Published in final edited form as:

Drug Alcohol Depend. 2016 November 1; 168: 135–139. doi:10.1016/j.drugalcdep.2016.09.009.

The effects of the therapeutic workplace and heavy alcohol use on homelessness among homeless alcohol-dependent adults

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Abstract

Background—A clinical trial demonstrated that a therapeutic workplace could promote alcohol abstinence in homeless, alcohol-dependent adults. This secondary-data analysis examined rates of homelessness and their relation to the therapeutic workplace intervention and alcohol use during the trial.

Methods—In the trial, homeless, alcohol-dependent adults could work in a therapeutic workplace for 6 months and were randomly assigned to Unpaid Training, Paid Training, or Contingent Paid Training groups. Unpaid Training participants were not paid for working. Paid Training participants were paid for working. Contingent Paid Training participants were paid for working if they provided alcohol-negative breath samples. Rates of homelessness during the study were calculated for each participant and the three groups were compared. Mixed-effects regression models were conducted to examine the relation between alcohol use (i.e., heavy drinking, drinks per drinking day, and days of alcohol abstinence) and homelessness.

Results—Unpaid Training, Paid Training, and Contingent Paid Training participants did not differ in the percentage of study days spent homeless (31%, 28%, 17%; respectively; $F(2,94) = 1.732$, $p = .183$). However, participants with more heavy drinking days ($b = 0.350$, $p < .001$), more drinks per drinking day ($b = 0.267$, $p < .001$), and fewer days of alcohol abstinence ($b = -0.285$, $p < .001$) spent more time homeless.

Conclusions—Reducing heavy drinking and alcohol use may help homeless, alcohol-dependent adults transition out of homelessness.

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Conflict of Interest. No conflict declared.

Contributions. All authors contributed to the conceptualization and design of the analyses. EC, AH, and JML conducted the analyses. EC, AH, and KS managed the literature search. EC wrote the first draft of the manuscript. AH, MF, DFW, JML, and KS provided substantive and conceptual feedback on manuscript drafts. All authors contributed to and have approved the final manuscript.

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Keywords

alcohol; heavy drinking; homeless; therapeutic workplace

1. INTRODUCTION

Alcohol use and abuse frequently occur alongside homelessness. As many as half of homeless adults have current alcohol use disorders (Fazel et al., 2008). A review of studies examining the relation between homelessness and mortality found that 30-70% of deaths in homeless individuals were related to alcohol intoxication or chronic alcohol use, with average age at death ranging from 42 to 52 years (O'Connell, 2005). Treatment of alcohol use disorder in the homeless is complicated by the range of problems they face (Fischer and Breakey, 1991; Toro et al., 1995) including extreme poverty, unemployment, co-occurring drug use and mental health problems, frequent contact with correctional agencies, and poor general health (Larimer et al., 2009; Polcin and Korcha, 2015). The Institute of Medicine identified the homeless as a group in need of specialized interventions that are tailored to their specific characteristics and needs (IOM 1990), including housing, income, and employment (Zerger, 2002).

Contingency management interventions have been shown effective in treating substance use in a diverse range of populations (Dutra et al., 2008; Knapp et al., 2007; Lussier et al., 2006). These interventions involve the delivery of tangible consequences (e.g., money or vouchers exchangeable for goods and services) contingent on objective evidence of drug abstinence (Higgins et al., 2002; Silverman et al., 1999). Milby and colleagues (1996, 2000, 2005) used abstinence-contingent housing and work therapy to promote drug abstinence in homeless adults and Miller (1975) used a contingency management intervention to promote abstinence from alcohol in so-called "chronic public drunkenness offenders." In a recent study, Koffarnus and colleagues (2011) used abstinence-contingent access to a therapeutic workplace to promote abstinence from alcohol in homeless alcohol-dependent adults. The therapeutic workplace is a contingency management intervention that was designed to address some of the interrelated and chronic problems of homelessness, such as unemployment, lack of education and job skills, and drug addiction (Silverman, 2004; Silverman et al., 2012). The therapeutic workplace includes two phases: in the initial phase (Phase 1) participants are paid for engaging in intensive individualized education and job-skills training in a model workplace. To promote drug abstinence, participants must provide drug-negative urine samples to gain access to the workplace and to maintain maximum pay. Once participants initiate abstinence and acquire skills, they can progress to the second phase (Phase 2) in which the emphasis is on employment in real-world businesses. In prior research, participants who progressed to Phase 2 were hired as data entry operators in a business that sold data entry services to paying customers, called Hopkins Data Services (Aklin et al., 2014; Silverman et al., 2005). Subsequent ongoing research is evaluating two additional models for maintaining abstinence and promoting employment in Phase 2, called the Wage Supplement Model and the Cooperative Employer Model (for a detailed description of the models, see Silverman et al., 2016).

The study by Koffarnus and colleagues (2011) showed that Phase 1 of the therapeutic workplace was effective in reducing alcohol use in homeless alcohol-dependent adults. However, any potential effects of the therapeutic workplace intervention on homelessness were not examined. Because alcohol abuse, unemployment, lack of job skills, and homelessness are interrelated problems, it is possible that the services provided via the therapeutic workplace may have affected homelessness. The present secondary-data analysis was conducted to examine whether participation in the therapeutic workplace program impacted homelessness and to examine whether changes in alcohol use were associated with changes in homelessness.

2. MATERIAL AND METHODS

This secondary analysis is based on data collected during a randomized clinical trial that examined whether the therapeutic workplace could promote alcohol abstinence in homeless, alcohol-dependent adults. The primary outcome measures and detailed methods have been reported elsewhere (Koffarnus et al., 2011). Methods pertaining to the present analysis are reproduced here for reference. Given the time-frame of data collection, the current report uses the term “alcohol dependence” as defined by DSM-IV, even though that term has been subsumed by the DSM-V category “alcohol use disorder.”

2.1. Setting and Participants

The original clinical trial was conducted in the Center for Learning and Health, located on the Johns Hopkins Bayview Campus in Baltimore, MD. Participants had to be at least 18 years old, reported that they were currently homeless (i.e., stayed in a shelter, on the street or in an abandoned house at least one night over the past 30 days; lost public housing assistance recently or were at risk of losing residence; or slept in more than two places over the past 30 days), were unemployed, and met DSM-IV criteria for alcohol dependence. All participants provided written informed consent.

2.2. Design and Description of Conditions

Participants ($N = 124$) of the original trial were invited to attend the therapeutic workplace to participate in a job-skills training program for 4 hours every weekday for six months. Twice-daily breath samples were collected and tested for alcohol on workdays. Randomly-scheduled breath samples also were collected and tested to capture alcohol use outside of the workplace (two per week, on average). Participants were randomly assigned to one of three groups (Contingent Paid Training, Paid Training, and Unpaid Training). Contingent Paid Training participants ($n = 43$) could receive training in the workplace and could earn monetary vouchers for their participation in the workplace. However, access to the workplace and the opportunity to earn vouchers was contingent on providing daily and randomly scheduled alcohol-negative breath samples ($BAL < 0.004$ g/dl). Contingent Paid Training participants who provided an alcohol-positive breath sample were not allowed access to the workplace until they provided an alcohol-negative breath sample; they also received a temporary decrease in their base pay voucher amount from \$5 per hour to \$1 per hour. After this base pay reset, the voucher amount increased by \$0.10 per hour for each day the participant met the abstinence requirement. After nine consecutive days of meeting the

abstinence requirement, the voucher amount was restored to its original value. Paid Training participants (n = 42) were invited to receive training in the workplace and could earn monetary vouchers for their participation in the workplace even if their daily or random breath samples tested positive for alcohol. Unpaid Training participants (n = 39) could receive training in the workplace even if their daily or random breath samples tested positive for alcohol, but they did not earn monetary vouchers for their participation in the workplace.

Contingent Paid Training and Paid Training participants could earn \$5 per hour in base pay for working in the workplace plus additional pay for performance on training programs. Performance pay was delivered via two computer-based training programs that taught participants keyboarding skills while in the workplace. Participants could earn performance pay for keyboarding correct characters and for passing steps in the programs. On most steps, participants could earn \$0.03 for every 10 correct characters. The bonuses for passing steps began at \$1.00 and increased in value as participants progressed through the program.

2.3. Assessments

Assessments were conducted at baseline and every month during the original trial. These assessments included the administration of the Addiction Severity Index (ASI; McLellan et al., 1980), the Timeline Follow-Back interview (Sobell and Sobell, 1996), and questionnaires on demographics and homelessness. At baseline only, alcohol dependence was assessed using the DSM-IV checklist (Hudziak et al., 1993). At each assessment, participants were asked to report how many days in the past 30 days they had stayed or slept in: (1) their own apartment or house (includes living with partner, parents, friends, or other relatives); (2) jail; (3) a residential treatment program or recovery house; (4) a room in a hotel or motel; (5) a hospital; (6) a homeless shelter; and (7) an abandoned house, in a park, in an automobile, in a vacant lot, in an alley, in a dumpster, under a bridge, behind a business, or on the street. For the present analyses, participants who reported that they had stayed or slept in any of the locations listed under items 6 and 7 were considered homeless on those days. This definition of homelessness was selected prior to conducting any of the data analyses and was selected to identify participants that would meet established definitions of literal homelessness (Orwin et al., 2005; Tsemberis et al., 2007). Data from the Timeline Follow-Back interview were used to calculate heavy drinking days (>5 drinks per day for men and >4 drinks per day for women), drinks per drinking day, and days of alcohol abstinence. Participants could earn \$30 in vouchers for completing each monthly assessment.

2.4. Data Analyses

Of the original 124 participants, 17 did not complete any of the 6 monthly assessments and 10 completed only 1–2 of the monthly assessments. Because accurate information on rates of homelessness during the study could not be determined for those participants, they were not included in the present analyses. However, the number of excluded participants was similar across the three groups (10 participants from the Contingent Paid Training group, 8 participants from the Paid Training group, and 9 participants from the Unpaid Training group) and there were no significant baseline differences between the participants who were and were not excluded from the present analyses. For the remaining participants (N = 97), an

aggregated measure of homelessness (percentage of study days spent homeless) was calculated for each participant. This was done by summing the total number of days participants reported being homeless at the monthly assessments divided by the total number of days from the completed monthly assessments.

Initial analyses were conducted to characterize the study groups and sample. Categorical participant characteristics were compared with chi-square tests, and continuous variables were compared with one-way ANOVAs. Mixed-effects regression models were used to examine changes in homelessness as a function of time (study months); separate models were fit with three measures of alcohol use (heavy drinking days, drinks per drinking day, and days of alcohol abstinence) as predictors.

3. RESULTS

Table 1 shows participant characteristics at baseline. The overall sample was predominantly male (75%) and white (53%). All of the participants met DSM-IV criteria for alcohol dependence and reported heavy drinking on 22.8 days out of the past 30 days. Participants reported being homeless on 18.9 days out of the past 30 days and 43% reported that they were usually homeless during the past 3 years. Sixty percent had a high school diploma or equivalency, and 54% had a professional skill or trade. All of the participants were unemployed and 54% reported that they were usually unemployed in the past 3 years. There were no significant between-group differences in these baseline characteristics.

Figure 1 shows the percentage of study days spent homeless for participants in each of the study groups. Participants in the Contingent Paid Training, Paid Training, and Unpaid Training groups did not significantly differ in the percentage of study days spent homeless (17.3%, 28.2%, 30.6%; respectively; $F(2,94) = 1.732, p = .183$). While all participants were homeless at baseline, about one-third of the participants (37 total participants; 13 Contingent Paid Training participants, 12 Paid Training participants, and 12 Unpaid Training participants) transitioned out of homelessness and gained stable housing during the study. The other two-thirds of the participants transitioned in and out of homelessness during the study, highlighting the instability of living arrangements among this study population.

Because homelessness during the study did not significantly differ among the three groups, data from all participants were combined to examine effects of alcohol use on homelessness. As shown in Table 2, homelessness was significantly associated with each of the measures of alcohol use. Homelessness increased by 0.350 days per month for each heavy drinking day, increased by 0.267 days per month for each drink per drinking day, and decreased by 0.285 days per month for each day of alcohol abstinence.

4. DISCUSSION

The therapeutic workplace was designed to address some of the interrelated and chronic problems of homelessness, such as unemployment, lack of education and job skills, and drug addiction (Silverman, 2004; Silverman et al., 2012). A prior clinical trial demonstrated that the therapeutic workplace was effective in reducing alcohol use in homeless, alcohol-dependent adults (Koffarnus et al., 2011). The present study extended this research by

examining whether the therapeutic workplace affected homelessness and examining whether changes in alcohol use were associated with changes in homelessness. Participants who were paid for working if they provided alcohol-negative breath samples (Contingent Paid Training participants), participants who were paid for working regardless of the results of their breath samples (Paid Training participants) and participants who were not paid for working (Unpaid Training participants) did not significantly differ in the percentage of study days spent homeless during the trial, although the effects on homelessness were in the expected direction. These results suggest that access to paid work and exposure to alcohol-abstinence contingencies as applied in the prior study may not be enough to help homeless, alcohol-dependent adults transition out of homelessness. However, more heavy drinking days, more drinks per drinking day, and fewer days of alcohol abstinence were significantly associated with homelessness during the study. Thus, reducing heavy drinking and alcohol use may be important to reducing homelessness in this population.

Increasing the robustness of the alcohol abstinence contingencies in the therapeutic workplace is a viable option for reducing heavy drinking and alcohol use. This could be achieved in two main ways. One, the amount participants can earn in base pay for working in the workplace could be increased. High magnitude incentives are more effective in promoting drug abstinence and are effective in a larger proportion of patients than smaller incentives (Dallery et al., 2001; Silverman et al., 1999). Second, alcohol breath testing could be replaced with methods that provide a longer window of detection of alcohol use, such as urinalysis testing for ethyl glucuronide (EtG) or monitoring of transdermal alcohol concentrations using wearable alcohol biosensors (Jatlow et al., 2014; Leffingwell et al., 2013). Both of these methods, relative to breathalyzer testing, decrease the likelihood that some instances of alcohol use go undetected.

The therapeutic workplace intervention also could target homelessness by providing access to housing. Recall that under the current therapeutic workplace model, participants initiate alcohol abstinence and acquire skills in Phase 1, and then progress to Phase 2 in which the focus is on employment in the community. To help participants obtain housing, a Housing First component that provides access to housing could be added to Phase 1. Housing First interventions have been shown to be cost effective, and their cost effectiveness has been shown to increase as the length of time individuals are housed increases (Larimer et al., 2009). In Phase 2, housing-based services could be provided to help participants transition to stable, independent housing once they are employed and able to pay for their own housing. While such a comprehensive intervention may require considerable resources, it could be a long-term and cost-effective solution to the interrelated and chronic problems of alcohol abuse, unemployment, and homelessness.

A few study limitations should be noted. First, not all of the participants who were included in the original trial could be included in the present analyses due to missing assessment data. However, the number of excluded participants was similar across the three groups, there were no significant baseline differences between the participants who were and were not excluded, and the remaining sample size was sufficient to identify important relations between homelessness and alcohol use. Second, several of the measures in the present study were based on participant self-reports, which may have been subject to socially desirable

reporting as well as recall bias. However, self-reports of alcohol use have been shown to be reasonably valid and reliable measures and use of the Time-Line Follow-Back should have aided participants in recalling instances of alcohol use (Del Boca and Darkes, 2003; Simons et al., 2015). Third, our conclusions are limited by the correlational nature of the data. We cannot know for certain whether lower rates of alcohol use during the study make participants more likely to transition out of homelessness, or whether those behaviors are simply associated with some unknown factor that affected homelessness, such as mental or physical health, having family or other forms of social support nearby, or having access to housing services.

The findings of this study contribute to evidence from other research that indicates the need for multifaceted approaches to treating and reducing homelessness. Homelessness is associated with a variety of conditions including, unemployment, low levels of education, alcohol and other drug use, and psychiatric disorders (Greenberg and Rosenheck, 2010; Johnson et al., 1997; McQuiston et al., 2014; O'Toole et al., 2004). Various interventions have been shown to improve some conditions, but not necessarily others. For instance, prior analyses of the data on which the present analysis is based showed that the therapeutic workplace intervention reduced alcohol use as well as increased participation in a job-skills training program (Koffarnus et al., 2011, 2013), but as found in this study, it did not influence housing status. In comparison, Housing First programs which prioritize housing over certain barriers, such as abstinence or treatment attendance have been successful in helping individuals maintain housing, but not necessarily in improving other outcomes (Groton, 2013). Effective multifaceted approaches for treating homeless adults with alcohol use disorder are clearly needed and the potential health and economic benefits of such approaches could be substantial.

Acknowledgments

Role of Funding Source. This work was supported by the National Institutes of Health grant numbers R01 AA12154, R01 DA019497, R01 DA037314, and T32 DA007209. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. These funding sponsors were not involved in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

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Highlights

- Heavy drinking days was associated with homelessness
- Drinks per drinking day was associated with homelessness
- Days of alcohol abstinence was inversely associated with homelessness
- Reducing heavy drinking and alcohol use may help reduce homelessness

Figure 1. Rates of homelessness for participants in the Contingent Paid Training, Paid Training, and Unpaid Training groups. The filled circles show data for individual participants and the grey horizontal lines show group means.

Table 1

Baseline characteristics of participants in each of the study groups and the overall sample.

Participant Characteristic	Contingent (n=33)	Paid (n=34)	Unpaid (n=30)	Total (N=97)	Statistic
Sex, % male	70	79	77	75	$\chi^2(2) = 0.90, p = .639$
Race					$\chi^2(2) = 5.88, p = .053$
% White or Caucasian	70	44	43	53	
% Black or African American	30	50	57	45	
% American Indian or Alaskan Native	0	6	0	2	
Heavy drinking days, past 30 days, mean (SD)	24.5 (8.3)	23.5 (8.1)	20.0 (10.4)	22.8 (9.0)	$F(2,94) = 1.86, p = .164$
Income spent on alcohol, past 30 days, %	52.3	56.8	38.7	49.7	$F(2,94) = 2.04, p = .135$
Days homeless, past 30 days, mean (SD)	16.8 (12.3)	19.3 (10.5)	21.1 (10.4)	18.9 (11.2)	$F(2,94) = 0.61, p = .545$
Usually homeless, past 3 years, %	49	41	40	43	$\chi^2(2) = 0.56, p = .757$
High school diploma or GED, %	67	50	63	60	$\chi^2(2) = 2.16, p = .339$
Professional skill or trade, %	49	50	63	54	$\chi^2(2) = 1.67, p = .434$
Usually unemployed, past 3 years, %	57	44	60	54	$\chi^2(2) = 1.93, p = .380$

Table 2

Mixed-effects regression models of the effects of alcohol use on homelessness.

Alcohol use measure	Beta	SE	<i>p</i> -value
Heavy drinking days ^a	0.350	0.036	< .001
Drinks per drinking day	0.267	0.045	< .001
Days of alcohol abstinence	−0.285	0.044	< .001

^aHeavy drinking = 5 or more drinks per day for men and 4 or more drinks per day for women