

# Gender and racial/ethnic differences in addiction severity, HIV risk, and quality of life among adults in opioid detoxification: results from the National Drug Abuse Treatment Clinical Trials Network

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**Purpose:** Detoxification often serves as an initial contact for treatment and represents an opportunity for engaging patients in aftercare to prevent relapse. However, there is limited information concerning clinical profiles of individuals seeking detoxification, and the opportunity to engage patients in detoxification for aftercare often is missed. This study examined clinical profiles of a geographically diverse sample of opioid-dependent adults in detoxification to discern the treatment needs of a growing number of women and whites with opioid addiction and to inform interventions aimed at improving use of aftercare or rehabilitation.

**Methods:** The sample included 343 opioid-dependent patients enrolled in two national multi-site studies of the National Drug Abuse Treatment Clinical Trials Network (CTN001-002). Patients were recruited from 12 addiction treatment programs across the nation. Gender and racial/ethnic differences in addiction severity, human immunodeficiency virus (HIV) risk, and quality of life were examined.

**Results:** Women and whites were more likely than men and African Americans to have greater psychiatric and family/social relationship problems and report poorer health-related quality of life and functioning. Whites and Hispanics exhibited higher levels of total HIV risk scores and risky injection drug use scores than African Americans, and Hispanics showed a higher level of unprotected sexual behaviors than whites. African Americans were more likely than whites to use heroin and cocaine and to have more severe alcohol and employment problems.

**Conclusions:** Women and whites show more psychopathology than men and African Americans. These results highlight the need to monitor an increased trend of opioid addiction among women and whites and to develop effective combined psychosocial and pharmacologic treatments to meet the diverse needs of the expanding opioid-abusing population. Elevated levels of HIV risk behaviors among Hispanics and whites also warrant more research to delineate mechanisms and to reduce their risky behaviors.

**Keywords:** buprenorphine, clinical trials network, gender differences, health disparity, HIV risk behavior, methadone, opioid dependence, rehabilitation

## Introduction

Opioid use disorders comprise the second most prevalent drug use disorder in the US, following marijuana use.<sup>1</sup> Recent evidence indicates that opioids are associated with the highest rate of drug-related overdose<sup>2</sup> and account for the highest proportion of drug-related admissions to treatment facilities that receive public funds.<sup>3</sup> When taking into account specific substances, heroin users are most likely to enter substance abuse treatment, and nonmedical prescription opioid users show the highest rate of

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increase among those seeking treatment.<sup>1</sup> Heroin addiction has been the central target for opioid dependence treatment, with methadone as the primary treatment medication.<sup>4</sup> However, the rising rate of prescription opioid abuse has added heterogeneity to the profile of individuals needing treatment and treatment options.<sup>1,5,6</sup> The Drug Addiction Treatment Act of 2000 approved office-based treatment with buprenorphine. For the first time, physicians can prescribe an opioid-based treatment for opioid-dependent patients in their usual practice setting. Unlike methadone treatment, which is administered in specially licensed programs and requires almost daily attendance at treatment initiation, buprenorphine treatment allows patients to self-administer by prescription, thereby enhancing treatment use by individuals who otherwise are reluctant to seek treatment from methadone programs.<sup>7</sup>

Given the increasing need for effective opioid detoxification, the first two national Clinical Trials Network studies examined the effectiveness of buprenorphine (Suboxone®, Reckitt Benckiser Pharmaceuticals Inc, Richmond, VA) for short-term opioid detoxification in inpatient and outpatient settings.<sup>8</sup> Because treatment options increase in parallel with the growing number of opioid-abusing individuals, research is needed to characterize clinical needs of various groups of treatment-seeking individuals and to inform newer treatment strategies. Specifically, opioid-abusing individuals are becoming increasingly diverse, eg, women and whites represent a growing group, while patients with heroin addiction tend to be older African Americans.<sup>3,9,10</sup> Moreover, recent data suggest an increased rate of heroin injection among young white adults and a declining rate among young African American adults.<sup>11</sup>

Short-term opioid detoxification is a frequent treatment for initiating abstinence and often serves as an initial contact for treatment. In 2007, 38% of heroin admissions and 30% of nonheroin opioid admissions to the US Treatment Episode Data Set received detoxification treatment.<sup>3</sup> Therefore, detoxification represents a window of opportunity for engaging patients in aftercare or rehabilitation, a crucial element to prevent relapse and achieve recovery. However, there is limited information concerning clinical profiles of individuals seeking detoxification, and the opportunity to engage patients in detoxification for aftercare often is missed.<sup>12</sup> For example, data from employer health insurance claims show that only 49% of detoxification episodes were followed by continuing aftercare within 30 days of discharge.<sup>13</sup> Evidence from a large public sector dataset indicates that 27% of the sample was readmitted for detoxification within a year.<sup>14</sup>

Given the expansion of a diverse opioid-dependent population, there is a clear need to discern clinical profiles of patients seeking detoxification to inform interventions aimed at improving aftercare use and reducing relapse. Prior research has focused on primary heroin users in methadone treatment programs drawn from one site. Due to the short-term nature of detoxification, there is a lack of systematic research to characterize clinical needs of various groups of patients seeking detoxification. To address this gap, this study capitalizes on the wealth of baseline data of patients who participated in multisite detoxification clinical trial studies to examine the extent of gender and racial differences in substance use, addiction severity, human immunodeficiency virus (HIV) risk, and quality of life. The goal is to describe patient differences better so that treatment for opioid addiction and interventions aimed at promoting aftercare use and rehabilitation can be improved. This study extends from prior studies by, first, examining a geographically diverse sample of opioid-dependent adults recruited from two treatment modalities at 12 programs to enhance its generalizability; second, elucidating gender and racial differences in clinical needs owing to an increased number of women and whites with opioid addiction; and, third, focusing on patients seeking detoxification, who represent an understudied group of opioid-dependent individuals as compared with patients in methadone treatment programs.

## Methods

### Data source

Analyses were performed on the data from two multisite National Drug Abuse Treatment Clinical Trials Network studies that evaluated the effectiveness of buprenorphine-naloxone and clonidine for opioid detoxification in inpatient ( $n = 113$ ) and outpatient ( $n = 230$ ) community-based treatment programs.<sup>8</sup> Inpatients were recruited from six programs located in eastern, southeastern, midwestern, or western regions of the US; outpatients were recruited from six programs located in eastern, midwestern, or western regions of the US. Eligible patients included treatment-seeking adults aged  $\geq 18$  years who met Diagnostic and Statistical Manual, Version IV criteria<sup>15</sup> for opioid dependence and were in need of medical management for opioid withdrawal. The use of the trials' data for this study was approved by the Duke University Institutional Review Board.

Patients were excluded if they: had a serious psychiatric or medical condition that would make participation medically hazardous (eg, suicidal behavior, uncontrolled diabetes); had a known allergy or sensitivity to buprenorphine, naloxone, or

clonidine; were receiving medications contraindicated with clonidine or had a systolic blood pressure <100 mmHg or pulse <56 beats per minute; had been enrolled in a methadone treatment program or had participated in another investigational drug study within 30 days of study enrollment; or could not remain in the area for the duration of active treatment. To enhance the study's generalizability, dependence on other drugs did not exclude individuals from participation unless immediate medical attention was required to manage these disorders. Female participants were excluded if pregnant or lactating and were required to have a negative pregnancy test prior to randomization.

## Study variables

Demographic variables included age, gender, race/ethnicity (non-Hispanic white, non-Hispanic African American, Hispanic, and other [Asian or Native American]), education, marital status, and employment status. Addiction Severity Index assessed substance use-related problems at intake in alcohol use, drug use, medical, psychiatric, legal, family/social, and employment domains.<sup>16,17</sup> Each Addiction Severity Index composite score (range 0–1) is mathematically derived to summarize responses to several questions within a problem area, with higher composite scores indicating greater problem severity. Scores have demonstrated reliability and validity.

Questions on current (past-month) substance use from the Addiction Severity Index were examined to determine specific substance use, including nicotine/tobacco products, alcohol to intoxication (at least three drinks in one sitting or at least five drinks in one day), heroin, other opioids, sedatives/tranquilizers, marijuana, inhalants, hallucinogens, cocaine, and amphetamines. Because very few patients used hallucinogens or inhalants (<1%), they were not examined in the subsequent analysis.

HIV risk was assessed by the HIV Risk Behavior Scale, an instrument with demonstrated reliability and construct validity in drug users.<sup>18,19</sup> It assesses behaviors involving injection drug use (needle sharing, use of unclean needles) and unprotected sex (multiple sexual partners, condom use) in the past 30 days. Responses to each item were coded on a six-point scale (0–5), with higher values associated with more risky behaviors. Three summary scores were examined, ie, total HIV risk, injection drug use risk, and sexual risk.

Quality of life was assessed by the SF-36, a reliable and valid subject-administered instrument.<sup>20</sup> It measures health-related quality of life in physical functioning, role limitations due to physical health problems, role limitations due to emotional problems, energy/vitality, emotional

well-being, social functioning, bodily pain, and general health perceptions. A high score indicates better functioning.

## Data analyses

Bivariate associations of each study variable with gender and race/ethnicity were determined using  $\chi^2$  test for proportions and *F* test for continuous variables. To reduce the chance of false positive associations, only variables associated with gender ( $P \leq 0.05$ ) from bivariate analyses were examined in the adjusted analyses. A more conservative *P* value ( $P \leq 0.09$ ) was used to select variables for adjusted analysis of the race/ethnicity variable due to reduced power for identifying racial/ethnic differences. Finally, adjusted logistic regression procedures (for categorical variables) and linear regression procedures (for continuous variables) were conducted to estimate differences in substance use, Addiction Severity Index, HIV risk, and quality of life in relation to gender and racial/ethnic backgrounds. Each model controlled for potential confounding influences from age, years of education, marital status, employment status, and treatment modality (inpatient versus outpatient).

## Results

### Characteristics of opioid-dependent patients

The mean age and years of education of the study sample were 37.5 years and 12.6 years, respectively (Table 1). Within

**Table 1** Selected characteristics of adult patients in opiate detoxification treatment (n = 343)

Demographics	Total
Age, mean (SD)	37.5 (10.16)
Years of education, mean (SD)	12.6 (2.06)
Gender, n (%)	
Male	233 (67.9)
Female	110 (32.1)
Race/ethnicity, n (%)	
White	155 (45.2)
African American	106 (30.9)
Hispanic	69 (20.1)
Other	13 (3.8)
Marital status, n (%)	
Married or cohabitating	94 (27.4)
Separated, divorced, or widowed	89 (26.0)
Never married	160 (46.7)
Past month employment, n (%)	
Employed	169 (49.3)
Unemployed/not employed	174 (50.7)
Treatment modality, n (%)	
Inpatient detoxification	113 (32.9)
Outpatient detoxification	230 (67.1)

**Abbreviation:** SD, standard deviation.

the sample, 32% were female, 55% were nonwhite (African American 31%, Hispanic 20%, other 4%), 47% had never being married, and 49% were employed.

## Gender differences in substance use problems, HIV risk, and quality of life

Bivariate associations of specific substance use, Addiction Severity Index subscales, HIV risk, and quality of life with gender are summarized in Table 2. Men were more likely than women to have used heroin in the past month (94% versus 81%) and to have more severe alcohol use and legal problems. Women were more likely than men to have used other opioids (44% versus 22%) and sedatives/tranquilizers (32% versus 19%) in the past month, have more severe psychiatric and family/social problems, and report poorer quality of life in vitality, emotional well-being, and social functioning. There were no gender differences in HIV risk scores.

## Racial/ethnic differences in substance use problems, HIV risk, and quality of life

Bivariate analyses also showed important differences in clinical needs according to patients' racial/ethnic backgrounds (Table 3). African Americans and Hispanics were more likely than whites to use heroin and tobacco; whites were more likely than African Americans and Hispanics to use other opioids, sedatives/tranquilizers, and amphetamines; and African Americans were more likely than other racial/ethnic groups to use cocaine. In addition, African Americans had more employment problems than other racial/ethnic groups, but reported fewer psychiatric and family/social problems (than whites and Hispanics), and better quality of life in vitality, emotional well-being, and social functioning (than whites). Of note, both whites and Hispanics reported a higher level of total HIV risk and injection drug risk than African Americans, and Hispanics reported a higher

**Table 2** Substance use, addiction severity (ASI), HIV risk (HRBS), and quality of life (SF-36) by gender among adult patients in opiate detoxification treatment (n = 343)

Study variables	Male (n = 233)	Female (n = 110)	P value <sup>a</sup>
Past month substance use, %			
Alcohol use to intoxication	20.6	16.4	0.35
Heroin	94.0	80.9	<0.01
Other opioids	22.3	43.7	<0.01
Sedatives/tranquilizers	18.5	31.8	<0.01
Cocaine	47.6	37.3	0.07
Amphetamines	6.4	6.4	0.98
Cannabis/marijuana	39.5	31.8	0.17
Nicotine/tobacco	86.7	86.4	0.93
Injection drug use	63.4	58.7	0.41
ASI composite score, mean (SE)			
Medical problems	0.14 (0.02)	0.16 (0.03)	0.51
Drug use problems	0.33 (0.01)	0.33 (0.01)	0.66
Alcohol use problems	0.08 (0.01)	0.03 (0.01)	<0.01
Employment problems	0.55 (0.02)	0.58 (0.03)	0.39
Legal problems	0.17 (0.01)	0.10 (0.02)	0.01
Psychiatric problems	0.19 (0.01)	0.24 (0.02)	0.03
Family/social problems	0.07 (0.01)	0.11 (0.02)	0.02
HRBS HIV risk score, mean (SE)			
HIV total risk	12.2 (0.58)	12.3 (0.90)	0.90
Injection drug use risk	6.9 (0.41)	6.9 (0.64)	0.98
Sexual risk	5.3 (0.38)	5.5 (0.55)	0.87
SF-36 quality of life score, mean (SE)			
Physical functioning	82.9 (1.51)	83.8 (1.91)	0.71
Role limitation due to physical health	56.7 (2.81)	60.6 (4.09)	0.44
Role limitation due to emotional problems	57.3 (2.94)	47.2 (4.31)	0.05
Vitality/energy	47.7 (1.39)	37.9 (2.05)	<0.01
Emotional well-being	58.6 (1.35)	48.5 (2.03)	<0.01
Social functioning	60.9 (1.83)	57.2 (2.72)	0.26
Pain	62.0 (1.85)	56.6 (2.49)	0.09
General health	64.6 (1.44)	65.1 (2.04)	0.85

**Note:** <sup>a</sup>P value:  $\chi^2$  for proportion or *t*-test for mean.

**Abbreviations:** SE, standard error; ASI, Addiction Severity Index; HIV, human immunodeficiency virus; HRBS, HIV Risk Behavior Scale.

**Table 3** Substance use, addiction severity (ASI), HIV risk (HRBS), and quality of life (SF-36) by race and ethnicity among adult patients in opiate detoxification treatment (n = 343)

Study variables	White (n = 155)	African American (n = 106)	Hispanic (n = 69)	Other (n = 13)	P value <sup>a</sup>
Past month use, %					
Alcohol use to intoxication	18.7	21.7	18.8	7.7	0.67
Heroin	82.6	97.2	97.1	76.9	<0.01
Other opioids	45.8	10.7	18.8	38.5	<0.01
Sedatives/tranquilizers	37.4	4.4	17.4	23.1	<0.01
Cocaine	40.0	57.6	36.2	30.8	<0.01
Amphetamines	10.3	0	4.3	7.7	0.01
Cannabis/marijuana	43.2	35.8	26.1	30.8	0.09
Nicotine/tobacco	84.5	89.6	91.3	61.5	0.02
Injection drug use	69.5	41.9	72.5	76.9	<0.01
ASI composite score, mean (SE)					
Medical problems	0.18 (0.02)	0.13 (0.03)	0.10 (0.03)	0.22 (0.09)	0.12
Drug use problems	0.34 (0.01)	0.32 (0.01)	0.33 (0.01)	0.35 (0.02)	0.41
Alcohol use problems	0.05 (0.01)	0.09 (0.01)	0.07 (0.01)	0.05 (0.03)	0.07
Employment problems	0.47 (0.02)	0.72 (0.03)	0.54 (0.04)	0.47 (0.08)	<0.01
Legal problems	0.14 (0.02)	0.16 (0.02)	0.16 (0.02)	0.11 (0.04)	0.59
Psychiatric problems	0.24 (0.02)	0.13 (0.02)	0.27 (0.02)	0.22 (0.09)	<0.01
Family/social problems	0.10 (0.01)	0.03 (0.01)	0.11 (0.02)	0.11 (0.05)	<0.01
HRBS HIV risk score, mean (SE)					
HIV total risk	12.6 (0.72)	9.0 (0.73)	16.2 (1.19)	12.7 (2.31)	<0.01
Injection drug use risk	7.9 (0.53)	4.3 (0.54)	8.5 (0.77)	7.4 (1.64)	<0.01
Sexual risk	4.7 (0.45)	4.6 (0.52)	7.6 (0.80)	5.3 (1.29)	<0.01
SF-36 quality of life score, mean (SE)					
Physical functioning	84.2 (1.77)	80.5 (2.12)	85.8 (2.68)	79.6 (6.50)	0.37
Role limitation due to physical health	56.2 (3.37)	59.6 (4.20)	60.1 (5.30)	53.8 (13.53)	0.87
Role limitation due to emotional problems	49.4 (3.68)	60.5 (4.21)	53.6 (5.49)	61.5 (12.85)	0.24
Vitality/energy	39.6 (1.66)	51.2 (2.13)	46.3 (2.45)	43.1 (7.41)	<0.01
Emotional well-being	50.8 (1.65)	61.0 (2.19)	57.4 (2.09)	53.8 (8.28)	<0.01
Social functioning	56.2 (2.16)	68.5 (2.65)	53.4 (3.40)	65.4 (8.97)	<0.01
Pain	56.6 (2.10)	62.6 (2.64)	66.0 (3.74)	55.6 (9.28)	0.08
General health	62.1 (1.69)	66.2 (2.33)	67.8 (2.27)	69.2 (7.00)	0.19

Note: <sup>a</sup>P value:  $\chi^2$  for proportion or *F* test for mean.

Abbreviations: SE, standard error; ASI, Addiction Severity Index; HIV, human immunodeficiency virus; HRBS, HIV Risk Behavior Scale.

level of unprotected sexual risk than whites and African Americans.

## Results from adjusted regression analyses

Adjusted analyses controlling for potential confounding influences of age, years of education, marital status, employment status, and treatment modality were conducted to provide a better understanding of gender and racial/ethnic differences in addiction severity, HIV risk, and quality of life. Variables significantly associated with gender are summarized in Table 4 and those with race/ethnicity are reported in Table 5.

Compared with men, women had a greater likelihood of using other opioids, having more psychiatric and family/social problems, and exhibiting poorer quality of life in

vitality and emotional well-being. Men, on the other hand, had a greater likelihood of using heroin and reporting more alcohol use and legal problems.

African Americans had a greater likelihood than whites of using heroin and cocaine, and had more alcohol use and employment problems (Table 5). Whites had a greater likelihood than African Americans of using prescription drugs (opioids, sedatives, tranquilizers), having more psychiatric and family/social relationship problems, engaging in more total HIV risk behaviors (especially injection drug risk behaviors), and exhibiting lower quality of life in terms of role limitation, vitality, emotional well-being, and social functioning. Compared with whites, Hispanics had a lower likelihood of using marijuana and a higher likelihood of reporting better quality of life in vitality and emotional

**Table 4** Summary of adjusted analyses of gender difference in substance use, addiction severity (ASI), HIV risk (HRBS), and quality of life (SF-36) among adult patients in opiate detoxification treatment (n = 343)

Regression coefficients $\beta$ (SE) from adjusted procedures <sup>a</sup>	Male versus female
Past month substance use	
Heroin	1.3 (0.41) <sup>b</sup>
Other opioids	-0.9 (0.28) <sup>b</sup>
ASI composite score	
Alcohol use problems	0.1 (0.01) <sup>c</sup>
Legal problems	0.1 (0.02) <sup>c</sup>
Psychiatric problems	-0.1 (0.03) <sup>c</sup>
Family/social problems	-0.03 (0.02) <sup>c</sup>
SF-36 quality of life score	
Vitality/energy	0.3 (0.10) <sup>b</sup>
Emotional well-being	0.2 (0.06) <sup>b</sup>

**Notes:** <sup>a</sup>Adjusted linear regression analyses were conducted for continuous variables; adjusted logistic regression analyses were conducted for binary variables; each model included age, years of education, gender, racial/ethnic status, marital status, employment status, and treatment modality; <sup>b</sup> $P \leq 0.01$ ; <sup>c</sup> $P \leq 0.05$ .

**Abbreviations:** SE, standard error; ASI, Addiction Severity Index; HIV, human immunodeficiency virus; HRBS, HIV Risk Behavior Scale.

well-being, but they exhibited a higher level of unprotected sexual risk. There were no significant differences between members of “other” racial/ethnic groups and whites.

Additionally, when comparing Hispanics with African Americans in the adjusted linear regression analysis, Hispanics were more likely to report a higher level of total HIV risk behaviors (regression coefficients = 0.5,  $P < 0.01$ ) and injection drug use behaviors (regression coefficients = 0.7,  $P < 0.001$ ). Members of “other” racial/ethnic groups also showed a higher likelihood of injection drug use behaviors than African Americans (regression coefficients = 0.7,  $P < 0.05$ ). To explore whether psychiatric severity might account for racial/ethnic differences in HIV risk scores,<sup>21</sup> we re-estimated the association between HIV risk and race/ethnicity by controlling for psychiatric severity from the Addiction Severity Index. These associations remained unchanged.

## Discussion

Research has shown that patients seeking detoxification report a pervasive need for a variety of desired aftercare services (eg, employment services, self-help meetings, transportation, housing, individual or group counseling, education, medical treatment, social services, vocational training, supportive medicine, psychiatric treatment, relationship counseling, or legal assistance).<sup>22</sup> However, many opioid-dependent patients receive detoxification only, and repeated admissions for detoxification treatment

are common.<sup>14,23</sup> This multisite national study of patients seeking opioid detoxification identifies differential treatment needs for various groups, and the results are useful for informing aftercare and need-service matching interventions to improve care for the growing, diverse opioid-dependent population, and for possibly reducing emergency room and other high-cost medical services by tailoring treatment to specific patient needs.

Clinical studies of gender differences have focused mainly on cocaine-dependent patients or patients with different drug dependences.<sup>24–27</sup> Generalizability of results from these studies to opioid-dependent patients is limited and complicated by small sample sizes, descriptive results, or a different drug-use focus. These studies show mixed results in pattern of drug use, but generally suggest greater drug-related problems in women than in men. The present study adds new data to the literature of opioid dependence by examining a geographically diverse sample recruited from 12 sites and by applying adjusted procedures to make direct comparisons between genders and racial/ethnic groups for multiple clinical indicators. Our results revealed that women used more nonheroin opioids and had more psychiatric and family/social relationship problems, while men used more heroin and reported more problems related to alcohol use and criminal activities. Additionally, women resembled men in HIV risk scores, but women reported poorer quality of life.

These discrete patterns emphasize the need for gender-specific psychosocial interventions in addition to standard treatment for opioid dependence to improve treatment retention and response.<sup>28–31</sup> For example, relationship or mental health problems, as well as childcare or transportation concerns, may be more likely to interfere with women’s treatment use than that for men; thus, women can benefit from ancillary services tailored to address these issues.<sup>29–31</sup> For men, treatment could incorporate motivational interviewing to address alcohol use problems or legal services to assist with legal problems. Of note, recent research has shown the benefits of male-targeted interventions in addressing motivation, communication skills, sexuality, or HIV risk.<sup>32,33</sup> Clearly, this understudied area warrants more research to develop male-specific interventions tailored to men’s unique areas of concern. Furthermore, quality of life has increasingly been considered a crucial outcome measure in addiction treatment trials.<sup>5</sup> The finding of poor quality of life in women indicates that baseline measures of quality of life should be included as a control variable in the analysis of treatment response to mitigate its confounding effects.

**Table 5** Summary of adjusted analyses of racial/ethnic differences in substance use, addiction severity (ASI), HIV risk (HRBS), and quality of life (SF-36) among adult patients in opiate detoxification treatment (n = 343)

Regression coefficients $\beta$ (SE) from adjusted procedures <sup>a</sup>	African American versus white	Hispanic versus white
Past month substance use		
Heroin	1.6 (0.68) <sup>b</sup>	1.4 (0.79)
Other opioids	-1.8 (0.41) <sup>c</sup>	-1.1 (0.39)
Sedatives/tranquilizers	-2.0 (0.52) <sup>c</sup>	-0.7 (0.40)
Cocaine	0.7 (0.31) <sup>b</sup>	-0.3 (0.32)
Cannabis/marijuana	-0.2 (0.32)	-1.0 (0.36) <sup>b</sup>
Injection drug use	-1.3 (0.33) <sup>c</sup>	-0.2 (0.36)
ASI composite score		
Alcohol use problems	0.04 (0.02) <sup>b</sup>	0.03 (0.02)
Employment problems	0.2 (0.03) <sup>c</sup>	0.04 (0.04)
Psychiatric problems	-0.1 (0.03) <sup>c</sup>	0.04 (0.03)
Family/social problems	-0.04 (0.02) <sup>b</sup>	0.02 (0.02)
HRBS HIV risk score		
HIV total risk <sup>e</sup>	-0.4 (0.14) <sup>c</sup>	0.1 (0.15)
Injection drug use risk <sup>e</sup>	-0.7 (0.16) <sup>d</sup>	-0.03 (0.17)
Sexual risk <sup>e</sup>	0.1 (0.15)	0.4 (0.16) <sup>c</sup>
SF-36 quality of life score		
Role limitation due to emotional problems	0.8 (0.31) <sup>c</sup>	-0.01 (0.33)
Vitality/energy	0.4 (0.12) <sup>c</sup>	0.3 (0.13) <sup>c</sup>
Emotional well-being	0.2 (0.08) <sup>d</sup>	0.2 (0.08) <sup>b</sup>
Social functioning	0.2 (0.11) <sup>c</sup>	-0.2 (0.12)

**Notes:** <sup>a</sup>Adjusted linear regression analyses were conducted for continuous variables; adjusted logistic regression analyses were conducted for binary variables; each model included age, years of education, gender, racial/ethnic status, marital status, employment status, and treatment modality; <sup>b</sup> $P \leq 0.05$ ; <sup>c</sup> $P \leq 0.01$ ; <sup>d</sup> $P \leq 0.001$ ; <sup>e</sup> $\beta$  (SE): HIV total risk score for Hispanics versus African Americans = 0.5 (0.17); <sup>c</sup> injection drug use risk score for Hispanics versus African Americans = 0.7 (0.19); <sup>d</sup> injection drug use risk score for members of other race/ethnicity versus African Americans = 0.7 (0.34).<sup>b</sup>

**Abbreviations:** SE, standard error; ASI, Addiction Severity Index; HIV, human immunodeficiency virus; HRBS, HIV Risk Behavior Scale.

The results also highlight significant public health concerns for whites and Hispanics. Whites not only had a greater likelihood of using prescription drugs (than African Americans) and cannabis (than Hispanics) and of engaging in more risky injection drug use (than African Americans), but they also showed more psychiatric and family/social relationship problems (than African Americans) and poorer quality of life (than African Americans and Hispanics). Although African Americans used more heroin and cocaine than whites and experienced greater employment problems than whites, they reported lower levels of risky injection drug use (than whites and Hispanics) and exhibited better mental health and social functioning (than whites). Thus, whites show more psychopathology and HIV risk than African Americans. Our additional analyses did not find the impact of psychiatric severity on HIV risk scores,<sup>21</sup> suggesting that the association between race/ethnicity and HIV risk behaviors is robust.

These findings of an elevated level of HIV-related injection drug use risk among whites are worrisome because recent evidence has suggested a growing rate of injection drug use in young white adults,<sup>11</sup> and young injection drug users generally engage in a high level of risky injection

and sexual behaviors.<sup>34</sup> Further, opioid addiction and drug-related problems may be more detrimental to whites' social support, family functioning, and mental health than to those of African Americans. Bourgois et al<sup>35</sup> have reported that, although African American heroin users generally have a more pervasive history of incarceration than white users, they often have maintained long-term ties with their families. In contrast, white heroin users are more likely than African American users to be expelled from their families and to perceive themselves as being defeated by addiction as their problems escalate. This study also reveals a better quality of life and family/social functioning among African Americans than among whites.

Taken together, whites may benefit from interventions tailored not only to their risky injection drug use, but also to issues related to psychiatric problems, social support, and family problems. For African Americans, their higher level of employment problems than whites may be related in part to earlier or prevalent involvement with illicit drugs (heroin or cocaine) and the criminal justice system, thereby potentially hindering educational attainment.<sup>35,36</sup> This distinct pattern of greater employment problems and cocaine

use among African Americans has important implications for intervention. For instance, greater addiction severity, employment problems, cocaine use, and African American race have been found to be associated with an increased rate of attrition from methadone maintenance treatment programs.<sup>37,38</sup> Therefore, the provision of additional vocational services or supportive employment counseling, in addition to standard treatment for opioid dependence, can be useful in improving both employment and substance use problems.<sup>39,40</sup>

The last issue concerns Hispanics' elevated level of HIV risk behaviors in both risky injection drug use (greater than African Americans) and unprotected sexual behaviors (greater than whites). Regardless of gender, the rate of new HIV infections among Hispanics in the US is about 2–4 times higher than that of whites.<sup>41</sup> HIV obviously has become a serious threat to Hispanics in the US. Unfortunately, HIV-related interventions have faced many unique challenges because Hispanics as a group in the US are considerably diverse in their cultural backgrounds. Their comparatively high rates of poverty, low education, and lack of insurance, along with language barriers, immigration issues, and diverse cultural beliefs about sexuality, have further impeded HIV prevention and treatment efforts.<sup>42,43</sup> Consequently, Hispanics have a comparatively low rate of HIV testing and a high rate of late HIV diagnosis.<sup>43</sup> These findings clearly highlight the need for research to monitor and discern patterns of HIV risk behaviors continuously and to develop culturally and linguistically appropriate HIV risk reduction interventions to meet the diverse needs of Hispanics.

This study has some limitations. The results are based on treatment-seeking opioid-dependent adults who participated in Clinical Trials Network studies. The sample is not necessarily representative of all opioid-dependent patients. Another limitation is reliance on patients' self-reports, which are subject to recall or reporting bias. Nonetheless, studies have found that self-reported drug use patterns and HIV-related injection and sexual behaviors among drug users are generally reliable.<sup>19,44–46</sup> In addition, due to confidentiality concerns, information on study sites was removed from the deidentified data files used for this research, and was not included in the analysis. Lastly, the small sample size of the "other" racial/ethnic group constrains the power to compare clinical characteristics of this group with those of whites, African Americans, or Hispanics.

Nonetheless, the multisite studies of the Clinical Trials Network also have noteworthy strengths not available from studies of participants from a single site. The participants

were recruited from 12 major treatment programs at two treatment modalities across the nation, making them more generalizable than those found in single-site studies. All participants were assessed by an identical set of standardized instruments (Addiction Severity Index, HIV Risk Behavior Scale, SF-36) with demonstrated reliability and validity in clinical samples to allow for comparisons across treatment settings.

## Conclusion

These results highlight distinct clinical needs for different gender and racial/ethnic groups among opioid-dependent patients when presenting for detoxification. First, the more severe pattern of psychopathology among women and whites emphasizes the need to monitor an increased trend of opioid addiction and treatment use in these two groups and to develop effective combined psychosocial and pharmacologic treatments for opioid addiction to meet the diverse needs of the expanding opioid-abusing population (eg, enhancing treatment retention and reducing use of emergency department or inpatient care).<sup>5,9–11,28,47</sup> Specifically, due to an increased rate of opioid addiction and the availability of office-based buprenorphine treatment, ie, Suboxone<sup>®</sup> and Subutex<sup>®</sup> (Reckitt Benckiser Pharmaceuticals, Inc), use of buprenorphine for either short-term detoxification or maintenance treatment is expected to increase over time.<sup>48,49</sup> Therefore, research is obviously needed to develop and incorporate effective comprehensive interventions to improve detoxification patients' use of continuing care or rehabilitation services.<sup>13,14,28</sup>

Finally, it is important to note that methadone treatment (detoxification or maintenance) remains the primary medication-assisted opioid therapy for opioid addiction in the US. Per the survey data of March 31, 2008, an estimated 268,071 clients (98.4%) in facilities with opioid treatment programs received methadone compared with 4280 clients (1.6%) who received buprenorphine.<sup>50</sup> Methadone maintenance treatment not only reduces illicit opioid use, HIV risk behaviors, and drug-related criminal behaviors,<sup>51</sup> but is also associated with lower rates of utilizing costly health care (eg, emergency services, inpatient visits, and other medical services) by individuals with opioid addiction.<sup>52</sup> While both buprenorphine and methadone treatment are clinically effective and cost-effective, methadone treatment is superior to buprenorphine at fixed medium or high doses and appears to be the preferred treatment by some individuals with severe addiction profiles.<sup>5,47,53–55</sup> On the other hand, buprenorphine's favorable safety profile

and ease of clinical administration are likely to recruit increasing numbers of individuals into treatment (eg, those with less prolonged opioid addiction, and women who are hesitant to use methadone treatment because of childcare or transportation barriers).<sup>5,49,55</sup> Clearly, research is needed to elucidate opioid-dependent individuals' preferences for buprenorphine versus methadone treatment and their safety profiles (eg, buprenorphine and benzodiazepine interaction) and effectiveness to optimize treatment response for diverse gender and racial/ethnic groups.

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