Response to culturally competent drug treatment among homeless persons with different living arrangements

Erick G. Guerrero\textsuperscript{a,\*}, Ahyoung Song\textsuperscript{b}, Benjamin Henwood\textsuperscript{a}, Yinfei Kong\textsuperscript{c}, Tina Kim\textsuperscript{d}

\textsuperscript{a} Suzanne Dworak-Peck School of Social Work, and Marshall School of Business, University of Southern California, Los Angeles, CA, 90089, USA
\textsuperscript{b} Department of Social Welfare, Gachon University, Seongnam, South Korea
\textsuperscript{c} Mihaylo College of Business and Economics, California State University, Fullerton, Fullerton, CA, 92834, USA
\textsuperscript{d} Los Angeles County Department of Public Health, Substance Abuse Prevention and Control, Alhambra, CA, 91803, USA

A R T I C L E  I N F O

Keywords:
Homelessness
Cultural competence
Drug use
Drug treatment

A B S T R A C T

This study investigated the association between program cultural competence and homeless individuals’ drug use after treatment in Los Angeles County, California. Los Angeles County has the largest and most diverse population of homeless individuals in the nation. We randomly selected for analysis 52 drug-treatment programs and 2158 participants who identified as homeless in the Los Angeles County Participant Reporting System in 2011. We included their living arrangements (indoors and stable, indoors and unstable, and outdoors) and individual and program characteristics (particularly whether their programs used six culturally competent practices) in multilevel regression analyses. The outcome was days of primary drug use at discharge. Results showed that higher levels of staff personal involvement in minority communities (IRR = 0.437; 95% CI = 0.222, 0.861) and outreach to minority communities (IRR = 0.406; 95% CI = 0.213, 0.771) were associated with fewer days of drug use at discharge. Homeless individuals living outdoors used their primary drug more often than any other group. Yet, compared to individuals with other living arrangements, when outdoor homeless individuals were treated by programs with the highest community resources and linkages (IRR = 0.364; 95% CI = 0.157, 0.844), they reported the fewest days of drug use. We discuss implications for program evaluation and community engagement policies and practices.

1. Introduction

Substance use is one of the most commonly observed health risks among people experiencing homelessness (Johnson, Freels, Parsons, & Vangeest, 1997; National Coalition for the Homeless, 2009; Substance Abuse and Mental Health Services Administration, 2013). Homeless persons are considered individuals without permanent housing who may live on the streets; stay in a shelter, mission, single room occupancy facilities, abandoned building or vehicle; or in any other unstable or non-permanent situation. (Section 330 of the Public Health Service Act (42U.S.C., 254b). Some studies reporting that most homeless persons experience substance use disorders (SUDs; Baumohl & Huebner, 1991; Folsom et al., 2005). Substance use among individuals who are homeless is associated with increased morbidity of physical and mental health conditions (Burt, 2001; McCarty, Argeriou, Huebner, & Lubran, 1991; Rhoades et al., 2011; Substance Abuse and Mental Health Services Administration, 2013) and early mortality (Henwood, Byrne, & Scriber, 2015; O’Connell, 2005; Zivanovic et al., 2015). Due to the scope of the problem, there have been continuous efforts to deliver effective SUD treatment to homeless populations (Drake, O’Neal, & Wallach, 2008; Hwang, Tolomieenko, Kouyoumdjian, & Garner, 2005; Milby et al., 1996). Yet, there is a dearth of research on the most effective approaches to SUD treatment for homeless individuals.

Experts have suggested considering homeless individuals’ racial and ethnic culture when tailoring services, given that minorities disproportionately experience chronic homelessness (Padgett, Gulcur, & Tsemberis, 2006; Padgett, Stanhope, Henwood, & Stefancic, 2011). Hence, the delivery of evidence-informed culturally competent SUD treatment may be key to improving substance-use outcomes for homeless individuals (Amodeo, Chassler, Oettinger, Labiosa, & Lundgren, 2008; Amodeo et al., 2011). Cultural competence has been generally defined as a series of policies, practices and attitudes that allow providers and programs to effectively respond to the cultural services needs of individuals (Cross, Bazron, Dennis, & Isaacs, 1989). SUD treatment programs with culturally competent practices and
policies, such as matching providers and clients based on their cultural and linguistic background have shown greater retention for African American and Latino clients (Guerrero & Andrews, 2011; Guerrero, 2013). Yet, there has been limited research on the role of culturally responsive practices in SUD treatment for homeless populations.

In the state of California, Los Angeles County seeks to reduce homelessness by funding, regulating, and supporting health and human services (County of Los Angeles Homeless Initiative, 2016), including SUD treatment. This study assesses whether culturally responsive practices of treatment programs can reduce drug use among homeless persons. We investigated substance use outcomes for 2158 individuals who received SUD treatment in 2011 from programs funded by the Los Angeles County Department of Public Health. Los Angeles County has the largest unsheltered homeless population in the United States, with an estimated 57,794 people experiencing homelessness on any given day (Los Angeles Homeless Services Authority, 2017). This number represents nearly 10 percent of the homeless population in the United States any given night in 2016 (National Alliance to End Homelessness, 2016). Although the overall U.S. homeless population has decreased in recent years, that in Los Angeles County increased (Los Angeles Homeless Services Authority, 2017). Because residential instability can compromise the effectiveness of SUD treatment (Robertson, Zlotnick, & Westerfelt, 1993), we investigated whether the type of homelessness—i.e., living with friends or family (indoors and stable), in a shelter (indoors and unstable), or on the streets (outdoors)—affects the relationship between culturally responsive practices and substance use outcomes. This relationship has been rarely considered in the literature (Kashner, Rosenheck, Campinell, Surís, & the CWT Study Team, 2002; Slesnick & Erdem, 2013; Slesnick, Kang, Bonomi, & Prestopnik, 2008).

1.1. Conceptual framework

Most organizational cultural competence frameworks outline a diverse set of practices, attitudes, and services for enhancing the sensitivity and responsiveness of health care organizations (Brach & Fraser, 2000; Harper et al., 2009; Lewin Group, 2001; Prince Inniss, Nessman, Mowery, Callejas, & Hernandez, 2009; Weech-Maldonado, 2002). There are several health care practices for effectively responding to the service needs of racial and ethnic minority clients (Brach & Fraser, 2000; Guerrero & Kim, 2013; Mason, 1995). The most common practices reported in the literature are, a) having providers with knowledge of community needs in racial and ethnic minority communities, b) personal involvement in racial and ethnic minority communities, c) development of resources and linkages to serve racial and ethnic minorities, d) hiring and retention of staff members with racial and ethnic minority backgrounds, e) reaching out to racial and ethnic minority communities, and f) developing policies and health service practices (e.g., bilingual treatment).

Preliminary studies have shown a strong relationship between staff cultural sensitivity and knowledge of minority communities and shorter wait time with greater retention among Latinos and African American clients (Guerrero & Andrews, 2011; Guerrero, 2013). Spanish-language translation of treatment materials was associated with higher odds of treatment completion among Latinos in California (Guerrero, Campos, Urada, & Yang, 2012). When interpreters or bilingual providers are not available, clients may wait longer to commence treatment (González, Vega, & Tarraf, 2010; Office of Minority Health, 2001). To date, however, there is limited evidence of the impact of culturally sensitive practices on treatment outcomes (i.e., post treatment drug use) among homeless individuals.

Poor response to SUD treatment among homeless clients may be due to programs’ limited knowledge and understanding of and response to community context and individual service needs (Padgett et al., 2006; Padgett et al., 2011). Culturally competent treatment include practices, such as delivering services in a bilingual, culturally diverse, and inclusive setting, are associated with minority clients experiencing effective communication, more accurate diagnosis, a positive therapeutic alliance, and greater satisfaction with treatment (Brach & Fraser, 2000; González et al., 2010; Saha et al., 1999; Saha, Taggart, Komaromy, & Bindman, 2000; Sue, Fujino, Hu, Takeuchi, & Zane, 1991; Wells, Klap, Koike, & Sherbourne, 2001).

This suggests that by (a) understanding and investing in the minority communities SUD treatment programs serve homeless individuals and (b) integrating hiring, training, and service practices and policies that are most responsive to client service needs in local communities (Guerrero & Kim, 2013), SUD treatment organizations may be more likely to reduce substance use among homeless individuals. SUD treatment effectiveness may vary by exactly where the homeless live (Padgett et al., 2006; Padgett et al., 2011). Hence, program personnel must understand and respond to the unique service needs of individuals with different living conditions and service needs. This work considers three hypotheses about homelessness and SUD treatment.

Hypothesis 1. Homeless individuals living outdoors will report more days of drug use at discharge than those living in stable indoor settings.

Hypothesis 2. Among all homeless individuals, higher degree of implementation of the six culturally competent program practices identified above will be associated with fewer days of primary drug use at discharge.

Hypothesis 3. Living arrangements (outdoors, indoors and unstable, or indoors and stable) will moderate the relationship between the degree of implementation for culturally competent program practices and days of primary drug use at discharge.

2. Methods

2.1. Sampling frame and data collection

The data were collected by accessing a fully concatenated program and client dataset involving all 408 nonprofit SUD treatment programs funded by the Los Angeles County Department of Public Health. Through the Los Angeles County Participant Reporting System, researchers can access all data entered by each provider on every client served on an ongoing basis. These data capture the treatment experiences, substance use, and individual characteristics of 15,100 individuals who participated in treatment from July 1, 2010 to December 30, 2011. Ethical and human protection practices were followed in data collection based on the Institutional Review Board of the Los Angeles County Department of Public Health and the based research institution. The dataset features 141 items, more than half of which are standardized scales following the guidelines of the California Outcomes Measurement System and the federal Treatment Episode Data Set system.

2.2. Analytic sample

To access program-level information, we obtained a random sample of 147 publicly funded and nonprofit programs from among 350 programs located in communities at least 40 percent Latino or African American. Of these 147 programs, 95 did not provide services to homeless individuals and were excluded from analysis. The final analytic sample included 52 programs serving 2158 individuals self-identified as homeless at admission.

2.3. Individual-level independent variables

We analyzed three types of homelessness, identifying clients by whether they were staying indoors in a stable setting with family or friends (coded as 0), living indoors but in an unstable setting (staying in a shelter, hotel, motel, car, or van; coded as 1), or living outdoors.
(coded as 2). This categorization is consistent with the U.S. Department of Health and Human Services, and the National Health Care for the Homeless Council (Substance Abuse and Mental Health Services Administration, 2013), which considers a homeless person an individual without permanent housing who may live on the streets; stay in a shelter, mission, single room occupancy facilities, abandoned building or vehicle; or in any other unstable or non-permanent situation. [Section 330 of the Public Health Service Act (42U.S.C., 254b)]

We measured history of mental health by clients’ response to the question, “Have you ever been diagnosed with a mental illness?” Clients responded yes (1) or no (0).

We assessed duration in treatment based on admission and discharge dates. To control for baseline differences in frequency of drug use at admission, we included a variable on the primary drug participants reported using in the 30 days prior to intake.

Demographic characteristics included age (continuous), race and ethnicity (1 = Latino, 0 = other), gender (1 = female, 0 = male), years of education (continuous), employment at admission (1 = not employed, 2 = sometimes employed, 3 = often employed, and 4 = fully employed), eligibility for Medicaid (1 = eligible, 0 = not eligible), and social support (Likert scale of degree of social support in peer groups from 1 = low to 5 = high).

2.4. Program-level independent variables

A cultural competence measure included six domains (practices) across 57 items (Mason, 1995). For each item, we measured supervisors’ report on their program staff’s (1) knowledge of racial and ethnic minority community needs; (2) personal involvement in racial and ethnic minority communities; (3) development of resources and linkages to serve racial and ethnic minorities; (4) reaching out to racial and ethnic minority communities; (5) hiring and retention of staff members from racial and ethnic minority backgrounds; and (6) development of policies and procedures to effectively respond to the service needs of racial and ethnic minority patients. Staff rated items on a 4-point Likert scale (1 = not at all to 4 = often). Cronbach’s α coefficients on these items ranged from 0.72 to 0.98. This measure of cultural sensitivity and responsiveness has been effectively used in other studies (Guerrero & Kim, 2013; Guerrero, 2013).

The survey measured state licensure by asking, “Is your program licensed by the state?” and accreditation by the Joint Commission by asking, “Is your program accredited by the Joint Commission?” Answers to both items were coded as yes (1) or no (0). We also measured whether the program accepts Medicaid payments and percent of public funds received in prior fiscal year. These four variables have been used in previous studies as program regulation and funding measures associated with treatment outcomes (Campbell & Alexander, 2002; Guerrero & Andrews, 2011; Guerrero, 2013).

2.5. Dependent variable

Our dependent variable is primary drug used during the 30 days prior to discharge. Program participants were first asked to identify their primary drug of choice and then “How many days in past 30 days you have used this primary drug?” This variable was analyzed as a continuous variable with a range of 0–30 days. This measure has been used in other studies as well (Frimpong, Guerrero, Kong, & Kim, 2016).

2.6. Analytic plan

We used Stata/SE (version 12) to conduct all analyses. We used analysis of variance and chi-square global tests to compare homeless individuals by their living arrangement (outdoors, indoors unstable, and indoors stable). We used multiple imputation to fill missing values, assuming data to be missing at random (Little & Rubin, 1987). Each missing value was replaced with 20 plausible values using the Markov chain Monte Carlo method (Schafer, 1997). We conducted imputation for program and client variables independently. The highest rate of missing data for any variable in the sample was 16 percent. We developed, merged, and analyzed twenty imputed datasets using Stata’s MI IMPUTE and MI ESTIMATE commands.

We also relied on Stata to conduct three multilevel negative binomial regression analyses models using MI ESTIMATE: NBREG with a log link function (Stata Press, 2012). The first model includes all program and individual variables except cultural competence and interactions with living arrangements. The second model adds cultural competence to the analysis, whereas the third and full model includes cultural competence and interactions with living arrangements. To obtain accurate estimates of standard errors, we controlled for the multilevel structure of the data (clients in programs) using the CLUSTER option (Blakely & Woodward, 2000). We relied on negative binomial regression with robust standard errors to analyze days of drug use, a measure that was overdispersed, with much greater than its mean (Cameron & Trivedi, 2009). We expressed the parameters presented in negative binomial regression as incidence rate ratios (IRRs). IRRs can be interpreted as the estimated rate ratio for a 1-unit increase in the independent variable, given other variables are held constant. For example, if a score for implementation of personal involvement in minority communities (range = 0–50) increased by 1 point, the ratio for number of days of drug use would decrease by an IRR factor of 0.437, holding all other variables in the model constant. We provide standardized IRRs in the results tables to identify and compare effect size, evaluated as the positive or negative distance from zero. For example, as Table 2 indicates, the standardized IRR for program staff personal involvement in racial and ethnic minority communities is 0.673.

3. Results

3.1. Descriptive analyses

Table 1 depicts the results of descriptive analyses by three types of living arrangement: outdoors (n = 622), indoors and unstable (n = 508), and indoors and stable (n = 1028). Individuals living indoors but unstable had the highest rate of mental illness (28.15%) of history of mental illness. About 40 percent of participants living indoors were women. Most living indoors in stable settings identified their race and ethnicity as Latino or other. Blacks are predominant among those with unstable indoors arrangements and Whites among those living outdoors. Among respondents in all living arrangements the mean number of years of education completed was less than 12.

3.2. Hypotheses

We found partial support for Hypothesis 1, which posited that Homeless individuals living outdoors would report more days of drug use at discharge than those living in stable indoor settings. As Table 1 shows, homeless people living outdoors reported the highest mean of 11.21 days of drug use in the 30 days prior to treatment, compared to 3.02 for those with unstable indoors living arrangements and 6.41 for those with stable indoors arrangements. However, after accounting for cultural competence and interactions with living arrangements in Model 3, we found a non-significant relationship between living arrangements and days of primary drug use (IRR = 1.272; 95% CI = 0.907, 1.784). See Table 2.

We found partial support for Hypothesis 2, which posited that among all homeless individuals, higher degree of implementation of the six culturally competent program practices identified above will be associated with fewer days of primary drug use at discharge. Model 2, in Table 2 shows two of the six practices related to the outcome. Higher levels of personal involvement in minority communities (IRR = 0.437; IRR standardized = 0.673; 95% CI = 0.222, 0.861) and outreach to minority communities (IRR = 0.406; IRR standardized = 0.665; 95%
CI = 0.213, 0.771) were associated with fewer days of drug use at discharge. We found partial support for Hypothesis 3, which states that living arrangements (outdoors, indoors and unstable, or indoors and stable) will moderate the relationship between the degree of implementation for culturally competent program practices and days of primary drug use at discharge. Receiving treatment from programs with high levels of implementation of resources and linkages to minority communities was associated with fewer days of drug use among homeless individuals living outdoors (IRR = 0.364; IRR standardized = 0.867; 95% CI = 0.157, 0.844). See Model 3 in Table 2 and Fig. 1.

Beyond the hypothesized relationships, we note several individual variables associated with days of drug use at discharge. The strongest [positive] effect was on days of drug use at admission and days of drug use at discharge (IRR = 1.064; IRR standardized = 2.236; 95% CI = 1.045, 1.084). Treatment duration had a negative effect on days of drug use at discharge (IRR = 0.989; IRR standardized = 0.427; 95% CI = 0.985, 0.993), whereas history of mental illness had a strong positive effect on days of drug use (IRR = 1.574; IRR standardized = 1.214; 95% CI = 1.004, 2.469).

4. Discussion

Our findings underscore the need to consider living arrangements and delivering community-based culturally competent care to reduce drug use among homeless individuals in SUD treatment. Homeless people living outdoors used their primary drug more days after discharge than other homeless individuals, as hypothesized. However, community-based culturally responsive practices played an important role in decreasing days of drug use among individuals in all living arrangements. Treatment staff’s personal involvement in minority communities and outreach activities were associated with fewer days of drug use for homeless individuals with different living arrangements, partially supporting hypotheses 2. This is an important finding because it suggests that to improve treatment outcomes for homeless individuals, treatment programs need to be more embedded in their communities.

Our study also shows that evaluating differences by living arrangements in response to treatment is key to improving homeless client outcomes. When homeless individuals living outdoors were served by programs with high resources and linkages to health and social services, this group showed a decreased in days of drug use compared to indoor homeless individuals and low resource and linkage programs. This suggests that living arrangements moderate the effects of program resources and linkages on homeless individuals’ drug use, an important preliminary finding as well. See Fig. 1.

The organizational cultural competence framework highlighted the significant value of programs learning about and connecting with minority communities to help improve homeless persons’ recovery. Although internal culturally responsive program practices such as hiring, training, and services may boost treatment responsiveness, our findings show that external community practices (investing in communities and outreach) are critical to promoting sobriety among homeless individuals in general. In specific, linking community providers to outdoor homeless individuals was the only culturally responsive practice associated with reduced days of drug use. This finding is critical because programs serving the most vulnerable homeless individuals (i.e., living outdoors) reported the lowest implementation of community-based culturally competent practices (i.e., personal involvement, resources and linkages and outreach). This is an area where SUD treatment programs can improve and make a difference.

This is an important recommendation because persons living outdoors are most likely to face significant psychosocial stressors that compromise their response to treatment (Ibabé, Stein, Nyanathi, & Bentler, 2014) and their recovery efforts (Padgett et al., 2011). Using a culturally responsive framework based on racial and ethnic minority communities was helpful to understanding the service needs of homeless persons in Los Angeles County, where Latinos and African Americans are highly represented (Los Angeles Homeless Services Authority, 2017).

Our results also indicate differences between homeless people living with friends and relatives and those with other living arrangements. Homeless individuals living with family or friends used their primary drug more often than those living indoors in other venues such as shelters, cars, or motels. This could reflect increased surveillance and restrictions on drug use at shelters or motels on the one hand, and relatives and friends allowing or even promoting drug use on the other (Neaigus et al., 2006).

Consistent with previous research, our findings highlight the large effects of prior drug use, mental health, and treatment engagement on drug use at discharge (Frimpong, Guerrero, Kong, & Kim, 2016; Marsh, Cao, Guerrero, & Shin, 2009). These findings also suggest that treatment program officials should seriously consider homeless persons’ living arrangements and drug use severity and psychosocial status in supporting recovery efforts.

4.1. Study limitations

Our findings have some limitations. First, the Los Angeles County Participant Reporting System does not focus on the treatment process or provide a comprehensive assessment of the availability of ancillary

---

**Table 1**

Sample Characteristics by Living arrangement (Tyle of homeless) (N = 2158).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Living Arrangement (Tyle of homeless)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Living outside (n = 622)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Days of primary drug use at discharge (M, SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 622)</td>
</tr>
<tr>
<td></td>
<td>11.21, 11.67</td>
</tr>
</tbody>
</table>

**Note.** Figures represent percentage unless otherwise noted.

- * Means or frequencies are different across homelessness groups at p < 0.05.

CI = 0.985, 0.993), whereas history of mental illness had a strong role in decreasing days of drug use among individuals in all living arrangements. Treatment staff’s personal involvement in minority communities and outreach activities were associated with fewer days of drug use for homeless individuals with different living arrangements, partially supporting hypotheses 2. This is an important finding because it suggests that to improve treatment outcomes for homeless individuals, treatment programs need to be more embedded in their communities.

Our study also shows that evaluating differences by living arrangements in response to treatment is key to improving homeless client outcomes. When homeless individuals living outdoors were served by programs with high resources and linkages to health and social services, this group showed a decreased in days of drug use compared to indoor homeless individuals and low resource and linkage programs. This suggests that living arrangements moderate the effects of program resources and linkages on homeless individuals’ drug use, an important preliminary finding as well. See Fig. 1.

The organizational cultural competence framework highlighted the significant value of programs learning about and connecting with minority communities to help improve homeless persons’ recovery. Although internal culturally responsive program practices such as hiring, training, and services may boost treatment responsiveness, our findings show that external community practices (investing in communities and outreach) are critical to promoting sobriety among homeless individuals in general. In specific, linking community providers to outdoor homeless individuals was the only culturally responsive practice associated with reduced days of drug use. This finding is critical because programs serving the most vulnerable homeless individuals (i.e., living outdoors) reported the lowest implementation of community-based culturally competent practices (i.e., personal involvement, resources and linkages and outreach). This is an area where SUD treatment programs can improve and make a difference.

This is an important recommendation because persons living outdoors are most likely to face significant psychosocial stressors that compromise their response to treatment (Ibabé, Stein, Nyanathi, & Bentler, 2014) and their recovery efforts (Padgett et al., 2011). Using a culturally responsive framework based on racial and ethnic minority communities was helpful to understanding the service needs of homeless persons in Los Angeles County, where Latinos and African Americans are highly represented (Los Angeles Homeless Services Authority, 2017).

Our results also indicate differences between homeless people living with friends and relatives and those with other living arrangements. Homeless individuals living with family or friends used their primary drug more often than those living indoors in other venues such as shelters, cars, or motels. This could reflect increased surveillance and restrictions on drug use at shelters or motels on the one hand, and relatives and friends allowing or even promoting drug use on the other (Neaigus et al., 2006).

Consistent with previous research, our findings highlight the large effects of prior drug use, mental health, and treatment engagement on drug use at discharge (Frimpong, Guerrero, Kong, & Kim, 2016; Marsh, Cao, Guerrero, & Shin, 2009). These findings also suggest that treatment program officials should seriously consider homeless persons’ living arrangements and drug use severity and psychosocial status in supporting recovery efforts.

4.1. Study limitations

Our findings have some limitations. First, the Los Angeles County Participant Reporting System does not focus on the treatment process or provide a comprehensive assessment of the availability of ancillary

---

**Table 1**

Sample Characteristics by Living arrangement (Tyle of homeless) (N = 2158).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Living Arrangement (Tyle of homeless)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Living outside (n = 622)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Days of primary drug use at discharge (M, SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 622)</td>
</tr>
<tr>
<td></td>
<td>11.21, 11.67</td>
</tr>
</tbody>
</table>

**Note.** Figures represent percentage unless otherwise noted.

- * Means or frequencies are different across homelessness groups at p < 0.05.

CI = 0.213, 0.771) were associated with fewer days of drug use at discharge. We found partial support for Hypothesis 3, which states that living arrangements (outdoors, indoors and unstable, or indoors and stable) will moderate the relationship between the degree of implementation for culturally competent program practices and days of primary drug use at discharge. Receiving treatment from programs with high levels of implementation of resources and linkages to minority communities was associated with fewer days of drug use among homeless individuals living outdoors (IRR = 0.364; IRR standardized = 0.867; 95% CI = 0.157, 0.844). See Model 3 in Table 2 and Fig. 1.

Beyond the hypothesized relationships, we note several individual variables associated with days of drug use at discharge. The strongest [positive] effect was on days of drug use at admission and days of drug use at discharge (IRR = 1.064; IRR standardized = 2.236; 95% CI = 1.045, 1.084). Treatment duration had a negative effect on days of drug use at discharge (IRR = 0.989; IRR standardized = 0.427; 95% CI = 0.985, 0.993), whereas history of mental illness had a strong positive effect on days of drug use (IRR = 1.574; IRR standardized = 1.214; 95% CI = 1.004, 2.469).

4. Discussion

Our findings underscore the need to consider living arrangements and delivering community-based culturally competent care to reduce
services. Therefore, we could not analyze the effects of ancillary services, including their capacity or the quality of care on drug use at discharge. In particular, housing and mental health and primary care services, in addition to drug treatment, are very important for homeless persons seeking to achieve sobriety and therefore require extensive consideration in future analyses.

Second, these data, which is from 2011 did not permit causal assessments of the relationships between key covariates and days of primary drug use at discharge. For example, the observed associations between involvement in minority communities and clients’ subsequent reduced drug use could be due to reverse causality. Clients referred to programs that were more invested in minority communities may have had access to additional services and oversight that decreased their drug use at discharge. We could not isolate the causal effects of programs’ culturally competent practices (and other covariates) because the data were not longitudinal. Measuring causal effects would require panel data and sophisticated econometric techniques.

Third, our categorization of homeless individuals also may not be comprehensive regarding the structure of living arrangements and the chronicity of homelessness. These limitations do not offset the strengths of this study. These include examination of one of the largest samples of urban homeless people in drug treatment and the highlighting of the strengths of this study. These include examination of one of the largest samples of urban homeless people in drug treatment and the highlighting of the relationship of different living arrangements, program quality (as measured by culturally competent practices) and chronicity of homelessness.

Nevertheless, there is a clear need for longitudinal approaches and refined measures to explicate the treatment processes that are most effective for homeless individuals living in urban settings.

Table 2
Negative binomial model of days of primary drug use after multiple imputation with fully conditional specification.

<table>
<thead>
<tr>
<th>Individual level variables</th>
<th>IRR</th>
<th>SE</th>
<th>95% CI</th>
<th>IRR</th>
<th>SE</th>
<th>95% CI</th>
<th>IRR</th>
<th>SE</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days of primary drug use at admission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homless</td>
<td>1.070*</td>
<td>0.010</td>
<td>1.051, 1.089</td>
<td>1.065*</td>
<td>0.010</td>
<td>1.045, 1.085</td>
<td>1.064*</td>
<td>0.010</td>
<td>1.045, 1.084</td>
</tr>
<tr>
<td>Living indoors unstable</td>
<td>1.096</td>
<td>0.027</td>
<td>0.669, 1.794</td>
<td>1.027</td>
<td>0.111</td>
<td>0.240, 0.649, 1.626</td>
<td>1.154</td>
<td>0.106</td>
<td>0.298, 0.694, 1.921</td>
</tr>
<tr>
<td>Living outside</td>
<td>1.415*</td>
<td>0.021</td>
<td>1.013, 1.977</td>
<td>1.184</td>
<td>0.079</td>
<td>0.198, 0.852, 1.644</td>
<td>1.272</td>
<td>0.115</td>
<td>0.219, 0.907, 1.784</td>
</tr>
<tr>
<td>Female</td>
<td>1.350*</td>
<td>0.020</td>
<td>1.007, 1.808</td>
<td>1.585*</td>
<td>0.126</td>
<td>0.312, 1.078, 2.331</td>
<td>1.626</td>
<td>0.126</td>
<td>0.344, 1.074, 2.461</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>0.606</td>
<td>0.015</td>
<td>0.366, 1.003</td>
<td>0.832</td>
<td>0.092</td>
<td>0.234, 1.479, 1.144</td>
<td>0.877</td>
<td>0.094</td>
<td>0.254, 0.497, 1.547</td>
</tr>
<tr>
<td>Latino</td>
<td>1.174</td>
<td>0.020</td>
<td>0.831, 1.659</td>
<td>1.264</td>
<td>0.121</td>
<td>0.223, 0.893, 1.778</td>
<td>1.259</td>
<td>0.119</td>
<td>0.225, 0.887, 1.788</td>
</tr>
<tr>
<td>Other</td>
<td>1.834</td>
<td>0.106</td>
<td>0.536, 6.280</td>
<td>1.811</td>
<td>0.112</td>
<td>0.392, 6.211, 5.284</td>
<td>1.815</td>
<td>1.122</td>
<td>0.203, 0.620, 5.310</td>
</tr>
</tbody>
</table>

Fig. 1. Influence of interaction of homeless persons’ living arrangements (indoors and stable; outdoors) and program cultural competence (low or high resources and linkages) on days of primary drug use.
4.2. Implications for program evaluation and planning

Our results have several implications for program evaluation and planning. Previous research suggests that living conditions can have critical effects on recovery among homeless people (Padgett et al., 2006; Padgett, Stanhope, Henwood, & Stefanic, 2011). Our findings suggest homeless individuals living outdoors are at a greater risk of continued drug use, and that treatment programs should focus on linking them to health and social services to improve their drug use outcomes. Our work provides preliminary evidence of differences by type of homelessness in reduction of drug use at discharge. Individuals living outdoors greatly benefited from providers who were personally involved in racial and ethnic minority communities and conducted outreach in those communities. These are critical practices to establish a trusting relationship with homeless individuals and support their recovery. Providers have a unique opportunity to connect with a population with a history of disenfranchisement and isolation, and with immediate need for care and support. Although it was not clear to what extent providers were responsive to unique homeless culture, our findings suggest that recovery efforts among homeless individuals living outdoors are best supported by programs with greater resources and linkages with minority communities. As Los Angeles County begins developing structural strategies to coordinate housing, health, and social services efforts to combat homelessness (County of Los Angeles Homeless Initiative, 2016), our findings provide much-needed detail on promising SUD treatment practices for homeless persons in varying living arrangements.

Declaration of interest

No conflict of interest declared.

Acknowledgements

Support for this research and manuscript preparation was provided by funding from the National Institute on Drug Abuse grant [blinded]. We appreciate [blinded] for support related to accessing administrative data. We also thank the treatment providers for their participation in this study. We would also like to acknowledge [blinded] for proofreading this paper.

References

Cameron, A. C., & Trivedi, P. K. (2009). Microeconomics using stata. College Station, TX: Stata Press.


Erick G. Guerreroc is an Associate Professor at Suzanne Dworak-Peck School of Social Work and Marshall School of Business. His research focuses on building organizational capacity to implement culturally responsive and evidence-based practices and eliminate health disparities.

Ahyoung Song is an Assistant Professor at Department of Social Welfare, Gachon University, Seongnam, South Korea. Her research focuses on the socio-cultural and epidemiological aspects of homelessness.

Benjamin Henwood is an Assistant Professor at Suzanne Dworak-Peck School of Social Work. His research focuses on the evaluation of the complex service environment for individuals with serious mental illness who have experienced homelessness.

Yinfei Kong is an Assistant Professor at Mihaylo College of Business and Economics, California State University, Fullerton. His research focuses on multilevel statistical models, variable selection methods and models to analyze big data.

Tina Kim is the Chief of the Epidemiology and Science Division at Los Angeles County Department of Public Health, Substance Abuse Prevention and Control. Her research interest is in acculturation and quality of care for racial and ethnic minority groups.