HSR Health Services Research

DOI: 10.1111/1475-6773.12031
RESEARCH ARTICLE

Disparities in Completion of Substance Abuse Treatment between and within Racial and Ethnic Groups

Erick G. Guerrero, Jeanne C. Marsh, Lei Duan, Christine Oh, Brian Perron, and Benedict Lee

Objective. To evaluate disparities in substance abuse treatment completion between and within racial and ethnic groups in publicly funded treatment in Los Angeles County, California.

Data Source. The Los Angeles County Participant Reporting System with multi-cross-sectional annual data (2006–2009) for adult participants (n = 16,637) who received treatment from publicly funded programs (n = 276) for the first time.

Study Design. Retrospective analyses of county discharge and admission data. Hierarchical linear regressions models were used to test the hypotheses.

Data Collection. Client data were collected during personal interviews at admission and discharge for most participants.

Principal Findings. African Americans and Latinos reported lower odds of completing treatment compared with Whites. Within-group analysis revealed significant heterogeneity within racial and ethnic groups, highlighting primary drug problem, days of drug use before admission, and homelessness as significant factors affecting treatment completion. Service factors, such as referral by the criminal justice system, enabled completion among Latinos and Whites only.

Conclusions. These findings have implications for reducing health disparities among members of racial and ethnic minorities by identifying individual and service factors associated with treatment adherence, particularly for first-time clients.

Key Words. Racial/ethnic disparities, treatment completion, outpatient treatment

Concern about disparities in substance abuse treatment (SAT) outcomes among racial/ethnic groups in the United States has led to efforts to identify differences in substance abuse patterns and response to treatment. Yet this research has focused on between-group differences, mainly of African Americans and Whites (see Grella and Joshi 1999; Smith and Weisner 2000; Green et al. 2002; Hser et al. 2003, 2004; Satre, Mertens, and Weisner 2004), with little attention to differences between these two groups and Latinos, the fastest

growing population in SAT (Morgenstern and Bux 2003; Marsh et al. 2009; Guerrero et al. 2012b). The few comparative studies that include Latinos (Marsh et al. 2009) also obfuscate service and psychosocial factors within these groups that may significantly impact their ability to complete treatment. Using multicross-sectional annual data (2006–2009) from adult participants who received treatment for the first time in Los Angeles County, this study tests the extent to which between- and within-group differences in individual and program characteristics exist for African American, Latino, and White clients, and how these differences interact with treatment completion in outpatient settings.

Successful completion of SAT is a well-established process outcome measure associated with long-term outcomes, such as less future criminal involvement and fewer readmissions (Evans, Li, and Hser 2009; Garnick et al. 2009). As such, this measure is particularly relevant for clients during their first exposure to treatment because successful completion reflects achievement of treatment goals at the client level and, under health care reform legislation, it may become a prevalent measure of program performance at the system level (Arndt 2010; Borys 2011). By examining individual- and service-level measures for an adequate sample of first-time clients, mainly those referred by the criminal justice system, this study involved a comparative analysis of the impact these factors have on treatment completion across racial/ethnic groups.

Conceptual Framework

Most research on SAT disparities across the United States has focused on individual factors to explain group differences in treatment completion between minorities and Whites. This research has highlighted the factors such as differences in client demographics, primary substance used, and addiction severity (Jacobson, Robinson, and Bluthenthal 2007a,b; Arndt 2010). In particular, findings from the national Treatment Episode Data Set pointed to seven client characteristics associated with a higher likelihood of successfully completing

---

Address correspondence to Erick G. Guerrero, Ph.D., School of Social Work, University of Southern California, 655 West 34th Street, Los Angeles, CA 90089-041; e-mail: erickgue@usc.edu. Lei Duan, Ph.D., is also with the School of Social Work, University of Southern California, Los Angeles, CA. Jeanne C. Marsh, Ph.D., is with the School of Social Service Administration, University of Chicago, Chicago, IL. Christine Oh, Ph.D., and Benedict Lee, Ph.D., are with the Los Angeles County Department of Public Health, Substance Abuse Prevention and Control, Alhambra, CA. Brian Perron, Ph.D., is with the School of Social Work, University of Michigan, Ann Arbor, MI.

SAT: (1) non-Latino White, (2) female, (3) older than 40, (4) more than 12 years of education, (5) employed, (6) use of alcohol as primary substance, and (7) less than daily substance use at admission (Substance Abuse and Mental Health Services Administration [SAMHSA] 2009).

Specifically, primary drug used and severity of drug use at intake, as well as psychosocial stressors, are individual factors associated with higher risk to drop out of treatment. Studies show that use of heroin, methamphetamine, and cocaine compared with alcohol is associated with reduced likelihood of treatment completion (Bluthenthal, Jacobson, and Robinson 2007; SAMHSA 2009). In Los Angeles County in 2006, African Americans were most likely to report using cocaine/crack than other drugs, Latinos were most likely to report using heroin, and Whites were most likely to report using amphetamine (Bluthenthal, Jacobson, and Robinson 2007). In addition, it is well documented that African Americans and Latinos enter treatment with more health, mental health, and social problems than Whites, which can contribute to reduced treatment completion (Marsh et al. 2009). Overall, the aggregate effect of primary drug used and severity of drug use, as well as the prevalence of mental health problems and homelessness, place minorities at a disadvantage in terms of successfully meeting the demands of a structured treatment program (Grella and Stein 2006; Ngo et al. 2009; Niv, Pham, and Hser 2009; Van Dorn, Swanson, and Swartz 2009). Thus, *Hypothesis 1* posited that after accounting for primary drug used and days of drug use before admission, as well as history of mental disorder and homelessness status, African American and Latino clients would report lower odds of completing treatment compared with White clients.

The literature on treatment completion has also suggested that minority status and primary drug used, such as cocaine, methamphetamine, and heroin compared with alcohol, are interacting factors associated with lower odds of completing treatment (Bluthenthal, Jacobson, and Robinson 2007; SAMHSA 2009). Thus, *Hypothesis 2* posited that African Americans and Latinos using cocaine, methamphetamine, and heroin as their primary drug problem would be less likely to complete treatment than Whites and individuals using alcohol.

It is well established that African American and Latinos face significant challenges to accessing and remaining in treatment long enough to complete treatment successfully (McKay et al. 2003; Tonigan 2003). However, emerging evidence has highlighted significant heterogeneity within African Americans and Latinos in terms of primary drug of choice, severity of drug use before admission, and prevalence of psychosocial stressors that may inhibit

efforts to meet treatment goals (Arndt 2010; Guerrero et al. 2012b). Thus, *Hypothesis 3* posited that use of illegal drugs as primary drug problem, days of drug use before admission, history of mental disorder, and homelessness status would be associated with lower odds of completing treatment within members of each racial and ethnic group.

There is growing recognition of the significant role of specific substance abuse treatment services and system factors in helping individuals achieve treatment completion (Marsh et al. 2009; Marsh, Shin, and Cao 2010). Among those seeking help for substance abuse issues, wait time to treatment entry is the most commonly cited service barrier (Claus and Kindleberger 2002; Appel et al. 2004), whereas unmet service needs are generally factors associated with a reduced likelihood for African Americans and Latinos to complete treatment (Jacobson, Robinson, and Bluthenthal 2007a; Marsh et al. 2009; Niv, Pham, and Hser 2009; Shim et al. 2009). Increasing evidence also suggests that referral source is related to treatment completion (SAMHSA 2009). In particular, drug and probation court referrals to SAT have aimed to facilitate rapid access to social services to achieve timely completion of treatment as a condition of probationary status (Evans, Li, and Hser 2008, 2009). Although African Americans and Latinos are disproportionally represented in the criminal justice system, it is not clear whether individuals benefit from rapid access to treatment and the additional supervision that court referrals offer to ensure successful completion of substance abuse treatment. Thus, *Hypothesis 4* posited that fewer days of wait time to treatment entry and referral by the criminal justice system would be associated with higher odds of completing treatment for all members of racial and ethnic groups.

METHODS

Data Collection and Procedures

This study analyzed a subset of data collected via the Los Angeles County Participant Reporting System (LACPRS). This database includes data from all publicly funded substance abuse treatment programs in the most populous county in the United States (Crèvecoeur, Finnerty, and Rawson 2002). This ongoing system-wide evaluation database captures the treatment experience and immediate outcomes of low-income racially and ethnically diverse clients. Of the 141 items in the LACPRS, more than half are standardized scales and questions related to admission, discharge, and health derived from state

(California Outcome Measure System) and federal (Treatment Episode Data Set) measurement systems.

Client data in LACPRS are collected during personal interviews at intake and discharge for most individuals. Through the use of standardized instruments, counselors collect information on five major domains: employment status, legal status, substance use profile, substance use history, and medical and psychological status. The collection form includes 10 items from the Addiction Severity Index (McLellan et al. 1993) and the Drug Abuse Reporting Program (Simpson and Sells 1982; Simpson 1984). These scales have been shown to be reliable measures of substance abuse severity (Weisner, McLellan, and Hunkeler 2000), particularly among diverse populations (Longabaugh 1991), allowing for assessment of client reports from intake to discharge.

Analytic Sample

The full sample (n = 87,719) was restricted to adults in outpatient treatment (n = 37,508). We limited the analysis to outpatient programs because they utilize the same treatment completion goals and represent the most common treatment option in L.A. County, accounting for more than 70 percent of all admissions (SAMHSA 2007). We excluded methadone and related opioid maintenance therapy programs because these ongoing programs have different criteria for treatment completion. Only clients who were admitted and discharged within the same year were included to obtain accurate estimates, due to data coding issues with clients who stayed beyond one calendar year. Furthermore, we included only clients at baseline (first time in substance abuse treatment) to identify factors associated with this first treatment experience.

This study included participants who self-reported primarily as African American, Latino, and non-Latino White. Participants who self-identified as other ethnicities were excluded due to small sample size (less than 5 percent total). Our analytic sample consisted of 16,637 clients from 276 treatment programs, including 4,650 African Americans (28 percent), 8,572 Latinos (52 percent), and 3,415 non-Latino Whites (20 percent).

Measures

Dependent Variable. Treatment completion served as the dependent variable and was dichotomously defined using nine different discharge codes contained in client records. Clinicians were instructed to enter the code that best described the status of participants at the time of discharge. Successful

treatment completion was represented by two discharge codes indicating respondents had successfully completed the major goals set forth in their recovery plan, regardless of whether they needed continuing care. Unsuccessful treatment included the remaining seven discharge codes related to leaving treatment early, leaving without making satisfactory progress, or failing to complete treatment for other reasons (e.g., incarceration). This measure of treatment completion is congruent with recent regional (Jacobson, Robinson, and Bluthenthal 2007a,b) and national studies (SAMHSA 2009).

Explanatory Variable. Individual demographics included client age, gender, race, and education (years in school). Respondents also reported psychosocial characteristics, including employment status (full-time, part-time, unemployed and seeking employment, unemployed and not seeking employment, or not in the labor force); homelessness status (stable housing or homeless); history of mental disorder (diagnosed with any mental disorder prior to treatment); age at first alcohol or drug use; days of drug use before admission (number of days of primary substance use during the 30 days prior to admission); and primary drug problem (heroin, methamphetamine, cocaine, marijuana, alcohol, or other). The "other" category represented drugs such as inhalants, LSD, and psilocybin. White racial background and alcohol use served as reference categories when comparing interaction effects between race/ethnicity and primary drug problem.

Respondents were also asked to describe service and system factors. Service factors included variables related to access to treatment (days of wait time) and treatment duration (days). Due to the strong positive correlation of duration with treatment completion, duration was not included in analysis. Measures of system factors included source of referral, which included self, community, Proposition 36, drug court, and social services.

Data Analysis

Initial analyses relied on analysis of variance and chi-square global tests to compare completion rates and demographic characteristics across racial/ethnic groups. To test the association between explanatory variables and treatment completion, seven multilevel logistic regressions were conducted to respond to the between-group Hypothesis 1, and for each of the within-group hypotheses separately (Hypotheses 2–4). Multivariate analyses were conducted in SAS 9.2 using *Proc GLIMMIX with a logit link* (SAS Institute 2008).

These regression analyses relied on random intercept models to account for the hierarchical structure of the data (clients nested within facility) to obtain more accurate estimates of standard errors (Blakely and Woodward 2000), as suggested in other multilevel program and client disparities analysis (see Marsh et al. 2009). To address within-group differences posited in Hypothesis 3, subgroup interaction terms were tested in three different regression models, one per racial/ethnic group, to determine the role of race/ethnicity and primary drug problem, with White and alcohol use as referents. Considering the large sample, the relationships observed in the predictive multivariate logistic regression models were considered statistically significant if the 99 percent confidence interval (CI) did not bound 1. This conservative approach highlighted the most meaningful differences and reduced type I error inflation due to the inclusion of numerous individual and program variables.

RESULTS

Results of comparative analysis revealed differences across racial/ethnic groups for most variables considered, particularly primary drug problem, psychosocial stressors, and treatment completion. African Americans reported the lowest percentage of treatment completion (8.6 percent), compared with Latinos (10.6 percent) and Whites (14.1 percent; see Table 1).

Findings supported Hypothesis 1, which posited that after accounting for primary drug used and days of drug use before admission, as well as history of mental disorder and homelessness status, African American and Latino clients will report lower odds of completing treatment compared with White clients. African Americans (OR = 0.65; CI = 0.52–0.83) and Latinos (OR = 0.82; CI = 0.68–0.99) were less likely to complete treatment than Whites (see Table 2).

Partial support was found for Hypothesis 2, which posited that African Americans and Latinos using cocaine, methamphetamine, and heroin as primary drug problem would be less likely to complete treatment than Whites and individuals using alcohol. Table 3 provides results on race/ethnicity and primary drug problem interaction effects. Analysis revealed that except for methamphetamines, African Americans using heroin (OR = 0.19; CI = 0.04–0.84) and cocaine (OR = 0.46; CI = 0.34–0.63) among other drugs (i.e., marijuana and inhalants) were less likely to complete treatment than Whites and individuals using alcohol. Similarly, except for heroin and inhalants, Latinos using methamphetamine (OR = 0.35; CI = 0.26–0.46) and cocaine

Table 1: Client Characteristics by Race/Ethnicity Using 2006–2009 Data

Variables	*African American (N = 4,650)*	*Latino (N = 8,572)*	*Non-Latino White (N = 3,415)*
Treatment completion*			
Complete successfully	8.6	10.6	14.1
Incomplete (satisfactory or unsatisfactory progress)	91.4	89.4	85.9
Individual factors			
Age (M, SD)*	33.9 (15.1)	26.1 (11.3)	36.7 (13.8)
Male*	64.4	69	64
Level of education (M, SD)*	10.7 (2.9)	9.9 (2.8)	11.2 (3.2)
Employment*			
Not in the labor force	26	24.3	12.9
Full-time	5.6	11.9	14.1
Part-time	4.5	7.4	8.4
Unemployed (seeking)	23.7	28.6	26.1
Unemployed (not seeking)	40.2	27.8	38.6
Homeless*	11.1	7.1	9.4
Diagnosed with a mental disorder*	21.3	8.8	31.8
Age at first drug use (M, SD)*	19.0 (8.5)	17.4 (6.9)	19.5 (8.4)
Days of primary drug use before admission(M, SD)*	6.7 (9.8)	5.4 (8.7)	6.3 (9.4)
Primary drug problem*			
Other	3.1	2.8	3.2
Heroin	1.2	2.2	4.4
Methamphetamine	3.1	29.1	35.1
Cocaine	29.1	8.7	9.1
Marijuana	38.8	34.9	19.5
Alcohol	24.8	22.4	28.7
Service and system factors			
Number of days on waiting list (M, SD)*	0.6 (3.5)	1.0 (4.8)	1.0 (4.7)
Treatment duration (M, SD)	44.4 (37.9)	44.9 (37.8)	43.1 (37.0)
Principal referral source*			
Self	25	14.4	26.1
Community	24.9	30.7	20.6
Proposition 36	26	27.8	30.3
Drug court	7.5	8.6	5.7
Social services	16.5	18.6	17.4

Note. Figures represent percentage unless otherwise noted.
*Means or frequencies are different across racial/ethnic groups at $p < .01$.

(OR = 0.52; CI = 0.37–0.73) among other drugs (i.e., marijuana) was associated with lower odds of treatment completion compared with Whites and individuals using alcohol.

Table 2: Random Effects Logistic Regression on Treatment Completion Using 2006–2009 Data

Independent Variables	*Odds Ratio (99% CI)*
Individual factors	
Race/ethnicity	
Non-Latino White (reference)	–
African American	**0.65 (0.52–0.83)**
Latino	**0.82 (0.68–0.99)**
Age	0.99 (0.99–1.01)
Male	1.16 (0.98–1.36)
Level of education	1.01 (0.98–1.03)
Employment	
Not in the labor force (reference)	–
Full-time	1.07 (0.81–1.43)
Part-time	0.90 (0.65–1.24)
Unemployed (seeking)	0.78 (0.61–1.01)
Unemployed (not seeking)	0.83 (0.65–1.05)
Homeless	**0.56 (0.40–0.77)**
Diagnosed with a mental disorder	**0.77 (0.60–0.98)**
Age at first drug use	**1.02 (1.01–1.03)**
Days of primary drug use before admission	**0.97 (0.96–0.98)**
Primary drug problem	
Alcohol (reference)	–
Heroin	**0.43 (0.25–0.75)**
Methamphetamine	**0.43 (0.34–0.55)**
Cocaine	**0.64 (0.48–0.83)**
Marijuana	0.86 (0.70–1.06)
Other	1.13 (0.79–1.61)
Service and system factors	
Number of days on waiting list	0.98 (0.96–1.01)
Principal referral source	
Self (reference)	–
Community	**1.33 (1.02–1.74)**
Proposition 36	**1.47 (1.10–1.95)**
Drug court	**1.81 (1.30–2.52)**
Social services	0.90 (0.68–1.20)

Note. Values in bold are significant at $p < .01$ based on a 99% CI that does not bound 1.0.

Partial support was also found for Hypothesis 3, which posited that use of illegal drugs as primary drug problem, days of drug use before admission, history of mental disorder, and homelessness status would be associated with lower odds of completing treatment among members of each racial and ethnic group. The three multilevel logistic random intercept models conducted for each racial/ethnic group showed that African Americans, Latinos, and Whites reported significant heterogeneity within their respective groups in terms of

Table 3: Three Separate Random Effects Logistic Regression Models by Race/Ethnicity Using 2006–2009 Data

Independent Variables	*African American*	*Latino*	*Non-Latino White*
	Odds Ratio (99% CI)		
Individual factors			
Age	**1.02 (1.01–1.04)**	0.99 (0.97–1.01)	0.99 (0.97–1.01)
Male	0.95 (0.68–1.34)	1.17 (0.91–1.48)	1.32 (0.96–1.80)
Level of education	0.97 (0.92–1.02)	1.01 (0.97–1.05)	1.01 (0.97–1.06)
Employment			
Not in the labor force (reference)	–	–	–
Full-time	1.01 (0.52–1.98)	1.01 (0.66–1.49)	1.66 (0.95–2.92)
Part-time	0.87 (0.42–1.83)	0.86 (0.54–1.37)	1.34 (0.72–2.50)
Unemployed (seeking)	1.01 (0.62–1.66)	0.81 (0.56–1.16)	0.88 (0.51–1.50)
Unemployed (not seeking)	0.71 (0.43–1.18)	0.88 (0.63–1.23)	0.93 (0.56–1.54)
Homeless	0.72 (0.42–1.23)	**0.47 (0.27–0.83)**	0.59 (0.31–1.12)
Diagnosed with a mental disorder	0.63 (0.40–1.01)	0.78 (0.50–1.21)	0.84 (0.57–1.25)
Age at first drug use	1.01 (0.98–1.02)	**1.02 (1.01–1.04)**	**1.03 (1.01–1.05)**
Days of primary drug use before admission	**0.96 (0.94–0.98)**	**0.97 (0.96–0.98)**	**0.97 (0.96–0.99)**
Primary drug problem (main effects)			
Alcohol (reference)	–	–	–
Heroin	0.24 (0.03–1.77)	0.82 (0.41–1.64)	**0.22 (0.08–0.63)**
Methamphetamine	1.35 (0.61–3.01)	**0.39 (0.28–0.54)**	**0.44 (0.28–0.69)**
Cocaine	0.68 (0.41–1.11)	**0.64 (0.42–0.97)**	**0.53 (0.29–0.97)**
Marijuana	0.97 (0.62–1.51)	**0.74 (0.56–0.98)**	1.02 (0.67–1.57)
Other	1.05 (0.46–2.42)	1.17 (0.71–1.91)	1.15 (0.57–2.35)
Primary drug problem (interaction effects)*			
Alcohol (reference)	–	–	–
Heroin	**0.19 (0.04–0.84)**	0.64 (0.37–1.09)	**0.21 (0.10–0.45)**
Methamphetamine	0.65 (0.37–1.15)	**0.35 (0.26–0.46)**	**0.41 (0.31–0.56)**
Cocaine	**0.46 (0.34–0.63)**	**0.52 (0.37–0.73)**	**0.48 (0.30–0.74)**
Marijuana	**0.49 (0.36–0.66)**	**0.68 (0.52–0.89)**	1.08 (0.80–1.46)
Other	**0.52 (0.29–0.94)**	1.01 (0.68–1.5)	1.27 (0.76–2.15)
Service system factors			
Number of days on waiting list	0.97 (0.91–1.03)	0.99 (0.97–1.02)	0.97 (0.93–1.02)
Principal referral source			
Self (reference)	–	–	–
Community	1.24 (0.68–2.28)	1.24 (0.85–1.82)	1.27 (0.78–2.06)
Proposition 36	1.77 (0.98–3.17)	**1.85 (1.22–2.82)**	0.96 (0.57–1.62)
Drug court	1.44 (0.68–3.07)	**1.76 (1.11–2.80)**	**2.40 (1.28–4.52)**
Social services	0.93 (0.50–1.76)	0.96 (0.63–1.46)	0.87 (0.52–1.47)

Note. Values in bold are significant at $p < .01$ based on a 99% CI that does not bound 1.0.
*Interaction terms use White and alcohol use as reference for each racial/ethnic group and drug problem.

the relationship between drug use and primary drug problem and treatment completion. Primary drug use before admission was the only measure associated with lower odds of treatment completion among members of each racial and ethnic groups.

However, Latinos and Whites reported the greatest heterogeneity in terms of primary drug problem and lower likelihood of treatment completion. Latinos were less likely to complete treatment if they used methamphetamine (OR = 0.39; CI = 0.28–0.54), cocaine (OR = 0.64; CI = 0.42–0.97), or marijuana (OR = 0.68; CI = 0.52–0.89), whereas use of heroin (OR = 0.21; CI = 0.10–0.45), methamphetamine (OR = 0.41; CI = 0.31–0.56), or cocaine (OR = 0.48; CI = 0.30–0.74) was associated with lower odds of completion among Whites. In terms of psychosocial stressors, no differences were found within groups in history of a mental disorder, whereas being homeless was associated with lower odds of completing treatment only for Latinos (OR = 0.47; CI = 0.27–0.83).

Our findings also offered partial support for Hypothesis 4, which posited that fewer days of wait time to treatment entry and referral by the criminal justice system would be associated with higher odds of completing treatment for all racial and ethnic groups. Although days spent waiting to enter treatment was not related to treatment completion in any group, two sources of referrals by the criminal justice system played a significant role in successful completion. Being referred by drug court increased the odds of treatment completion for both Latinos (OR = 1.76; CI = 1.11–2.80) and Whites (OR = 2.40; CI = 1.28–4.52), whereas being referred by Proposition 36 was associated with higher odds of completing treatment for Latinos only (OR = 1.85; CI = 1.22–2.82).

DISCUSSION

The results of this study showed that distinct individual, service, and system factors played an important role in treatment completion for different racial/ethnic groups. The average 12 percent completion rate for first-time clients in outpatient treatment is significantly lower than the rate of completion reported in other regional studies. Arndt (2010) reported a higher percentage of successful treatment completion among first-time clients in Iowa, a figure that also differed among racial/ethnic groups (55.6 percent for African Americans, 67.4 percent for Latinos, and 67.0 percent for Whites). The 12 percent rate found here is also significantly lower than the 45 percent rate reported in national

studies using recurrent clients attending all levels of care (i.e., outpatient, inpatient, residential) (SAMHSA 2009). These varying rates reflect differences in population and service characteristics, as well as measurement criteria of successful completion. Using an adequate sample size of multiethnic groups attending outpatient treatment, this study contributed to the literature on racial and ethnic disparities by comparing client response to treatment at baseline (first episode) and under the same completion criteria (outpatient services).

Most important, findings suggested that after accounting for individual and service factors, African Americans and Latinos were more likely than non-Latino Whites to experience unsuccessful first-time treatment episodes. Although treatment completion rates among African Americans and Latinos are disproportionally affected by issues associated with race and ethnicity, the within-group analysis showed specific risk factors for each racial/ethnic group.

Furthermore, findings on the interaction effects between race/ethnicity and primary drug problem also provided evidence of different levels of vulnerability that may impact treatment completion for minorities. In other words, although racial/ethnic characteristics seemed to play a role in treatment completion, issues related to their use of cocaine, and other illegal drugs had a compounding effect associated with a decreased likelihood of completing treatment, compared with Whites and those who use alcohol as primary drug problem.

Another significant contribution of this study was identifying the heterogeneity within groups in risk factors associated with treatment completion. Drug use severity before admission was the only individual factor consistently and negatively related to treatment completion, whereas the highest level of heterogeneity associated with completion was found within Latinos in terms of homelessness status, primary drug problem, and drug court referrals. Emerging research suggests that the significant heterogeneity among Latinos in terms of mental health and drug of choice, as well as engagement with social services and overall treatment experience, may be related to differences in level of acculturation, English proficiency, national origin, and rural/urban background (Vega and Lopez 2001; Vega and Sribney 2005; Alegrőa et al. 2006). These findings reinforce the Institute of Medicine's call for the collection of data on national origin and English language proficiency to help identify significant health disparities among distinct groups of Latinos (Ulmer, McFadden, and Nerenz 2009).

An important finding of this study was that the system factors such as referral by drug court played a significant role in enabling completion among Latinos and Whites only. Proposition 36 had an impact on Latinos' likelihood of completion, while no referrals source was significant for completion among African Americans. Despite the goal of drug and probation court referrals to monitor treatment compliance by probation personnel, this approach has a differential impact for each group to achieve completion of treatment.

Overall, study findings provided evidence necessary for the development of effective substance abuse treatments for specific racial/ethnic groups. By understanding the specific factors that make members of each group more or less likely to complete treatment during their first treatment attempt, tailored pathways to recovery can be developed. This evidence is of particular value for Latino populations in the United States given their current size, growth rate, and limited data on drug use, service utilization, and treatment completion (Amaro et al. 2006).

Limitations

The limitations and strengths of this study both derive from characteristics of the LACPRS dataset. The representation of low-income African American and Latino samples in the LACPRS dataset is an important strength of this study. However, the LACPRS data were limited in terms of information collected on income and racial/ethnic background, as well as country of origin, primary language, and English proficiency. These factors could help us further examine the heterogeneity found among non-Latino Whites, who may be immigrants from different national origins. Another shortcoming of these data was the limited number of service and program performance measures, which prevented analysis of the intensity and quality of treatment received. Moreover, findings should be interpreted with caution as they describe the characteristics and experiences of people attending treatment for the first time and a large Latino subgroup, which may not reflect the makeup of Latinos in other parts of the United States. Despite these limitations, this study is the only examination of disparities between and within racial/ethnic groups in terms of treatment completion using regional data from the second-largest publicly funded treatment system in the United States.

Future Research

Future research can further examine the service factors that influence treatment effectiveness. It is particularly critical to examine the mechanisms at play in the court system in Los Angeles County that enable successful treatment completion for minority first-time clients.

Overall, findings support the development of racially and ethnically responsive substance abuse treatment approaches, with a specific focus on tailoring treatment based on primary drug problem, drug use severity at admission, and co-occurring psychosocial issues. Future research on treatment outcomes could focus on developing integrated health service interventions for Latinos, a difficult to engage and bilingual/bicultural population that requires services delivered in a culturally and linguistically responsive environment (Guerrero et al. 2012a). In addition, knowledge about the challenges faced during the initial engagement phase by clients with unstable housing situations, mental health issues, and dependence on hard illegal drugs could help addiction health services researchers to develop and test the efficacy of on-demand culturally responsive housing and psychiatric interventions delivered within intensive outpatient substance abuse treatment.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: We thank Director John Viernes and his research staff at L.A. County Department of Health, Substance Abuse Prevention and Control, who kindly provided the data necessary for our analysis. We also appreciate Eric Lindberg, who assisted with the preparation and proofreading of the manuscript. We report no conflicts of interests and disclosures without which some readers may feel that important relevant information is being withheld.

Disclosures: None.

Disclaimers: None.

REFERENCES

Alegrőa, M., J. B. Page, H. Hansen, A. M. Cauce, R. Robles, C. Blanco, D. E. Cortes, H. Amaro, A. Morales, and P. Berry. 2006. "Improving Drug Treatment Services for Hispanics: Research Gaps and Scientific Opportunities." *Drug and Alcohol Dependence* 84 (suppl 1): S76–84. doi:10.1016/j.drugalcdep.2006.05.009

Amaro, H., S. Arévalo, G. Gonzalez, J. Szapocznik, and M. Y. Iguchi. 2006. "Needs and Scientific Opportunities for Research on Substance Abuse Treatment among Hispanic Adults." *Drug and Alcohol Dependence* 84 (suppl 1): S64–75. doi:10.1016/j.drugalcdep.2006.05.008

Appel, P. W., A. A. Ellison, H. K. Jansky, and R. Oldak. 2004. "Barriers to Enrollment in Drug Abuse Treatment and Suggestions for Reducing Them: Opinions of Drug Injecting Street Outreach Clients and Other System Stakeholders." *American Journal of Drug and Alcohol Abuse* 30 (1): 129–53. doi:10.1081/ADA-120029870

Arndt, S.. 2010. *Minority Clients Entering Substance Abuse Treatment for the First Time: 10 Year Trends.* Iowa City, IA: Iowa Consortium for Substance Abuse Research and Evaluation.

Blakely, T. A., and A. J. Woodward. 2000. "Ecological Effects in Multi-Level Studies." *Journal of Epidemiology & Community Health* 54 (5): 367–74. doi:10.1136/jech.54.5.367

Bluthenthal, R. N., J. O. Jacobson, and P. L. Robinson. 2007. "Are Racial Disparities in Alcohol Treatment Completion Associated with Racial Differences in Treatment Modality Entry? Comparison of Outpatient Treatment and Residential Treatment in Los Angeles County, 1998 to 2000." *Alcoholism: Clinical and Experimental Research* 31 (11): 1920–6. doi:10.1111/j.1530-0277.2007.00515.x

Borys, S.. 2011. "Pay for Performance Pilot with Drug Court Providers in New Jersey" [accessed on October 10, 2011]. Available at http://www.gmuace.org/documents/events/Borys.pdf

Claus, R. E., and L. R. Kindleberger. 2002. "Engaging Substance Abusers after Centralized Assessment: Predictors of Treatment Entry and Dropout." *Journal of Psychoactive Drugs* 34 (1): 25–31. doi:10.1080/02791072.2002.10399933

Crèvecoeur, D. A., B. Finnerty, and R. A. Rawson. 2002. "Los Angeles County Evaluation System (LACES): Bringing Accountability to Alcohol and Drug Abuse Treatment through a Collaboration between Providers, Payers, and Researchers." *Journal of Drug Issues* 32 (3): 865–79.

Evans, E., L. Li, and Y. I. Hser. 2008. "Treatment Entry Barriers among California's Proposition 36 Offenders." *Journal of Substance Abuse Treatment* 35 (4): 410–8. doi:10.1016/j.jsat.2008.03.003

Evans, E., L. Li, and Y. I. Hser. 2009. "Client and Program Factors Associated with Dropout from Court Mandated Drug Treatment." *Evaluation and Program Planning* 32 (3): 204–12. doi:10.1016/j.evalprogplan.2008.12.003

Garnick, D. W., M. T. Lee, C. M. Horgan, and A. Acevedo. 2009. "Adapting Washington Circle Performance Measures for Public Sector Substance Abuse Treatment Systems." *Journal of Substance Abuse Treatment* 36 (3): 265–77. doi:10.1016/j.jsat.2008.06.008

Green, C. A., M. R. Polen, D. M. Dickinson, F. L. Lynch, and M. D. Bennett. 2002. "Gender Differences in Predictors of Initiation, Retention, and Completion in an HMO-Based Substance Abuse Treatment Program." *Journal of Substance Abuse Treatment* 23 (4): 285–95. doi:10.1016/S0740-5472(02)00278-7

Grella, C. E., and V. Joshi. 1999. "Gender Differences in Drug Treatment Careers among Clients in the National Drug Abuse Treatment Outcome Study." *American Journal of Drug and Alcohol Abuse* 25 (3): 385–406. doi:10.1081/ADA-100101868

Grella, C. E., and J. A. Stein. 2006. "Impact of Program Services on Treatment Outcomes of Patients with Comorbid Mental and Substance Use Disorders." *Psychiatric Services* 57 (7): 1007–15. doi:10.1176/appi.ps.57.7.1007

Guerrero, E. G., M. Campos, D. Urada, and J. C. Yang. 2012a. "Do Cultural and Linguistic Competence Matter in Latinos' Completion of Mandated Substance Abuse Treatment?" *Substance Abuse Treatment, Prevention, and Policy* 7: 34. doi:10.1186/1747-597X-7-34

Guerrero, E. G., A. Cepeda, L. Duan, and T. Kim. 2012b. "Disparities in Completion of Substance Abuse Treatment among Latino Subgroups in Los Angeles County, CA." *Addictive Behaviors* 37 (10): 1162–6. doi:10.1016/j.addbeh.2012.05.006

Hser, Y. I., D. Huang, C. Teruya, and M. D. Anglin. 2003. "Gender Comparisons of Drug Abuse Treatment Outcomes and Predictors." *Drug and Alcohol Dependence* 72 (3): 255–64. doi:10.1016/j.drugalcdep.2003.07.005

Hser, Y. I., Y. C. Huang, C. Teruya, and M. D. Anglin. 2004. "Gender Differences in Treatment Outcomes over a Three-Year Period: A Path Model Analysis." *Journal of Drug Issues* 34 (2): 419–40.

Jacobson, J. O., P. Robinson, and R. N. Bluthenthal. 2007a. "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 (2): 462–76. doi:10.1016/j.socscimed.2006.08.032

Jacobson, J. O., P. Robinson, and R. N. Bluthenthal. 2007b. "Racial Disparities in Completion Rates from Publicly Funded Alcohol Treatment: Economic Resources Explain More Than Demographics and Addiction Severity." *Health Services Research* 42 (2): 773–94. doi:10.1111/j.1475-6773.2006.00612.x

Longabaugh, R.. 1991. "Monitoring Treatment Outcomes." *Alcohol Health & Research World* 15 (3): 189–200.

Marsh, J. C., H. C. Shin, and D. Cao. 2010. "Gender Differences in Client-Provider Relationship as Active Ingredient in Substance Abuse Treatment." *Evaluation and Program Planning* 33 (2): 81–90. doi:10.1016/j.evalprogplan.2009.07.016

Marsh, J. C., D. Cao, E. G. Guerrero, and H. C. Shin. 2009. "Need-Service Matching in Substance Abuse Treatment: Racial/Ethnic Differences." *Evaluation and Program Planning* 32 (1): 43–51. doi:10.1016/j.evalprogplan.2008.09.003

McKay, J. R., K. G. Lynch, H. M. Pettinati, and D. S. Shepard. 2003. "An Examination of Potential Sex and Race Effects in a Study of Continuing Care for Alcohol- and Cocaine-Dependent Patients." *Alcoholism: Clinical and Experimental Research* 27 (8): 1321–3. doi:10.1097/01.ALC.0000080347.11949.B7

McLellan, A. T., I. O. Arndt, D. S. Metzger, G. E. Woody, and C. P. O'Brien. 1993. "The Effects of Psychosocial Services in Substance Abuse Treatment." *Journal of the American Medical Association* 269 (15): 1953–9. doi:10.1001/jama.1993.03500150065028

Morgenstern, J., and D. A. BuxJr. 2003. "Examining the Effects of Sex and Ethnicity on Substance Abuse Treatment and Mediational Pathways." *Alcoholism: Clinical and Experimental Research* 27 (8): 1330–2. doi:10.1097/01.ALC.0000080344.96334.55

Ngo, V. K., J. R. Asarnow, J. Lange, L. H. Jaycox, M. M. Rea, C. Landon, L. Tang, and J. Miranda. 2009. "Outcomes for Youths from Facial-Ethnic Minority Groups in a Quality Improvement Intervention for Depression Treatment." *Psychiatric Services* 60 (10): 1357–64. doi:10.1176/appi.ps.60.10.1357

Niv, N., R. Pham, and Y. I. Hser. 2009. "Racial and Ethnic Differences in Substance Abuse Service Needs, Utilization, and Outcomes in California." *Psychiatric Services* 60 (10): 1350–6. doi:10.1176/appi.ps.60.10.1350

SAS Institute. 2008. *SAS/STAT® 9.2 User's Guide.* Cary, NC: SAS Institute.

Satre, D. D., J. R. Mertens, and C. Weisner. 2004. "Gender Differences in Treatment Outcomes for Alcohol Dependence among Older Adults." *Journal of Studies on Alcohol and Drugs* 65 (5): 638–42.

Shim, R. S., M. T. Compton, G. Rust, B. G. Druss, and N. J. Kaslow. 2009. "Race-Ethnicity as a Predictor of Attitudes Toward Mental Health Treatment Seeking." *Psychiatric Services* 60 (10): 1336–41. doi:10.1176/appi.ps.60.10.1336

Simpson, D. D.. 1984. "National Treatment System Evaluation Based on the Drug Abuse Reporting Program (DARP) Follow-Up Research." In *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*, edited by F. M. Tims and J. P. Ludford, pp. 29–41. Rockville, MD: National Institute on Drug Abuse.

Simpson, D. D., and S. B. Sells. 1982. "Effectiveness of Treatment for Drug Use: An Overview of the DARP Research Program." *Advances in Alcohol & Substance Abuse* 2 (1): 7–29. doi:10.1300/J251v02n01_02

Smith, W., and C. Weisner. 2000. "Alcohol Problems in Women: Making the Case for Gender-Specific Research." *FrontLines: Linking Alcohol Services Research & Practice* 8: 1–2.

Substance Abuse and Mental Health Services Administration. 2007. *National Household Survey on Drug Use and Health.* Rockville, MD: Office of Applied Studies, Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration. 2009. *The TEDS Report: Predictors of Substance Abuse Treatment Completion or Transfer to Further Treatment, by Service Type.* Rockville, MD: Office of Applied Studies, Substance Abuse and Mental Health Services Administration.

Tonigan, J. S.. 2003. "Project Match Treatment Participation and Outcome by Self-Reported Ethnicity." *Alcoholism: Clinical and Experimental Research* 27 (8): 1340–4. doi:10.1097/01.ALC.0000080673.83739.F3

Ulmer, C., B. McFadden, and D. R. Nerenz. 2009. *Race, Ethnicity, and Language Data: Standardization for Health Care Quality Improvement.* Report of Subcommittee on Standardized Collection of Race/Ethnicity Data for Healthcare Quality Improvement, Board on Health Care Services, Institute of Medicine. Washington, DC: National Academies Press.

Van Dorn, R. A., J. W. Swanson, and M. S. Swartz. 2009. "Preferences for Psychiatric Advance Directives among Latinos: Views on Advance Care Planning for Mental Health." *Psychiatric Services* 60 (10): 1383–5. doi:10.1176/appi.ps.60.10.1383

Vega, W. A., and S. R. Lopez. 2001. "Priority Issues in Latino Mental Health Services Research." *Mental Health Services Research* 3 (4): 189–200. doi:10.1023/A:1013125030718

Vega, W. A., and W. M. Sribney. 2005. "Seeking Care for Alcohol Problems: Patterns of Need and Treatment among Mexican-Origin Adults in Central California." *Alcoholism Treatment Quarterly* 23 (2–3): 29–51. doi:10.1300/J020v23n02_03

Weisner, C., A. T. McLellan, and E. M. Hunkeler. 2000. "Addiction Severity Index Data from General Membership and Treatment Samples of HMO Members: One Case of Norming the ASI." *Journal of Substance Abuse Treatment* 19 (2): 103–9. doi:10.1016/S0740-5472(99)00103-8

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.