A Comparison of Opioid and Nonopioid Substance Users in Residential Treatment for Co-Occurring Substance Use and Mental Disorders

Brian E. Bride, Samuel A. Macmaster, Siobhan A. Morse, Cayce M. Watson, Sam Choi & John Seiters

Routledge
Taylor & Francis Group

∂ OPEN ACCESS

A Comparison of Opioid and Nonopioid Substance Users in Residential Treatment for Co-Occurring Substance Use and Mental Disorders

Brian E. Bride[a], Samuel A. Macmaster[b], Siobhan A. Morse[c], Cayce M. Watson[d], Sam Choi[e], and John Seiters[c]

[a]School of Social Work, Georgia State University, Atlanta, Georgia, USA; [b]Department of Family and Community Medicine, Baylor College of Medicine, Houston, Texas, USA; [c]Foundations Recovery Network, Brentwood, Tennessee, USA; [d]Department of Social Work and Sociology, Lipscomb University, Nashville, Tennessee, USA; [e]College of Social Work, University of Tennessee, Nashville, Tennessee, USA

ABSTRACT

The past decade has seen a marked increase in the illicit use of opioids, as well as a doubling of the percentage of individuals seeking treatment for opioid use disorders. However, little is known about the differences between opioid users and nonopioid users in residential treatment. Further, no studies have been published that compare opioid users and nonopioid users in treatment for co-occurring substance use and mental disorders. To address this gap, this study examined differences between opioid and nonopioid substance users in residential treatment for co-occurring disorders. Data was drawn from 1,972 individuals treated between 2009 and 2011 at one of three private residential treatment centers that provide integrated treatment for co-occurring substance use and mental disorders. Data was collected at program intake, and 1- and 6-month postdischarge using the Addiction Severity Index and the University of Rhode Island Change Assessment. To examine within-group changes in substance use, addiction severity, and mental health across time, linear mixed-model analyses were conducted with facility, year, age, gender, and race included as covariates. The authors found more similarities than differences between the two groups on baseline characteristics, treatment motivation, length of stay, and outcomes on measures of substance use, addiction severity, and mental health. The results demonstrate that though opioid users entered treatment with higher levels of substance use – related impairment, they were just as successful in treatment outcomes as their non-opioid-using peers.

Opioid misuse results in significant costs to the individual and society. At the individual level, opioid use is linked to diminished quality of life and functionality, as well as increased mortality (Butler, 2010; Darke, 2006; De Mayer, 2011). Indeed, the greatest risk of mortality among illicit drug users occurs among opioid users (Darke, 2006). In 2014, 18,853 deaths were attributed to prescription opioid pain reliever overdose and 10,574 deaths due to heroin overdose (National Institute on Drug Abuse, 2015). The societal cost of opioid misuse, abuse, and dependence is estimated to be $55.7 billion per annum, including $26 million in workplace costs, $25 million in health care costs, and $5 billion in workplace costs (Birnbaum, 2011).

Over the past decade, the United States has experienced a marked increase in the illicit use of opioids including prescription pain relievers, heroin, and methadone (Alford et al., 2007; Meges et al., 2014).

CONTACT Siobhan Morse, MHSA ✉ Siobhan.morse@frnmail.com 🖃 Foundations Recovery Network, 5409 Maryland Way, Suite 320, Brentwood, TN 37027.

An estimated 80% of the global opioid supply is consumed in the United States, though the nation accounts for only 5% of the world population (Manchikanti & Singh, 2008). The nonmedical use of prescription opioid pain relievers (e.g., hydrocodone, oxycodone, morphine, and codeine) has become the prevailing form of opioid misuse, with 4.5 million Americans reporting such behavior in 2013 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). Further, 1.7 million Americans reported current (i.e., in the past month) nonmedical use of prescription opioid pain relievers, and 1.5 million reported initiation of nonmedical use of prescription opioid pain relievers in 2013 (SAMHSA, 2014). Heroin is the second most widely used opioid with approximately 681,000 individuals reporting past year use, 289,000 reporting current use, and 350,000 reporting initiation of heroin use in 2013 (SAMHSA, 2014). Further, there is growing evidence that nonmedical use of prescription opioid pain relievers increases the likelihood of initiation of heroin use (Muhuri, Gfroerer, & Davies, 2013). Increased availability is likely a significant contributor to the increased use of opioids. Four times as many prescription opioids were sold to pharmacies, hospitals, and doctors' offices in the United States in 2010 than in 1999 (Centers for Disease Control and Prevention [CDC], 2012). In addition, average U.S. sales of prescription opioids per capita increased by more than 400% between 1997 and 2007 (Manchikanti & Singh, 2008).

The increased use of opioids over the past decade has resulted in an increased need for treatment. In 2003, 1.4 million individuals had prescription opioid dependence or abuse and 190,000 had heroin dependence or abuse, compared to 1.9 million and 517,000, respectively, in 2013. Although the number of people receiving treatment in a substance abuse treatment facility in 2013 was similar to that reported in 2003, the number receiving treatment specifically for opioid use significantly increased during this period. In 2013, 746,000 persons in the United States received treatment for prescription opioid use and another 526,000 persons received treatment for heroin use (SAMHSA, 2014). These numbers are higher than those reported in 2003 when 415,000 individuals were treated for prescription opioid use and 281,000 were treated for heroin use (SAMHSA, 2004). As a result, the number of individuals seeking treatment for opioid use as a proportion of all individuals seeking treatment is now 33% (SAMHSA, 2014).

Despite the high numbers of individuals seeking treatment for opioid misuse, the completion rates for long-term treatment are lowest and the dropout rates for short-term treatment are highest among opioid users (SAMHSA, 2009). Opioid dependence has historically been treated differently from other illicit drug abuse, primarily because of the availability of efficacious pharmacotherapies. Medication assisted treatment (MAT) for the treatment of opioid dependence has been available since the 1960s in the form of methadone maintenance treatment (MMT) and more recently with buprenorphine maintenance treatment (BMT). The literature describing opioid treatment has primarily focused on the use of MAT, and research has been conducted primarily in outpatient settings. In a review of randomized controlled trials and quasi-experimental studies, Fullerton et al. (2014) found evidence for positive effect of MMT on treatment retention and illicit opioid use. Similarly, a review of 16 randomized controlled trials of BMT also reported high level of evidence for positive impact on treatment retention and illicit opioid use (Thomas et al., 2014). No conclusive evidence was found that MMT or BMT alone provide significant positive improvements in secondary outcomes such as risk-related behaviors or other social consequences. American Psychiatric Association (APA) guidelines recommend pharmacologically based treatment modalities in combination with community reinforcement (Nicholls, 2010). Similar to APA and other professional standards, the World Health Organization (2009) guidelines for the treatment of opioid dependence include the use of psychosocial and pharmacological treatment.

However, the chronic administration of buprenorphine and naloxone, the most common pharmacological treatment combination, can have adverse effects on the dopaminergic circuitry in the brain and actually increase relapse potential (Blum et al., 2011). In addition to these concerns, outpatient treatment is not therapeutically appropriate for all individuals seeking treatment for opioid use disorder, particularly those individuals with higher severity or who have not been successful at previous attempts at outpatient treatment. For such individuals, residential treatment may be the most appropriate treatment modality.

Compounding the overall complexity of treatment for opioid users is the high rate of co-occurring disorders. A co-occurring disorder is present when a person has a substance use disorder (SUD) and one

or more mental disorders not related to substance use (SAMHSA, 2005). Individuals with SUDs experience mental health disorders at higher rates than those without SUDs (Compton, Thomas, Stinson, & Grant, 2007; Kessler et al., 1996). Kessler et al. (2005) estimate that 27% of adults in the United States have at least one psychiatric disorder, and 45% of these individuals have two or more disorders. Among the 20 million adults with a past-year SUD, 8 million (39%) had a mental illness in the past year compared to adults without a past year SUD, in which 16% (35.6 million adults) had a mental illness in the past year (Center for Behavioral Health Statistics and Quality [CBHSQ], 2015). Just over 18% of the 43.6 million adults with a mental illness also met criteria for past-year SUD (CBHSQ, 2015). The percentage of adults who had co-occurring mental illness in the past year was highest among those age 26 to 49 (43%) followed by those age 18 to 25 (36%) and age 50 or older (36%; CBHSQ, 2015).

The prevalence of co-occurring disorders among opioid abusers is higher than is found in the general population (Brooner et al., 1997; Kessler et al., 2005). In a study of opioid abusers seeking treatment, Brooner et al. (1997) reported that psychiatric comorbidity was present in 47% of the patients. The researchers also found that psychiatric comorbidity was associated with more severe SUD, more severe psychiatric distress, and less positive response to substance abuse treatment (Brooner et al., 1997; Darke et al., 2007; Kidorf et al., 2004). Major depression and antisocial personality disorder were found to be the most commonly co-occurring with opioid abusers (Brooner et al., 1997; Kidorf et al., 2004; McGovern, Xie, Segal, Siembab, & Drake, 2006).

Unfortunately, little is known about differences between opioid users and nonopioid users in residential treatment. Such information is necessary to individualize treatment options, prevent early discharge, and sustain positive outcomes. In addition, no studies have been published that compare opioid users and nonopioid users in treatment for co-occurring substance use and mental disorders. The purpose of this study was to address the gap in existing research by examining similarities and differences between opioid and nonopioid users enrolled in integrated residential treatment for co-occurring substance use and mental health disorders. In particular, we compared opioid and nonopioid users on sociodemographic characteristics, treatment motivation and retention, and substance use, addiction severity, and mental health outcomes at three time points: intake (baseline), 1-month postdischarge, and 6-months postdischarge.

Method

Sample and procedure

This study utilized data from 1,972 adults enrolled in residential substance abuse and mental health treatment services between 2009 and 2011 at one of three private residential facilities operated by Foundations Recovery Network (FRN), a private for-profit treatment provider. Although the facilities are located in Tennessee and California, service recipients are drawn from across the United States and Canada. Treatment was delivered within an integrated model of evidence-based mental health and substance abuse services using individual and group modalities. To ensure the protection of human subjects the study protocol was reviewed and approved by an independent community-based Institutional Review Board. Trained intake professionals at each facility described the study and obtained informed consent from participants. Baseline data was collected on recent substance use, treatment motivation, addiction severity, and mental health symptoms within 72 hours of admission. Intake data was collected by a trained masters'-level clinician. Follow-up data was collected at 30 days and 6-months postdischarge via phone interviews conducted by trained research interviewers. Retention data was extracted from patient records.

Instruments

Addiction severity index

Substance use, addiction severity, and mental health indicators were measured with the Addiction Severity Index (ASI; McLellan, 1992). For recent substance use, participants indicated how many days

in the past month they used a range of specific substances. Addiction severity was measured with the ASI's composite severity indices in each of seven potential problem areas that include medical, employment, alcohol, drug, legal, family/social, and psychiatric problems. To ensure that each question within a problem area is given the same weight in calculation of the composite index each item is divided by its maximum value and by the total number of questions assigned to each composite problem area. This scoring yields a score from 0 to 1 for each composite index, with higher scores indicating greater severity. As mental health indicators, we used three individual items from the psychiatric status section of the ASI. These items indicate whether respondents have had a significant period of time in which they have experienced symptoms not as a result of substance use in the following domains: depression, anxiety, and cognitive difficulties.

University of Rhode Island Change Assessment

The University of Rhode Island Change Assessment (URICA) is a measure of readiness to change that has been studied with a variety of populations (DiClemente, & Hughes, 1990). It consists of 32 statements that participants endorse on a 5-point scale from *strongly agree* to *strongly disagree*. The URICA yields scores on each of four subscales corresponding with the stages of change (i.e., precontemplation, contemplation, action, and maintenance) described by Prochaska, DiClemente, and Norcross (1992). A readiness-to-change composite score can be derived by adding the contemplation, action, and maintenance subscales and subtracting the precontemplation subscore (Project MATCH Research Group, 1997). The readiness-to-change composite score was used to measure readiness to change and alpha was .70 based upon the four subscale scores.

Treatment retention

Treatment retention was operationalized as length of stay, calculated by the total number of days between program start date and discharge date.

Data analyses

Differences between opioid and nonopioid users on demographic characteristics were compared using bivariate analyses, chi-square analyses for categorical variables, and *t* tests for continuous variables. Differences between groups in treatment motivation and length of stay were examined using linear regression with facility, year, age, gender, and race as covariates. Differences between groups on baseline levels of substance use, addiction severity, and mental health were compared with simple linear regression (unadjusted) and multiple regression controlling for age, gender, race/ethnicity, treatment facility, and year entered treatment (adjusted). To examine within group changes in substance use, addiction severity, and mental health across time, linear mixed model analyses were conducted with facility, year, age, gender, and race included as covariates. Lastly, comparisons between opioid and nonopioid users on outcomes at the same points in time were conducted with multiple regression or logistic regression, depending on the dependent variable, controlling for facility, year, age, gender, and race, and baseline severity for the outcome of interest.

Results

Demographic and treatment characteristics

Participants were predominately male (59.3%), White (89.0%), and ranged from age 18 to 78 years with a mean age of 37.04 (*SD* = 12.3). More than one third (39.8%) reported opioid use in the 30 days prior to enrolling in treatment, with 32.4% reporting prescription opioid use, 11.8% reporting heroin use, and 5.4% reporting nonprescription methadone use. There was some overlap between these three groups with 8.4% of the sample reporting use of more than one of the three types of opioids. Patients reporting

Table 1. Comparison of Opioid and Nonopioid Users on Demographic and Treatment Variables.

	Opioid Users M (SD) or n (%)	Nonopioid Users M (SD) or n (%)	Test Statistic, p Value
Age	32.5 (11.7)	39.5 (11.9)	$t = 11.83$, $p < .001$
Gender			
Females	464 (40%)	315 (41%)	$\chi^2 = 0.198$, $p = .656$
Males	696 (60%)	453 (59%)	
Race/ethnicity			
White	21 (68%)	788 (68%)	$\chi^2 = 0.002$, $p = .966$
Black	22 (4%)	90 (10%)	$\chi^2 = 17.92$, $p < .001$
Hispanic	11 (2%)	15 (2%)	$\chi^2 = 0.178$, $p = .673$
Treatment location			
Facility 1	299 (39%)	418 (36%)	$\chi^2 = 1.661$, $p = .197$
Facility 2	25 (3%)	60 (5%)	$\chi^2 = 4.030$, $p = .045$
Facility 3	444 (58%)	682 (59%)	$\chi^2 = 0.183$, $p = .669$
Year entered treatment			
2009	163 (21%)	322 (28%)	$\chi^2 = 10.48$, $p = .001$
2010	411 (54%)	576 (50%)	$\chi^2 = 2.756$, $p = .097$
2011	194 (25%)	262 (23%)	$\chi^2 = 1.830$, $p = .176$

opioid use may have also reported use of other substances including alcohol. Table 1 displays comparisons between opioid users and nonopioid users on demographic (age, gender, race/ethnicity) and treatment (treatment location, year entered treatment) variables. Opioid users were younger on average than nonopiate users (32.5 vs. 39.5 years). In addition, nonopioid users were more likely to be Black than opioid users (10% vs. 4%). Further, Facility 2 accounted for a significantly higher proportion of nonopioid users than opioid users (5% vs. 3%), whereas there was no difference found with Facility 1 or Facility 3. There was not a statistical difference in the gender of opioid and nonopioid users (40% vs. 41% female).

Treatment motivation and retention

No difference was found between opioid and nonopioid users on treatment motivation as measured by the URICA readiness-for-change score (10.86 vs. 10.91; $t = .620$, $df = 1448$, $p = .536$), even when facility, year, age, gender, and race are taken into account ($\beta = -.079$, SE $= .09$, $df = 1453$, $p = .373$). However, we did find a difference in treatment retention as measured by length of stay. Opioid users had a shorter average length of stay by approximately 2 days (30.9 vs. 32.8 days, $t = .204$, $df = 1890$, $p < .05$) in unadjusted analysis and 3 days in an analysis adjusting for facility, year, age, gender, and race ($\beta = -3.06$, SE $= .95$, $df = 1895$, $p < .01$) than nonopioid users.

Baseline levels of substance use, addiction severity, and mental health

Table 2 displays comparisons of opioid users and nonopioid users on baseline levels of substance use, addiction severity, and mental health. In the 30 days prior to treatment, opioid users reported significantly fewer days of alcohol use (8.11 vs. 14.7 days) and alcohol use to intoxication (6.2 vs. 11.2 days), and significantly more days of drug use (22.5 vs. 7.6) in unadjusted and adjusted analyses. By definition, opioid users reported more days of opioid use in the month prior to entering treatment. Opioid users reported using three classes of opioid drugs designated in the study: 32.4% reported using "other" opioids (primarily prescription drugs), 11.8% reported heroin use, and 5.4% reported nonprescription methadone use. There was some overlap between these three groups with 8.4% of the sample reporting use of more than one type of opioid. Opioid users reported an average of 14.6 days of prescription drug use, 5.8 days of heroin use, and 2.1 days of nonprescription methadone use. With the exception of amphetamines, opioid users and nonopioid users reported significant differences in the use of other substances examined in unadjusted and adjusted analyses. Opioid users reported more days than

Table 2. Comparison of Opioid and Nonopioid Users on Pretreatment Substance Use, Addiction Severity, and Mental Health Indicators.

	Opioid User ($n = 801$) M (SD) or %	Nonopioid User ($n = 1171$) M (SD) or %	Unadjusted b (SE)	Adjusted b (SE)
Substance use				
Any alcohol	8.11 (10.71)	14.65 (11.51)	−6.54 (.54)***	−5.59 (.53)***
Alcohol to intoxication	6.15 (9.91)	11.22 (11.33)	−5.07 (.53)***	−4.53 (.53)***
Any drugs	22.52 (9.15)	7.58 (10.79)	14.94 (.51)***	13.92 (.53)***
Amphetamines	1.33 (5.17)	0.93 (4.37)	0.37 (.23)	0.24 (.23)
Cannabis	6.81 (11.02)	3.14 (7.68)	3.68 (.42)***	2.36 (.43)***
Cocaine	3.31 (7.36)	2.45 (6.68)	0.86 (.34)*	0.91 (.35)*
Heroin	5.74 (10.32)	0 (0)	5.76 (.32)***	5.22 (.32)***
Other opiates	14.56 (11.64)	0 (0)	14.51 (.37)***	14.67 (.38)***
Sedatives	6.11 (10.14)	2.48 (7.53)	3.27 (.40)***	3.16 (.42)***
Addiction severity				
Medical	.325 (.382)	.242 (.346)	.08 (.02)***	0.13 (.02)***
Employment	.415 (.266)	.415 (.278)	.0003 (.01)	−0.02 (.01)
Alcohol	.249 (.316)	.496 (.337)	−0.25 (.02)***	−0.22 (.02)***
Drug	.316 (.127)	.104 (.132)	0.21 (.01)***	0.20 (.01)***
Legal	.150 (.237)	.095 (.197)	.06 (.01)***	0.03 (.01)**
Family	.344 (.269)	.311 (.257)	.03 (.01)**	0.02 (.01)
Psychiatric	.513 (.199)	.474 (.218)	.04 (.01)***	0.03 (.01)***
Mental health				
Depression	76%	71%	0.27 (.11)*	0.36 (.12)**
Anxiety	85%	80%	0.36 (.13)**	0.29 (.13)*
Cognitive	57%	48%	0.34 (.01)***	0.35 (.10)***

*$p < .05$. **$p < .01$. ***$p < .001$.

nonopioid users of cannabis (6.8 vs. 3.1 days), cocaine (3.3 vs. 2.5 days), and sedatives (6.1 vs. 2.5 days). With the exception of employment, opioid users and nonopioid users differed significantly on the domains of addiction severity at treatment entry. Opioid users reported higher severity in the medical (.325 vs. .242), drug (.316 vs. .104), legal (.150 vs. .095), family (.344 vs. .311), and psychiatric (.513 vs. .474) domains. Significant differences were found in unadjusted and adjusted analyses, with the exception of the family domain, which was significant in the unadjusted analysis but not the adjusted analysis. Opioid users also reported lower severity in the alcohol (.249 vs. .496) domain in unadjusted and adjusted analyses. In unadjusted and adjusted analyses, opioid users reported higher rates of depression (76% vs. 71%), anxiety (85%), and cognitive difficulties (57% vs. 48%) than nonopioid users.

Substance use outcomes

At the time that data was analyzed, 1,495 (75.8%) individuals provided follow-up data. Individuals who did not participate in follow-up data collection were not included in analyses of outcomes. Results of repeated-measures analyses of substance use, addiction severity, and mental health outcomes are presented in Table 3. Both groups maintained statistically significant reductions in substance use at 1-month and 6-month follow-up across all substances. Opioid users reported significantly higher use of alcohol, alcohol to intoxication, any drugs, cannabis, and other opiates at 6-month follow-up compared to 1-month follow-up, whereas nonopioid users demonstrated significantly higher use of alcohol, alcohol to intoxication, and any drugs at 6-month follow-up compared to 1-month follow-up. Opioid and nonopioid users differed on alcohol to intoxication and any drug use at 1-month follow-up, with opioid users reporting less alcohol to intoxication ($b = -.506$, SE $= .242$, $p = .037$) and more drug use ($b = .738$, SE $= .302$, $p = .015$). At 6-month follow-up, the groups differed only on use of any drug, with opioid users reporting more days of drug use ($b = 1.394$, SE $= .512$, $p = .007$).

Addiction severity outcomes

Opioid users and nonopioid users reported significantly lower severity in the medical, alcohol, drug, legal, family, and psychiatric domains at 1-month and 6-month follow-up compared to baseline.

Table 3. Comparison of Opioid and Nonopioid Users on Longitudinal Outcomes.

	Opioid Users					Nonopioid Users				
	Baseline	1-month	b (SE)	6-months	b (SE)	Baseline	1-month	b (SE)	6-months	b (SE)
Substance use										
Any alcohol	7.72 (.38)	1.00 (.16)	− 6.71 (.39)***	2.18 (.28)ᶜ	− 5.53 (.46)***	14.59 (.35)	1.67 (.19)	− 12.92 (.35)***	3.05 (.27)ᶜ	− 11.54 (.42)***
Alcohol to intoxication[a]	5.69 (.36)	0.47 (.10)	− 5.21 (.35)***	1.37 (.24)ᶜ	− 4.31 (.42)***	10.97 (.35)	1.21 (.16)	− 9.76 (.35)***	1.99 (.22)ᶜ	− 8.98 (.40)***
Any drugs[a,b]	22.79 (.33)	1.60 (.26)	− 21.19 (.41)***	3.25 (.42)ᶜ	− 19.54 (.54)***	7.44 (.32)	0.43 (.09)	− 7.01 (.32)***	1.10 (.18)ᶜ	− 6.34 (.36)***
Amphetamines	1.30 (.19)	0.15 (.07)	− 1.15 (.19)***	0.41 (.16)	− 0.89 (.24)***	0.93 (.13)	0.07 (.04)	− 0.85 (.12)***	0.16 (.07)	− 0.77 (.14)***
Cannabis	6.87 (.40)	0.53 (.15)	− 6.34 (.40)***	1.33 (.26)ᶜ	− 5.54 (.47)***	3.10 (.23)	0.27 (.08)	− 2.83 (.23)***	0.56 (.13)	− 2.54 (.26)***
Cocaine	3.27 (.27)	0.19 (.08)	− 3.08 (.28)***	0.15 (.06)	− 3.12 (.27)***	2.41 (.20)	0.15 (.05)	− 2.26 (.20)***	0.14 (.06)	− 2.27 (.21)***
Heroin	5.80 (.39)	0.29 (.10)	− 5.51 (.38)***	0.82 (.22)	− 4.98 (.44)***	—	—	—	—	—
Other opiates	14.68 (.43)	0.90 (.20)	− 13.78 (.46)***	2.32 (.36)ᶜ	− 12.36 (.56)***	—	—	—	—	—
Sedatives	6.07 (.37)	0.46 (.13)	− 5.61 (.37)***	0.90 (.22)	− 5.17 (.42)***	2.79 (.22)	0.37 (.11)	− 2.42 (.24)***	0.53 (.13)	− 2.27 (.26)***
Addiction severity										
Medical	.323 (.01)	.159 (.01)	− 0.16 (.02)***	.179 (.01)	− 0.14 (.02)***	.240 (.01)	.133 (.01)	− 0.11 (.01)***	.157 (.01)	− 0.08 (.01)***
Employment	.412 (.01)	.471 (.01)	0.06 (.01)***	.387 (.01)ᶜ	− 0.03 (.01)	.416 (.01)	.462 (.01)	0.05 (.01)***	.401 (.01)ᶜ	− 0.02 (.01)
Alcohol[a]	.233 (.01)	.054 (.01)	− 0.18 (.01)***	.079 (.01)ᶜ	− 0.15 (.13)***	.488 (.01)	.107 (.01)	− 0.38 (.01)***	.124 (.01)	− 0.36 (.01)***
Drug	.315 (.01)	.046 (.00)	− 0.27 (.01)***	.051 (.01)	− 0.26 (.01)***	.100 (.00)	.019 (.00)	− 0.08 (.00)***	.022 (.00)	− 0.08 (.00)***
Legal	.152 (.01)	.090 (.01)	− 0.06 (.01)***	.059 (.01)ᶜ	− 0.09 (.01)***	.096 (.01)	.061 (.01)	− 0.04 (.01)***	.048 (.01)ᶜ	− 0.05 (.01)***
Family	.340 (.01)	.142 (.01)	− 0.20 (.01)***	.145 (.01)	− 0.19 (.01)***	.309 (.01)	.142 (.01)	− 0.17 (.01)***	.136 (.01)	− 0.17 (.01)***
Psychiatric	.513 (.01)	.288 (.01)	− 0.23 (.01)***	.261 (.01)	− 0.25 (.01)***	.473 (.01)	.271 (.01)	− 0.20 (.01)***	.253 (.01)	− 0.22 (.01)***
Mental health										
Depression	0.76 (.02)	0.36 (.02)	− 0.40 (.03)***	0.33 (.02)	− 0.44 (.03)***	0.71 (.01)	0.35 (.02)	− 0.36 (.02)***	0.36 (.02)	− 0.34 (.02)***
Anxiety	0.85 (.01)	0.54 (.02)	− 0.31 (.02)***	0.48 (.03)	− 0.37 (.03)***	0.80 (.01)	0.50 (.02)	− 0.30 (.02)***	0.44 (.02)ᶜ	− 0.36 (.02)***
Cognitive	0.57 (.02)	0.33 (.02)	− 0.24 (.03)***	0.26 (.02)ᶜ	− 0.30 (.03)***	0.48 (.02)	0.28 (.02)	− 0.20 (.02)***	0.28 (.02)	− 0.21 (.02)***

[a]significant difference between opioid and nonopioid users at 1-month postdischarge. [b]Significant difference between opioid and nonopioid users at 6 months postdischarge. ᶜSignificant within group difference between 1-month and 6-month postdischarge.
***p < .001.

Both groups also reported higher severity at 1-month follow-up compared to baseline in the employment domain, though neither group reported a significant difference in employment severity between baseline and 6-month follow-up. Among opioid users, employment and legal severity decreased and alcohol severity increased from 1-month to 6-month follow-up. Nonopioid users reported a reduction in severity in the employment and legal domains of from 1-month to 6-month follow-up. Comparison of opioid users and nonopioid users revealed one significant between-groups difference on alcohol severity at 1-month, but not 6-month, follow-up. Opioid users reported significantly lower alcohol severity than did nonopioid users ($b = -.030$, SE $= .010$, $p = .003$). No further between group differences were found at 1-month or 6-month follow-up.

Mental health outcomes

opioid users and nonopioid users reported lower levels of depression, anxiety, and cognitive difficulties at 1-month and 6-month follow-up as compared to baseline. Opioid users reported continued improvement in cognitive difficulties at 6-month follow-up compared to the 1-month follow-up, whereas nonopioid users reported continued improvement in anxiety from 1-month to 6-month follow-up. There were no significant between group differences between on depression, anxiety, or cognitive difficulties at either 1-month or 6-month follow-up.

Discussion

The purpose of this study was to examine similarities and differences between opioid and nonopioid users enrolled in integrated residential treatment for co-occurring substance use and mental health disorders. More specifically, we compared opioid and nonopioid users on sociodemographic characteristics, treatment motivation and retention, and substance use, addiction severity, and mental health outcomes. Compared to nonopioid users, opioid users were younger, less likely to identify as African American, and presented to treatment with a more severe clinical profile. In particular, opioid users reported more frequent drug use; higher addiction severity in the medical, drug, legal, family, and psychiatric domains; and more mental health symptoms at intake. It should be noted, however, that at intake nonopioid users reported more frequent alcohol use, alcohol intoxication, and greater addiction severity in the alcohol domain. Opioid users were similar to nonopioid users in treatment motivation but remained in treatment for approximately 3 days longer. Although the difference in length of stay is statistically significant, the clinical significance of this difference in length of stay is less clear given the similar outcomes found in both groups.

Despite these differences, opioid users and nonopioid users demonstrated improvement in all but one outcome at 1 month and 6 months following treatment completion. The one exception was the domain of employment, where both groups demonstrated the same pattern—a significant increase in employment severity at 1 month, with a return to baseline level at 6-month follow-up. This finding is not unanticipated given that treatment was residential, and thus patients were not able to work during treatment. Thus, patients may have been unemployed or underemployed immediately following treatment despite improvement in addiction and mental health symptoms but over time were able to find sufficient employment opportunities. Certain outcomes demonstrated diminished improvement at 6 months as compared to 1 month, however despite this slippage, 6-month outcomes remained improved, statistically and clinically, as compared to intake.

It is important to note that the study population was drawn from private for-profit residential treatment centers. This is a population of individuals who do not typically enroll in substance abuse treatment research. Historically, research on opioid addiction is even less likely to be conducted in a similar setting, as the preponderance of such research is conducted with indigent populations enrolled in outpatient methadone maintenance therapy. A unique strength of this study includes increasing the depth and breadth of our understanding of opioid use disorder treatment to a population under-represented in the literature. However, it can also be considered a limitation, in that it may limit the

external validity of the study to other similar well-resourced populations. In addition, the results from this study are only applicable to the individuals who participated in the research interviews, and thus selection bias may be present in that individuals included in the sample may differ from the population of potential service recipients. It should also be noted that data was collected over a 3-year period at a time when the opioid epidemic was expanding and the treatment system may have been adjusting to these changes.

Despite these limitations, the results are important. All of the outcome measures indicated significant improvements for the individuals involved in the study, and with few exceptions there were limited differences between opioid and nonopioid users. The results can be used to further develop and/or enhance services to other groups of similar opiate using individuals in other areas. The project demonstrated that a continuum of intensive residential abstinence-based substance abuse and mental health treatment services may be effective for the target population, especially because opioid users have been historically described as more difficult to reach and/or nonadherent to traditional services than other substance users. Despite higher levels of impairment and greater social challenges, opioid users experienced similar significant positive outcome to the nonopioid using population. Thus, existing abstinence-based, residential treatment models that include dual diagnosis fidelity, stage-wise monitoring and clinical interventions are as effective in treating individuals with opiate addiction as they are in treating individuals with other addictions. In conclusion, these findings demonstrate that an integrated model of residential treatment for individuals with co-occurring substance use and mental health disorders is effective in reducing substance use, addiction severity, and mental health symptoms.

References

Alford, D. P., LaBelle, C. T., Richardson, J. M., O'Connell, J. J., Hohl, C. A., Cheng, D. M., & Samet, J. H. (2007). Treating homeless opioid dependent patients with buprenorphine in an office-based setting. *Journal of General Internal Medicine, 22*(2), 171–176.

Birnbaum, H. W. (2011). Societal costs of prescription opioid abuse, dependence, and misuse in the United States. *Pain Medicine, 12,* 657–667.

Blum, K., Chen, T. J., Bailey, J., Bowirrat, A., Femino, J., Chen, A. L., … Oscar-Berman, M. (2011). Can the chronic administration of the combination of buprenorphine and naloxone block dopaminergic activity causing anti-reward and relapse potential? *Molecular Neurobiology, 44,* 250–268.

Brooner, R. K., King, V. L., Kidorf, M., Schmidt, C. W., & Bigelow, G. E. (1997). Psychiatric and substance use comorbidity among treatment-seeking opioid abusers. *Archives of General Psychiatry, 54*(1), 71–80. doi:10.1001/archpsyc.1997.01830130077015

Butler, S. B. (2010). Characteristics of perscription opioid abusers in treatment: prescription opioid history, age, use patterns and functional severity. *Journal of Opioid Management, 6,* 246–252.

Center for Behavioral Health Statistics and Quality. (2015). *Behavioral health trends in the United States: Results from the 2014 National Survey on Drug Use and Health* (HHS Publication No. SMA 15-4927, NSDUH Series H-50). Retrieved from http://www.samhsa.gov/data/

Centers for Disease Control and Prevention. (2012). Vital signs: Risk for overdose from Methadone used for pain relief – United States, 1999–2010. *Morbidity and Mortality Weekly Report, 61,* 493–497.

Compton, W. M., Thomas, Y. F., Stinson, F. S., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry, 64*(5), 566–576.

Darke, S. D. (2006). *Mortality amonst illicit drug users: epidemiology, causes and intervention.* Cambridge, England: Cambridge University Press.

Darke, S., Ross, J., Williamson, A., Mills, K. L., Havard, A., & Teesson, M. (2007). Borderline personality disorder and persistently elevated levels of risk in 36-month outcomes for the treatment of heroin dependence. *Addiction, 102,* 1140–1146.

De Mayer, J. V. (2011). A good quality of life under the influence of methadone: A qualitative study among opiate dependent individuals. *International Journal of Nursing Studies, 48,* 1244–1257.

DiClemente, C. C., & Hughes, S. O. (1990). Stages of change profiles in alcoholism treatment. *Journal of Substance Abuse, 2,* 217–235.

Fullerton, C. A., Kim, M., Thomas, C. P., Lyman, D. R., Montejano, L. B., Dougherty, R. H., … Delphin-Rittmon, M. E. (2014). Medication assisted treatment with methadone: Assessing the evidence. *Psychiatric Services, 65,* 146–157.

Kessler, R. C., Chiu, W. T., Demler, O., Merikangas, K. R., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*(6), 617–627.

Kessler, R. C., Nelson, C. B., McGonagle, K. A., Edlund, M. J., Frank, R. G., & Leaf, P. J. (1996). The epidemiology of co-occurring addictive and mental disorders: Implications for prevention and service utilization. *American Journal of Orthopsychiatry*, *66*, 17–31.

Kidorf, M., Disney, E. R., King, V. L., Neufeld, K., Beilenson, P. L., & Brooner, R. K. (2004). Prevalence of psychiatric and substance use disorders in opioid abusers in a community syringe exchange program. *Drug and Alcohol Dependence*, *74*, 115–122.

Manchikanti, L., & Singh, A. (2008). Therapeutic opioids: A ten-year perspective on the complexities and complications of the escalating use, abuse and nonmedical use of opioids. *Pain Physician*, *11*(Suppl 2), 563–568.

McGovern, M. P., Xie, H., Segal, S. R., Siembab, L., & Drake, R. W. (2006). Addiction treatment services and co-occurring disorders. *Journal of Substance Abuse Treatment*, *31*, 267–275.

McLellan, A. A. (1992). A new measure of substance abuse treatment: Initial studies of the treatment services review. *Journal of Nervous and Mental Diseases*, *180*, 101–110.

Meges, D., Zevin, B., Cookson, E., Bascelli, L., Denning, P., Little, J., . . . Post, P. (Eds.). (2014). *Adapting your practice: Recommendations for the care of homeless patients with opioid use disorders*. Nashville, TN: National Health Care for the Homeless Council, Inc.

Muhuri, P. K., Gfroerer, J. C., & Davies, C. (2013, August). Associations of nonmedical pain reliever use and initiation of heroin use in the United States. *CBHSQ Data Review*. Retrieved from Substance Abuse and Mental Health Services Administration website: http://www.samhsa.gov/data/sites/default/files/DR006/DR006/nonmedical-pain-reliever-use-2013.htm

National Institute on Drug Abuse. (2015). *National overdose death rates*. Retrieved from https://d14rmgtrwzf5a.cloudfront.net/sites/default/files/cdc-us-overdose-deaths-2014.pdf

Nicholls, L. B. (2010). Opioid dependence treatment and guidelines. *Journal of Managed Care Pharmacy*, *16*, S14–S21.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist*, *47*(9), 1102–1114.

Project MATCH Research Group. (1997). Matching patients with alcohol disorders to treatments: Clinical implications from Project MATCH. *Journal of Mental Health*, *7*(6), 589–602.

Substance Abuse and Mental Health Services Administration. (2004). *Results from the 2003 National Survey on Drug Use and Health: Summary of national findings* (NSDUH Series H-25, DHHS Publication No. SMA 04-3964). Rockville, MD: Author.

Substance Abuse and Mental Health Services Administration. (2009). *Integrated treatment for co-occurring disorders: Building your program* (DHHS Pub. No. SMA-08-4366). Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services.

Substance Abuse and Mental Health Services Administration. (2014). *Results from the 2014 National Survey on Drug Use and Health: Summary of national findings* (NSDUH (HHS Publication No. SMA 15-4927, NSDUH Series H-50). Rockville, MD: Author.

Thomas, C. P., Fullerton, C. A., Kim, M., Montejano, L., Lyman, D. R., Dougherty, R. H., . . . Delphin-Rittmon, M. E. (2014). Medication assisted treatment with buprenorphine: Assessing the evidence. *Psychiatric Services*, *65*, 158–170.

World Health Organization. (2009). *Guidelines for the psychosocially assisted pharmacological treatment of opioid dependence*. Geneva, Switzerland: Author.