal supervision	33.7	25.1***	37.5**	35.4	32.0**	46.1***

Table 1:   Continued

	Outpatient Settings			Residential Settings		
Variables	White (N = 1,537)	African American (N = 2,270)	Hispanic (N = 1,988)	White (N = 1,793)	African American (N = 1,871)	Hispanic (N = 1,132)
Principle source of referral						
Self-referral	27.1	25.0	19.2***	54.8	68.2***	45.8***
Court/criminal justice	25.3	14.4***	29.4***	21.2	14.9***	31.1***
School/employer	1.1	0.7	1.5	0.9	0.4	0.4
Other	46.5	59.8***	50.0**	23.0	16.5***	22.8
Patient characteristics: mean (effect size compared with whites)¶						
Age in years	39.41	40.6***	36.11***	37.93	38.03	35.36***
		(0.12)	(−0.32)		(0.01)	(−0.27)
Highest school grade	12.06	11.67***	10.32***	12.16	11.86***	10.79***
		(−0.20)	(−0.69)		(−0.15)	(−0.58)
Days drinking in past month	14.56	17.02***	11.34***	24.9	24.64	22.94***
		(0.19)	(−0.25)		(−0.03)	(−0.19)
Days secondary drug use in past month	5.36	7.21***	4.17***	11.95	19.32***	13.23**
		(0.17)	(−0.12)		(0.56)	(0.09)
Age of first substance abuse in years	15.54	16.41***	16.32***	14.56	15.42***	15.03***
		(0.16)	(0.16)		(0.19)	(0.11)

Notes: Table excludes patients whose first episode in 1998–2000 ended in referral or transfer elsewhere.

**p-value $\leq$ .05; ***p-value $\leq$ .01.

†Percentages may not sum to 1 because of rounding. Significance results are from two-sample, two-sided test of proportions comparing each group to whites. Satisfactory progress, according to the interviewer's instruction manual, indicates that the participant "was in recovery services long enough to (in the judgment of the provider's staff) have made significant progress toward achieving the goals set forth in his/her recovery plan" while unsatisfactory progress means "the participant has dropped out of or has been dismissed from recovery services."

‡χ^2 tests comparing each group to whites.

§Percentages may not sum to 1 because patients can report multiple substance abuse problems (up to 3).

¶Two-sample, two-sided *t*-tests comparing each group to whites.

Table 2a: Logistic Models Predicting Treatment Completion in Outpatient Settings (*N* = 5,795)

Independent Variables	Model 0: Unadjusted OR (SE)	Model 1: Demographics OR (SE)	Model 2: Addiction Severity OR (SE)	Model 3: Econ. Resources OR (SE)	Model 4: Referral, Legal OR (SE)
Demographics					
Race/ethnicity					
African American	0.58 (0.05)***	0.58 (0.05)***	0.59 (0.05)***	0.73 (0.06)***	0.75 (0.07)***
Hispanic	1.16 (0.09)**	1.13 (0.09)	1.07 (0.09)	1.08 (0.09)	1.10 (0.10)
White	—	—	—	—	—
Male		0.96 (0.06)	0.98 (0.07)	0.94 (0.07)	0.89 (0.07)
Age in years†		1.00 (0.00)	1.00 (0.00)	1.01 (0.00)***	1.02 (0.00)***
Highest school grade†		0.98 (0.01)	0.98 (0.01)	0.97 (0.01)**	0.98 (0.01)
Addiction severity					
Ever received prior treatment			1.08 (0.07)	1.00 (0.07)	0.98 (0.07)
Additional drug problems					
Heroin			0.72 (0.15)	0.74 (0.16)	0.74 (0.16)
Amphetamines			1.29 (0.14)**	1.26 (0.14)**	1.16 (0.13)
Cocaine/crack			1.09 (0.08)	1.03 (0.08)	0.98 (0.08)
Marijuana			1.09 (0.08)	1.05 (0.08)	1.01 (0.08)
Other not listed above			0.95 (0.14)	0.90 (0.13)	0.89 (0.13)
Injection drug use			0.65 (0.11)***	0.81 (0.14)	0.80 (0.14)
Chronic mental illness			0.89 (0.10)	0.89 (0.11)	0.95 (0.12)
Days drinking in past month†			0.99 (0.00)***	0.99 (0.00)***	0.99 (0.00)**
Days secondary drug use in past month†			0.99 (0.00)***	0.99 (0.00)	0.99 (0.00)
Age of first substance abuse in years†			1.01 (0.01)**	1.01 (0.01)	1.01 (0.01)
Economic resources					
Employment					
Not in labor market				—	—
Unemployed				0.89 (0.07)	0.89 (0.07)

Table 2a: *Continued*

Independent Variables	Model 0: Unadjusted OR (SE)	Model 1: Demographics OR (SE)	Model 2: Addiction Severity OR (SE)	Model 3: Econ. Resources OR (SE)	Model 4: Referral, Legal OR (SE)
Part-time (5–34 hours/week)				1.60 (0.20)***	1.33 (0.17)**
Full-time (>34 hours/week)				2.62 (0.26)***	2.04 (0.21)***
Homeless				0.43 (0.05)***	0.47 (0.05)***
Medi-Cal beneficiary				1.20 (0.12)	1.19 (0.12)
Referral and legal status					
Under legal supervision					1.15 (0.10)
Principle source of referral					
Self-referral					—
Court/criminal justice					1.98 (0.21)***
School/employer					1.38 (0.39)
Other					0.90 (0.08)
Pseudo-R^2	0.01	0.02	0.03	0.07	0.09
χ^2	95.14***	98.80***	200.87***	453.06***	570.43***
Log likelihood	−3,154.21	−3,152.39	−3,101.35	−2,975.25	−2,916.57

Notes: Outcome is treatment completion (1) versus incomplete, whether deemed satisfactory or unsatisfactory by the treatment provider (0); episodes ending in transfer or referral are omitted.

**p-value $\leq$ .05; ***p-value $\leq$ .01.

†Centered continuous variable.

OR, odds ratio.

Table 2b: Logistic Models Predicting Treatment Completion in Residential Settings ($N = 4,796$)

Independent Variables	Model 0: Unadjusted OR (SE)	Model 1: Demographics OR (SE)	Model 2: Addiction Severity OR (SE)	Model 3: Econ. Resources OR (SE)	Model 4: Referral, Legal OR (SE)
Demographics					
Race/ethnicity					
African American	0.52 (0.04)***	0.53 (0.04)***	0.55 (0.05)***	0.55 (0.05)***	0.55 (0.05)***
Hispanic	0.88 (0.07)	0.95 (0.08)	0.96 (0.08)	0.95 (0.08)	0.92 (0.08)
White	—	—	—	—	—
Male		1.37 (0.09)***	1.31 (0.09)***	1.31 (0.09)***	1.20 (0.09)**
Age in years†		1.02 (0.00)***	1.03 (0.00)***	1.03 (0.00)***	1.03 (0.00)***
Highest school grade†		1.03 (0.01)**	1.03 (0.01)**	1.03 (0.01)**	1.04 (0.02)***
Addiction severity					
Ever received prior treatment			1.16 (0.08)**	1.14 (0.08)**	1.05 (0.07)
Additional drug problems					
Heroin			0.75 (0.12)	0.77 (0.13)	0.74 (0.12)
Amphetamines			0.97 (0.1)	1.00 (0.10)	1.01 (0.10)
Cocaine/crack			0.78 (0.06)***	0.80 (0.06)***	0.82 (0.07)**
Marijuana			1.15 (0.08)	1.18 (0.09)**	1.21 (0.09)**
Other not listed above			0.91 (0.13)	0.90 (0.13)	0.91 (0.13)
Injection drug use			0.75 (0.11)**	0.75 (0.11)**	0.75 (0.11)**
Chronic mental illness			0.78 (0.09)**	0.81 (0.10)	0.82 (0.10)
Days drinking in past month†			0.99 (0.00)**	0.99 (0.00)**	1.00 (0.00)
Days secondary drug use in past month†			1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Age of first substance abuse in years†			0.99 (0.01)	0.99 (0.01)	0.99 (0.01)
Economic resources					
Employment					
Not in labor market				—	—

Table 2b: *Continued*

Independent Variables	Model 0: Unadjusted OR (SE)	Model 1: Demographics OR (SE)	Model 2: Addiction Severity OR (SE)	Model 3: Econ. Resources OR (SE)	Model 4: Referral, Legal OR (SE)
Unemployed				1.19 (0.13)	1.13 (0.12)
Part-time (5–34 h/week)				1.29 (0.56)	1.19 (0.52)
Full-time (>34 h/week)				1.12 (0.27)	1.14 (0.28)
Homeless				0.83 (0.05)***	0.91 (0.06)
Medi-Cal beneficiary				0.76 (0.10)**	0.77 (0.10)**
Referral and legal status					
Under legal supervision					1.04 (0.08)
Principle source of referral					
Self-referral					—
Court/criminal justice					2.05 (0.20)***
School/employer					1.77 (0.69)
Other					0.92 (0.08)
Pseudo-R^2	0.02	0.03	0.04	0.04	0.05
χ^2	100.25***	182.56***	240.25***	256.34***	351.03***
Log likelihood	−3,164.04	−3,122.89	−3,094.04	−3,086.00	−3,038.65

Notes:

**p-value $\leq$ .05; ***p-value $\leq$ .01.

Outcome is treatment completion (1) versus incomplete, whether deemed satisfactory or unsatisfactory by the treatment provider (0); episodes ending in transfer or referral are omitted.

†Centered continuous variable.

OR, odds ratio.

Table 3:   Contribution of Differences in Patient Characteristics to African American–White Differences in Treatment Completion

	Difference in Completion Explained	
Patient Characteristics	*Percent (95% CI)*	*Percentage Points (95% CI)*
Outpatient settings		
Age, sex, education	− 1.6 (− 4.3, 0.2)	− 0.1 (− 0.4, 0.0)
Addiction severity	4.1 (− 3.6, 13.8)	0.4 (− 0.3, 1.3)
Economic resources	31.8 (20.0, 52.6)	2.9 (1.8, 4.8)
Referral, legal status	6.1 (1.2, 14.1)	0.6 (0.1, 1.3)
Residential settings		
Age, sex, education	3.3 (0.9, 6.6)	0.5 (0.1, 1.0)
Addiction severity	3.5 (− 6.0, 15.1)	0.5 (− 0.9, 2.3)
Economic resources	− 0.5 (− 2.2, 1.0)	− 0.1 (− 0.3, 0.2)
Referral, legal status	0.3 (− 2.7, 3.7)	0.1 (− 0.4, 0.6)

Notes: The unadjusted difference in completion is 9.2 percentage points in outpatient and 15.4 percentage points in residential settings. Entries are bootstrap estimates of expression (1) applied to models in Table 2 and may differ slightly than direct application of expression (1) to results in Table 2 due to rounding of the OR reported.
CI, confidence interval; OR, odds ratio.

referral and legal status have confidence intervals that do not include 0, indicating a statistically significant increase (rather than nonsignificance or decrease) in the OR estimate. Approximately 60 percent of differences in completion are unexplained after adjustment for all variables.

Table 2b repeats the analysis for the residential sample. The relative OR moves only slightly closer to parity, from 0.52 (Model 0) to 0.55 (Models 2, 3, and 4), after adjustments for all patient attributes. Demographic variables explain 0.5 percentage points (3.3 percent) of the 15.4 percentage point absolute difference in residential completion rates. Other blocks of variables did not result in a significant change in the relative odds of completion (Table 3).

DISCUSSION

African Americans in publicly funded alcohol treatment programs in LAC during 1998–2000 were significantly less likely than their white counterparts in both outpatient and residential settings to remain in treatment for the intended duration of the program. Among those who ceased treatment prematurely in outpatient care, African Americans were more likely than whites to be judged by treatment staff as having made unsatisfactory progress toward treatment goals.

Do the differences identified constitute a health "disparity"? Rathore and Krumholz (2004) propose that the term "disparity" be reserved for differences in appropriate utilization of treatment, which, for a particular group, are associated with poor clinical outcomes and are not attributable to patient factors. Shorter lengths of stay and failure to complete treatment have consistently been found to be associated with poor clinical outcomes, including higher rates of relapse (Anglin and Hser 1990; Hubbard et al. 1997; Simpson et al. 1997; McKay et al. 2002; Moos and Moos 2003; McKay 2005). In this sample, statistically significant racial differences in completion remain after adjustment for a number of patient factors that could be related to true treatment need and propensity to complete, including multiple indicators of addiction severity, economic resources, age and sex demographics, source of treatment referral, and criminal justice system involvement.

These factors explained some, although not all, of racial differences in completion. Of the 9.2 percentage point "completion gap" in outpatient settings (26.7 percent for whites versus 17.5 percent for African Americans), 2.9 percentage points (31.8 percent) can be attributed to lower rates of employment, housing, and state-provided medical insurance among African American patients. An additional 0.6 percentage points (6.1 percent) is explained by referral source and legal status, principally by lower rates of criminal justice coercion into treatment compared with white patients. The association of differences in addiction severity to racial differences in completion was nonsignificant. Importantly, few studies have found that economic prospects outweigh the effect of addiction severity on retention (Wickizer et al. 1994; Veach et al. 2000; Hser et al. 2001). Our finding that economic variables contribute considerably more to racial differences in completion than other variables underscores the importance of broader socioeconomic conditions in differences related to treatment outcomes. Less favorable employment prospects may be associated with less hope for the future and motivation to recover. Lack of housing can interfere with attendance at outpatient treatment facilities and can contribute to exposure to drug use triggers.

In residential settings, less of the difference in completion (46.1 percent for whites versus 30.7 percent for African Americans) can be explained by differences in the patient attributes available for analysis. Racial differences in demographics, the only statistically significant block of variables identified, explain just 0.5 percentage points (3.3 percent) of the 15.4 absolute percentage point difference in completion rates.

Less than 30 percent of outpatients and 50 percent of residential patients in any race group in this sample completed treatment. This level of retention is

not atypical compared with other substance abuse treatment studies (Maglione et al. 2000; Hser et al. 2001), although particular programs have achieved retention as high as 75 percent (De Leon et al. 2000; Veach et al. 2000). Retention and extended care (i.e., residential followed by outpatient) have been consistently linked with improved outcomes (Anglin and Hser 1990; Simpson et al. 1997; McKay et al. 2002; Moos and Moos 2003; McKay 2005) and address the chronic and relapsing nature of addiction illness (McLellan et al. 2000).

Evidence of racial disparities in completion (i.e., differences in completion that remain after controls for a broad range of patient factors) should motivate a broadened research agenda to investigate those patient characteristics that could not be included in this study, as well as characteristics of the treatment system. For example, geographic proximity to treatment has been associated with retention in other study areas (Beardsley et al. 2003) and could help explain racial differences in retention. Given high levels of racial residential segregation in Los Angeles, differences in completion rates could also result from differences in neighborhood conditions associated with social stress, strain, and triggers for relapse thought to be linked to retention (Jacobson 2004). If location and program quality are correlated, then a potential implication of geographic clustering of patients by race is that African Americans may systematically attend lower quality programs. One way to test this hypothesis, taking advantage of the hierarchical nature of the data (i.e., patients within programs), is to determine whether African Americans are more likely than white patients to attend programs with lower completion rates even after adjusting for patient mix. We are investigating these and other possible explanations that can be assessed with these data.

In addition, several possible explanations merit attention but cannot be investigated with these data, including differences in program strategies and components; provision of transportation assistance, primary medical care, and other ancillary services; the degree to which treatment staff may be attuned to any unique beliefs, attitudes, and problems of African American patients (i.e., "cultural competence" Betancourt et al. 2003); and racial differences in communication with treatment providers, which have recently been documented in medical care settings (Johnson et al. 2004). Patient preferences and views of treatment are other key areas that could not be controlled in this analysis. While recent evidence suggests that both African Americans and whites view treatment as an appropriate intervention for alcohol problems, African Americans are more likely to view alcoholism as a moral failing as well as an illness (Caetano 1989, 2003), which could influence perceptions of different

treatment approaches and patient preferences with respect to treatment duration. An important component of future research must also be improved data collection to more rigorously assess patient profiles and treatment outcomes by moving from the administrative data analyzed here to more scientific measures. Importantly, our analysis also provides no information regarding "racial bias" in treatment provision, which Rathore and Krumholz (2004) define as "differential provision of appropriate care to patients principally because of their race."

Our study has several strengths. We draw on a large sample of more than 10,000 treatment patients with ample representation of African American, Hispanic, and white patients and geographic coverage of a large metropolitan area with a high estimated economic cost from alcohol-related problems (approximately $7 billion annually) (Alcohol and Drug Program Administration [ADPA] 2004). We observe patient populations in practice rather than in select programs or controlled settings of questionable representativeness. Our analysis is also subject to limitations. Most importantly, the data are from administrative records rather than a validated and rigorously designed data collection instrument. While not likely to reverse our finding of large disparities in treatment completion, more refined measures could increase our estimates of the extent to which differences in treatment completion are explained by other differences between patients. Second, treatment completion is not a direct measure of treatment effectiveness. However, it is likely to reflect differences in patient satisfaction and has been found previously to be inversely associated with relapse (Simpson et al. 1997). Finally, a danger for this analysis is the possibility that counselors may systematically apply different standards to minority patients than white patients when assessing completion. While we cannot gauge any such tendency with these data, to the extent that racial bias in determination of completion occurs in favor of whites, this analysis would tend to underestimate the magnitude of differences in completion rates.

Our study is also limited in its controls for economic resources. In Project Match's smaller sample of 1,380 white and 168 African American patients, controlling for occupation eliminated racial differences in outpatient attendance and aftercare (Tonigan 2003). In contrast, in this study, racial differences in completion remained after adjusting for differences in employment, homelessness, and Medi-Cal insurance. Could these contrary findings simply be an artifact of Project Match's smaller sample size, rather than the set of economic controls? To address this issue, we conducted a Monte Carlo simulation. Of 10,000 random subsamples of 1,380 whites and 168 African Americans drawn from our outpatient LACPRS data, we detected an adjusted

difference in completion in favor of whites and significant at the 5 percent level in only 3,308 (33 percent) cases. Thus, were our sample size as small as in Project Match, we would not have been likely to detect the racial differences in completion rates actually detected in our study. This provides evidence that Project Match may have lacked the statistical power necessary to detect racial differences in completion net of any economic controls.

Finally, interpretation of the study's findings should recognize that race and ethnicity are socio-political, not biological classifications and as such are inherently subjective (Ford and Kelly 2005). Furthermore, it is possible that patients may have misreported their race and ethnicity if they perceived a racial/ethnic bias on the part of the individual administering the questionnaire. The extent of such measurement error in LACPRS is currently unknown, so that race and ethnicity in this study must be interpreted as subjective, negotiated (between respondent and counselor) constructs reflecting patients' determinations of the most expedient response.

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NOTES

1. Based on the Substance Abuse and Mental Health Services Administration's Treatment Episode Data Set, in 2003, the most recent year available, Los Angeles had the second highest number of drug and alcohol admissions (55,859) among U.S. metropolitan statistical areas.

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