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A Group-Based Motivational Interviewing Brief Intervention to Reduce Substance Use and Sexual Risk Behavior among Homeless Young Adults

Joan S. Tucker, PhD^a, Elizabeth J. D'Amico, PhD^a, Brett A. Ewing, MS^a, Jeremy N. V. Miles, PhD^a, and Eric R. Pedersen, PhD^a

^aRAND Corporation, 1776 Main Street, Santa Monica, CA 90407-2138

Abstract

Homeless young adults ages 18–25 exhibit high rates of alcohol and other drug (AOD) use, and sexual risk behaviors such as unprotected sex. Yet few programs exist for this population that are both effective and can be easily incorporated into settings serving this population. This pilot cluster cross-over randomized controlled trial evaluates AWARE, a voluntary four session group-based motivational interviewing (MI) intervention to reduce AOD use and sexual risk behavior. We evaluated AWARE with 200 homeless young adults using drop-in center services in Los Angeles County (mean age=21.8 years; 73% male; 79% heterosexual; 31% non-Hispanic White, 25% African American, 24% Hispanic, 21% multiracial/other). Surveys were completed at baseline and three months after program completion. Retention in the AWARE program was excellent (79% attended multiple sessions) and participants reported high levels of satisfaction with the program. AWARE participants self-reported positive change in their past 3 month and past 30 day alcohol use ($p = .05$), motivation to change drug use ($p < .05$), and condom use self-efficacy ($p = .05$) compared to the control group. Among those with multiple sex partners, AWARE participants showed a decrease in unprotected sexual events ($p < .05$), whereas the control group did not. Results from this pilot evaluation are promising, suggesting that a brief group-MI risk reduction intervention can be effective in helping homeless young adults make positive changes in their alcohol and condom use. Further work is needed to more fully evaluate the efficacy of AWARE on AOD behavior and sexual risk behavior outcomes.

Keywords

Homeless youth; Motivational interviewing; Alcohol; Drug use; Condom use

Correspondence should be addressed to: Joan S. Tucker, Ph.D. RAND Corporation, 1776 Main Street, Santa Monica, CA 90407-2138. Phone: 310-393-0411, x7519. jtucker@rand.org.

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1. Introduction

Recent point-in-time estimates of homelessness in the U.S. suggest that more than 35,000 unaccompanied youth under age 25 are homeless on any given night (Henry, Watt, Rosenthal, & Shivji, 2016). The health threats facing homeless youth are compounded by high rates of alcohol and other drug (AOD) use and sexual risk behaviors (Marshall et al., 2009; Salomonsen-Sautel et al., 2008; Tucker, Edelen, Ellickson, & Klein, 2011; Tucker et al., 2012a.) A survey of 419 homeless youth found that two-thirds reported past month alcohol use (68%), as well as use of one or more illicit drugs (e.g., 66% marijuana, 15% methamphetamine, 16% ecstasy, 9% injection drugs; Wenzel, Tucker, Golinelli, Green, & Zhou, 2010). In another sample of 601 homeless youth, 69% met diagnostic criteria for past year substance use disorder (Bender, Brown, Thompson, Ferguson, & Langenderfer, 2015), which is about four times higher than among 18–25 year olds in the general population (Center for Behavioral Health Statistics and Quality, 2015). Rates of HIV infection among homeless youth range from about 3–25% across U.S. studies (Medlow, Klineberg, & Steinbeck, 2014), and pregnancy is also more common among homeless than stably housed youth (Begun, 2015; Tucker et al., 2012c). Although condom use can be an effective means of protection, 40–70% of homeless youth report engaging in unprotected sexual intercourse (Tucker et al., 2012b; Valente & Auerswald, 2013).

1.1. AOD Use and Sexual Risk Behavior

AOD use is associated with increased sexual activity and risky sex among homeless youth (Gleghorn, Marx, Vittinghoff, & Katz, 1998; Tucker et al., 2012a), as it is for young people more generally. Alcohol use is related to the decision to have sex and indiscriminate forms of risky behavior such as having multiple or casual sex partners (Cooper, 2002; Weinhardt & Carey, 2000), as well as having unprotected sex with new or casual partners (Kiene, Barta, Tennen, & Armeli, 2009; Scott-Sheldon, Carey, & Carey, 2010). Although less thoroughly investigated than alcohol, similar associations have been found with the use of marijuana and other drugs (e.g., ecstasy) (Bryan, Schmiede, & Magnan, 2012; Kerr, Washburn, Morris, Lewis, & Tiberio, 2015; Rendina, Moody, Ventuneac, Grov, & Parsons, 2015). Given the interrelated nature of AOD use and risky sex, interventions will likely be more effective if they simultaneously address both types of behavior than either one alone (Bryan, Ray, & Cooper, 2007; Lewis, Neighbors, Lee & Oster-Aaland, 2008; Lewis et al., 2014).

1.2. Risk Reduction Programs for Homeless Youth

Risk reduction programs for homeless youth are needed that address both AOD use and sexual risk behavior, are evidence-based, and can be feasibly delivered in the settings where these youth typically seek services (Naranbhai, Abdool Karim, & Meyer-Weitz, 2011). The existing interventions that target both types of behaviors tend to require substantial time and resources to deliver. For example, Street Smart is a group-based HIV/STI prevention intervention designed for 11–18 year olds, with information on AOD use integrated throughout the curriculum. The program consists of eight 1.5–2-hour group sessions, one individual session, and one visit to a community-based organization resource. Evaluations of this program found positive effects on condom use, high-risk sexual behavior, and AOD use (Rotheram-Borus, Koopman, Haignere, & Davies, 1991; Rotheram-Borus et al., 2003).

Another example is a program that included 16 individual sessions of the Community Reinforcement Approach, which is a comprehensive behavioral program for treating substance-abuse problems, combined with HIV prevention programming. Participants in this integrated program reported a greater reduction in days of alcohol and drug use (Slesnick, Prestopnik, Meyers, & Glassman, 2007) and increase in condom use (Slesnick & Kang, 2008) compared to usual care. Although these results are promising, a challenge with implementing intensive interventions, even if found to be effective, is that community-based organizations often report adapting them to be more manageable, usually by substantially shortening them (Veniegas, Kao, & Rosales, 2009).

There has been keen interest among both service providers and researchers working with homeless youth to develop effective AOD and sexual risk reduction programs that require less time and fewer resources. As such, brief interventions have been implemented for homeless youth, yet they have tended to target either AOD use or HIV/STI prevention (rather than the unique combined risks from both behaviors) and have demonstrated minimal long-term efficacy. For example, a single-session one-on-one Motivational Interviewing (MI) intervention, which presented youth with personalized feedback about their patterns of risk associated with AOD use, did not have a significant effect on AOD use at 3 month follow-up (Peterson, Baer, Wells, Ginzler, & Garrett, 2006). Another evaluation of a four-session one-on-one motivational intervention, with average total treatment exposure of 73 minutes, similarly found no effect on AOD use at 3 month follow-up (Baer, Garrett, Beadnell, Wells, & Peterson, 2007). Other brief interventions include a street outreach HIV prevention intervention that offered service listings/referrals and supplies (e.g., condoms and bleach) which did not find a statistically significant effect on condom use (Gleghorn et al., 1997), and a peer-delivered HIV prevention intervention which increased HIV knowledge, but did not significantly reduce AOD use or sexual risk behavior at 3 month follow-up (Booth, Zhang, & Kwiatkowski, 1999). An exception was a 2-session HIV intervention that was integrated into ongoing substance use treatment at a drop-in center, which was found to have statistically significant positive effects on condom use at 6 month follow-up and number of sex partners at 12 month follow-up (Carmona, Slesnick, Guo, & Letcher, 2014).

1.3. The Current Study

This study addresses an important gap in prevention services by conducting a pilot randomized controlled trial of AWARE, an innovative group-MI (Motivational Interviewing) brief intervention designed to reduce AOD use and sexual risk behavior among homeless young adults between the ages of 18 to 25. AWARE was designed to address the substantial need for risk reduction interventions for homeless youth that are both intensive enough to address the multiple and interrelated risk behaviors that most homeless youth exhibit *and* feasible to integrate into settings such as drop-in resource centers where these young people routinely seek services (Slesnick, Dashora, Letcher, Erdem, & Serovich, 2009). We first evaluated overall treatment effects, hypothesizing that AWARE participants would show more positive change in AOD- and sexual risk-related outcomes over a 3 month period compared to control group participants. Given the relatively short follow-up period for this pilot evaluation, we also examined changes in motivation (e.g., importance of and readiness to change) given that these changes may be related to subsequent behavior change (Merrill,

Wardell, & Read, 2015). We then conducted subgroup analyses to explore whether treatment effects were moderated by the individual's substance use severity or number of sex partners, in light of some evidence suggesting that brief interventions may be less effective with "higher severity" youth (Saitz, 2007).

2. Methods

2.1. Settings and Participants

The study was conducted at two drop-in centers for homeless youth, located in distinct areas of Los Angeles County (Hollywood and Venice) that attract homeless youth with somewhat different sociodemographic profiles (e.g., the homeless youth population in Hollywood is more racially/ethnically diverse than the population in Venice; Golinelli, Tucker, Ryan, & Wenzel, 2015). Drop-in centers offer services to address the basic needs of homeless youth such as food and hygiene, as well as case management and other programs to meet health and social service needs. Homeless youth are more likely to use drop-in centers than other types of services such as shelters (Kort-Butler & Tyler, 2012) and thus represent a site to reach homeless youth who may not seek care elsewhere (Pedersen, Tucker, & Kovalchik, 2016). Individuals were eligible if they were ages 18–25, seeking services at one of the drop-in centers, planned to be in the study area for the next month, and could be reached by e-mail or phone for follow-up. Of the 214 individuals who were screened for eligibility, 2 were ineligible, 1 refused participation, and 11 were identified as repeaters, resulting in a final sample of $n = 100$ intervention and $n = 100$ control participants. The sample was 73% male, 79% heterosexual, and 31% non-Hispanic white (25% African American, 24% Hispanic, 21% multiracial/other). Mean age was 21.81 ($SD = 1.87$). On average, participants were 16.01 ($SD = 3.23$) years old the first time they left home and were living on their own, and their most recent period of homelessness had lasted 20.62 ($SD = 29.99$) months. The intervention and control groups did not significantly differ on these characteristics.

2.2. Study Design

This evaluation used a form of group-randomized design (Bauer et al., 2008; Murray, 1998) with crossover of conditions and groups to avoid problems of power reduction associated with conventional group randomization (Keogh-Brown et al., 2007). The unit of analysis is the individual. The field period was divided into four 16-week phases and individuals were assigned to groups in each of these phases based on the drop-in center where they were present during recruitment hours. The two drop-in centers alternated across phases in serving as the "intervention site" or "control site," with each drop-in center having a total of two intervention phases and two control phases. We initially considered an individually randomized trial for this study, with individuals randomly assigned to condition within drop-in center. However, implementation challenges did not make this design a feasible option and there was concern about contamination across conditions. A group-randomized design for this evaluation has distinct advantages, and we maximized the comparability of the intervention and control groups by having each drop-in center serve as both intervention and control site on an alternating basis (with a wash-out period between the intervention and control phases within site) and using the same procedures at each drop-in center to identify and recruit participants for the study (**Garvey, Pedersen, D'Amico, Ewing, & Tucker, in

press). The control group received “usual care,” which included access to all of the basic services (e.g., food, hygiene), case management, and programs that were available at the drop-in center at the time of the study.

2.3. AWARE Program

The AWARE program is based on Social Learning Theory (Bandura, 1986), Decision-Making Theory (Kahneman & Tversky, 2000), and Self-Efficacy Theory (DeVellis & DeVellis, 2001). AWARE includes components that have been utilized in effective programs for homeless and other at-risk youth (e.g., D’Amico, Hunter, Miles, Ewing, & Osilla, 2013; Rotheram-Borus et al., 1991, 2003) such as targeting multiple, interrelated behaviors (Rotheram-Borus, Ingram, Swendeman & Flannery, 2009), utilizing interactive techniques that allow for active learning (Ingram, Flannery, Elkavich, & Rotheram-Borus, 2008), reinforcing skills (Covey, Rosenthal-Stott, & Howell, 2016), providing personalized feedback (Dotson, Dunn, & Bowers, 2015), delivering the curriculum in a group format which allows the facilitator to capitalize on prosocial processes (e.g., reinforcement for behavior change, norm change, vicarious learning; D’Amico et al., 2010), and presenting the materials using an MI approach (Miller & Rollnick, 2012).

AWARE consists of four distinct 45-minute sessions that rotated on a weekly basis throughout the 16-week period. The AWARE curriculum involves sharing basic information on HIV/STI transmission and the effects of AOD use on the brain; providing condom use skills training; providing normative feedback on AOD use and HIV-risk behavior among young adults; discussing unrealistic beliefs about AOD use and HIV risk; discussing potential benefits of both cutting down and stopping risky behaviors; and discussing risky situations and coping strategies (e.g., avoiding certain high-risk situations, protecting yourself when drinking or having sex). All sessions include discussion of the connection between AOD use and risky sexual behavior. Participants receive a personalized feedback form at the beginning of each session which is populated with their responses to certain baseline survey questions relevant to that session’s content. This personalized feedback is intended to: (1) strengthen engagement in the program by increasing its personal relevance; (2) help youth assess their current situation and identify potential changes they can make to be safer in the future, if they are interested; (3) maximize time devoted to curriculum delivery by collecting important information for group discussion ahead of time; and (4) provide participants with additional information, such as online resources and skills training tips for making healthier choices. In addition, AWARE participants had access to “usual care” at the drop-in center in terms of all basic services, case management, and programs that were available at the time of the study.

We conducted four focus groups (8 participants per group) to obtain feedback on the style and content of the AWARE program to ensure that it was relevant for this population and age group. Homeless 18–25 year olds provided feedback that the program was generally appropriate and offered suggestions for how to improve certain aspects of the content, such as suggestions for what should be included in the personalized feedback form. They also indicated that they did not want the group discussions to focus on reduction of marijuana (although it was discussed if a participant brought it up) as they felt this was not a “drug”

and that alcohol and other drugs caused “more problems” than marijuana. Thus, alcohol use was the focus of much of the AOD discussion, yet other substances, such as amphetamines or heroin, were discussed as appropriate within each group.

Participants received \$5 for each of the four sessions attended and an additional \$15 for attending all sessions. Free snacks and condoms were available at each session. Two project staff, not affiliated with either drop-in center, attended each AWARE session: one was a Bachelor-level facilitator who delivered the curriculum and the other was an individual who provided any needed assistance (e.g., distributing materials). The first author was the lead trainer on the curriculum, and the second author (who is a member of the Motivational Interviewing Network of Trainers or MINT) was the lead trainer on MI. Training included a one-day workshop on MI and practice sessions for each of the four sessions.

2.4. Recruitment Procedures

Participants in both conditions were recruited by advertising the study at the drop-in centers and soliciting volunteers. At each recruitment visit to the drop-in center, we used a sign-up sheet for individuals to indicate their interest in participating. Depending upon the number of sign-ups, individuals were randomly selected from the sign-up sheet until our recruitment goal for the visit was met. Individuals were then screened for eligibility, and those who were eligible were asked to provide written consent and complete the baseline survey.

Recruitment of intervention group participants occurred once a week, on the day when the program was being delivered at the drop-in center. Because each AWARE session was designed to be free standing, and individuals could attend the sessions in any order, those in the intervention condition attended their first AWARE session shortly after completing the baseline survey. All recruitment was completed during the first half of each 16-week phase in order to give participants at least two opportunities to complete each of the four sessions. All screened individuals received written information on HIV prevention and a resource guide that listed free and low-cost services for homeless youth in the study area.

2.5. Surveys

The baseline and 3 month follow-up surveys were written at the 7th grade reading level and self-administered, although research staff was available to participants who needed assistance. We obtained extensive tracking and locator information from participants at baseline and were able to complete follow-up surveys with 91% of participants overall, with a higher follow-up rate among intervention than control participants (95% vs. 86%, respectively; $p = .032$). Survey responses are protected by a Certificate of Confidentiality from the National Institutes of Health, and all study materials and procedures are approved by the institution’s Internal Review Board. Participants received \$20 for completing the baseline survey and \$30 for completing the follow-up survey.

2.6. Study Measures

Covariates—These included age, gender, race/ethnicity, sexual orientation, and treatment site. Participants were categorized on race/ethnicity as Black, non-Hispanic White, Hispanic, and Multiracial/Other. For sexual orientation, participants were asked which of the following terms best described their sexual orientation: straight/heterosexual, bisexual, gay,

questioning, lesbian, and asexual. Participants were then categorized as heterosexual versus non-heterosexual based on small *ms* within each of the individual non-heterosexual categories.

AOD-related outcomes—Participants rated how frequently they had consumed at least one full drink of alcohol, used marijuana, and used each of eight types of other drugs (crack, cocaine, heroin, methamphetamine, ecstasy, hallucinogens, inhalants, and over-the-counter medicines “to get high”) in the past 3 months using a scale from 0 = *never*, 1 = *less than once a month*, 2 = *once a month*, 3 = *2–3 times a month*, 4 = *once a week*, 5 = *2–3 times a week*, 6 = *4–5 times a week*, 7 = *every day*. We examined frequency of alcohol and marijuana use separately, and calculated the average frequency of use for all drugs other than marijuana. We collected more detailed information on alcohol use, given that it was the main substance addressed in AWARE. Past 30 day use was assessed by asking how many days they had at least one full drink of alcohol and, on those days, how many drinks they consumed. We derived two measures of past 30 day drinking based on this information: (a) average number of drinks per day (frequency × quantity/30) and (b) a 4-category drinking status measure [1 = *non-drinker*, 2 = *non-heavy drinker* (always < 5 drinks per day), 3 = *heavy drinker* (5+ drinks on 1 to 4 occasions), and 4 = *frequent-heavy drinker* (5+ drinks on 5 or more occasions) (Tucker, Burnam, Sherbourne, Kung, & Gifford, 2003)]. Drinking negative consequences were assessed with the 24-item Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler, Strong, & Read, 2005) which involved summing the number of negative consequences participants had experienced in the past 3 months (possible range = 0 to 24). The Global Appraisal of Individual Needs – Short Screener (GAIN-SS; Dennis, Chan & Funk, 2006) was administered to explore whether program effects on AOD use outcomes might differ for those with a high vs. low-moderate probability of a past year alcohol or marijuana use disorder. The possible range is 0 to 5, with scores of 3 or greater indicating a high probability of a past year disorder. Finally, motivations to change alcohol, marijuana, and other drug use were assessed with rulers, modified from prior work (Boudreaux et al., 2012), asking how important it was to them to cut down/stop their use, how ready they were to cut down/stop their use, and how confident they were that they will cut down/stop their use. AOD non-users reported on their motivation to remain a non-user. Items were rated on a scale from 0 = *not at all* to 10 = *extremely*.

Sex-related outcomes—Number of sex partners in the past 3 months was calculated by summing the number of primary partners (defined as “a boyfriend, girlfriend, spouse or other ‘steady’ partner”) and the number of casual partners (defined as “not steady like a boyfriend/girlfriend or spouse, but instead is more casual, like once-in-a-while, ‘in the moment’, a ‘friend with benefits’, or maybe ‘just for fun’) with whom they had oral, vaginal or anal sex. Proportion of unprotected sex in the past 3 months was calculated from information on the number of times they had vaginal or anal sex during this period and how many of those times involved condom use. Condom self-efficacy was assessed with 8 items from Brafford and Beck (1991) which ask about confidence in discussing condom use with partners, remembering to use condoms, and ability to use condoms (1 = *strongly disagree* to 4 = *strongly agree*; $\alpha = 0.80$). Motivations to change condom use were assessed with rulers, modified from prior work (Boudreaux et al., 2012), asking how important it was to them to

increase their condom use, how ready they were to increase their condom use, and how confident they were that they will increase their condom use. Consistent condom users reported on their motivation to remain a consistent user. Items were rated on a scale from 0 = *not at all* to 10 = *extremely*.

2.7. Fidelity and Acceptability Measures

All session recordings were reviewed by the first two authors to determine adherence to the protocol content and provide weekly supervision to the facilitator. Using standard fidelity procedures (Gaume, Bertholet, Faouzi, Gmel, & Daeppen, 2010; Moyers, Martin Houck, Christopher, & Tonigan, 2009), we coded twenty-eight percent ($n = 16$) of the sessions using the Motivational Interviewing Treatment Integrity scale (MITI 3.1; Moyers, Martin, Manuel, Miller & Ernst, 2010) to measure MI adherence in delivering the protocol content, with one-quarter of these sessions ($n = 4$) being independently coded by two coders. The MITI comprises both global scores and behavioral counts to assess overall adherence. To assess participant acceptance, AWARE participants were asked to complete a short, anonymous satisfaction questionnaire at the end of each session. In addition, items on the follow-up survey asked whether they had used the skills and information they learned in their daily life, and whether the skills and information helped them to make the changes they wanted. Acceptance ratings were on a scale from 1=*strongly agree* to 4=*strongly disagree*.

2.8. Analysis Plan

The treatment and control groups were compared at baseline on demographic characteristics and the outcome of interest (see Table 1) using t-tests for continuous variables and chi-squared tests for categorical variables. For each outcome, we evaluated the overall difference in the treatment and control groups at follow-up using a multivariable regression model, which controlled for the covariates listed above and the baseline value of the outcome being evaluated (Model 1; see Overall Treatment Effect in Tables 2 and 3). We used a generalized linear modeling approach for continuous outcomes and a multinomial logistic regression model was used for the categorical drinking outcome (reference category = non-drinker). To test for interactions with participant “severity,” we then added the main effect of “severity” and its interaction with the treatment indicator to Model 1. For significant interactions, we report treatment effects for each severity subgroup. For AOD use, participants were categorized as “lower severity” if they had a GAIN score < 3 and “higher severity” if they had a GAIN score ≥ 3 (Dennis et al., 2006). For number of sex partners, participants were categorized as having 0, 1 or 2+ sex partners at baseline, with analyses comparing 0 vs. 1 partner, 0 vs. 2+ partners. (Note that for the severity interaction model for the number of partners at follow-up, the control variables were modified to exclude the baseline value of number of partners given that this was the severity measure.) Finally, we conducted a secondary analysis on the main sex-related outcome of interest, proportion of unprotected sex in the past 3 months, restricting the sample to individuals who were sexually active at both assessments. Paired t-tests were used to evaluate changes from baseline to follow up on two subsamples of participants: those with 1 partner at both assessments, and those with 2+ partners at both assessments.

Effect sizes (Cohen's d) are reported in the text for effects that are significant or marginally significant at $p < .10$. Also, note that we initially ran the multivariable regression models taking the rolling groups into account using a multiple-membership multilevel model (Paddock & Savitsky, 2013). Results did not differ substantively from results where we ignored the group membership (because group effects were small) and so we present the simpler results here. The amount of missing data was modest ($< 1\%$ for most variables; 4.4% maximum) and handled by mean/modal imputation.

3. Results

3.1. Acceptability and Fidelity of AWARE

Of the AWARE participants, 21% attended one session, 27% attended two sessions, 4% attended three sessions, and 48% attended all four sessions. Program satisfaction ratings were made on a scale from 1 = *strongly disagree* to 4 = *strongly agree*. Ratings made immediately after each session indicated that participants thought the discussion was helpful ($M = 3.77$, $SD = 0.57$), they could use the information ($M = 3.76$, $SD = 0.57$), they liked the type/style of meeting ($M = 3.76$, $SD = 0.59$), and they thought the group leader was helpful ($M = 3.86$, $SD = 0.44$). At 3 month follow-up, participants reported having used the skills and information they learned in their daily life ($M = 3.73$, $SD = 0.52$), and that it helped them to make the changes they wanted ($M = 3.73$, $SD = 0.56$). In terms of fidelity, average global scores across sessions (evocation, collaboration, autonomy/support, direction, and empathy) on the MITI were all over 4 (competent), with all double-coded global scores within one point of each other. Adherence to protocol content across sessions was 93.70%.

3.2. Comparison of Intervention and Control Groups at Baseline

Descriptive statistics for outcome variables are shown in Table 1. There were only two statistically significant baseline differences between intervention and control groups: the control group reported greater confidence in their ability to quit using other drugs ($p = 0.048$) and lesser frequency of other drug use ($p = 0.049$). Overall, results were substantively equivalent regardless of adjustment for covariates; thus we report results for which the covariates were adjusted.

3.3. Effects of AWARE on Alcohol and Drug Outcomes (Table 2)

AWARE participants reported significantly lower frequency of alcohol use in the past 3 months ($p = .01$; $d = .31$), and a near-significant lower likelihood of being a frequent heavy drinker in the past 30 days ($p = .05$; $d = .22$) at follow-up compared to control participants. AWARE participants also reported a marginally greater increase in confidence that they could reduce/quit their alcohol use at follow-up compared to control participants ($p = .09$; $d = 0.26$). These treatment effects did not significantly differ for those who scored low vs. high on the GAIN-SS ($p > .10$ for all Treatment \times Severity interactions). Significant intervention effects were not found for number of drinks per drinking occasion, negative alcohol consequences, or importance or readiness to change alcohol use ($ps > .10$).

For marijuana, significant overall treatment effects were not found for frequency of use in the past 3 months or motivation to change marijuana use ($p > .10$). However, there were

significant Treatment \times Severity interactions for motivation to change: importance ($b = -3.59$, 95% $CI = -5.78$ to -1.39 , $p = .002$), readiness ($b = -3.74$, 95% $CI = -5.91$ to -1.57 , $p = .001$), and confidence ($b = -2.85$, 95% $CI = -5.21$ to -0.49 , $p = .02$). Lower severity AWARE participants reported a significantly greater increase in importance ($b = 1.61$, 95% $CI = 0.24$ to 2.99 , $p = .02$, $d = .38$) and readiness ($b = 1.43$, 95% $CI = 0.06$ to 2.79 , $p = .04$, $d = .33$) to reduce/quit their marijuana use compared to lower severity control group participants. In contrast, higher severity AWARE participants reported a significantly greater decrease in importance ($b = -1.97$, 95% $CI = -3.68$ to -0.27 , $p = .02$, $d = .46$) and readiness ($b = -2.31$, 95% $CI = -4.00$ to -0.62 , $p = .01$, $d = .54$) to reduce/quit their marijuana use at follow-up compared to higher severity control group participants. Lower severity AWARE participants also reported a marginally greater increase in confidence to reduce/quit their marijuana use at follow-up compared to lower severity control participants ($b = 1.46$, 95% $CI = -.02$ to 2.94 , $p = .05$, $d = .33$), whereas no treatment effect on confidence was found for the higher severity groups ($b = -1.39$, 95% $CI = -3.22$, 0.45 , $p > .10$).

For drugs other than marijuana, a significant overall treatment effect was not found for average frequency of use in the past 3 months ($p > .10$). However, there were significant treatment effects on motivation to change other drug use. AWARE participants reported a significantly greater increase in readiness ($p = .02$; $d = .32$) and confidence ($p = .02$; $d = .36$) to reduce/quit other drug use, and a marginally greater increase in importance of reducing/quitting other drug use ($p = .09$; $d = 0.24$) at follow-up compared to control participants. There was one significant Treatment \times Severity interaction: importance of reducing/quitting other drug use ($b = -2.51$, 95% $CI = -4.79$ to -0.23 , $p = .03$). The interaction showed that lower severity AWARE participants reported a significantly greater increase in importance at follow-up compared to lower severity control participants ($b = 1.98$, 95% $CI = 0.54$ to 3.41 , $p = .01$, $d = .48$), whereas no treatment effect on importance was found for the higher severity groups ($b = -0.53$, 95% $CI = -2.29$ to 1.23 , $p > .10$).

3.4. Effects of AWARE on Sexual Risk Outcomes (Table 3)

AWARE participants reported a near-significant greater increase in condom use self-efficacy at follow-up compared to control participants ($p = .055$; $d = .27$). This treatment effect did not significantly differ as a function of number of sex partners at baseline ($p > .10$ for the Treatment \times Severity interactions). Significant overall treatment effects were not found for unprotected sex, number of sex partners, or motivation to change ($ps > .10$). There was more potential to detect behavioral change in unprotected sex, our main outcome of interest, among young adults who were sexually active at both assessments. Thus, secondary analyses used paired t-tests to evaluate changes from baseline to follow up on two subsamples of participants. The first subsample consisted of the most sexually active participants: 45 individuals who reported having multiple (2 or more) partners in the past 3 months at both assessments. AWARE participants showed a significant reduction in proportion of unprotected sexual events (baseline: $M = 0.45$, $SD = 0.44$; follow-up: $M = 0.24$, $SD = 0.35$, $t = 2.15$, $p = .042$; $d = 0.60$), whereas there was no change among control participants (baseline: $M = 0.46$, $SD = 0.44$, follow-up: $M = 0.49$, $SD = 0.48$; $p > .10$). The second subsample was less restrictive: 118 individuals who reported any sexual activity in the past 3 months at both assessments. There was little change in proportion of unprotected

sex acts from baseline to follow-up in either the AWARE group (baseline: $M = 0.57$, $SD = 0.45$; follow-up: $M = 0.51$, $SD = 0.45$; $p > .10$) or control group (baseline: $M = 0.60$, $SD = 0.44$, follow-up: $M = 0.58$, $SD = 0.47$; $p > .10$) using this less restrictive sample.

4. Discussion

This pilot study is the first to test a brief group MI intervention targeting both AOD use and sexual risk behavior for homeless young adults. AWARE participants overall showed positive changes in frequency of alcohol use and condom use self-efficacy compared to those that did not receive AWARE, with the majority of effect sizes in the moderate to large range, emphasizing the clinical significance of findings and the potential for AWARE with larger samples. Specifically, AWARE participants reduced their alcohol use, on average, from 2–3 times per month to 1 time per month (over the course of the year, this could represent a change from 36 drinking occasions to 12 drinking occasions). This reduction in frequency of drinking in this population is important given that these young people face significant risks due to living on the streets and drinking may significantly increase these risks. Further, among those with multiple sex partners at both assessments, AWARE participants reported a significant reduction in the proportion of unprotected sexual events, whereas control participants did not. An interesting finding, in light of the intervention effects that were found for frequency alcohol use, is that AWARE participants did not show greater decreases in drinks per occasion and negative consequences from drinking compared to control participants. A similar pattern has been reported in intervention research with college students (Lewis et al., 2014), suggesting that young people in general may still be at risk for heavier drinking and negative consequences given the social environment in which they drink, even when drinking less frequently. In general, AWARE appears to be effective in helping homeless young adults make positive changes in their frequency of alcohol use, perceived ability to use condoms, and (for those with multiple sex partners) condom use behavior.

In cases where we did not find intervention effects on behavior, it was primarily for behaviors that were not a main focus of the AWARE program. For example, the lack of intervention effects on number of sex partners may be due to the AWARE curriculum focusing primarily on condom use rather than sexual abstinence as a risk reduction strategy. Similarly, lack of intervention effects on marijuana use may be due to the fact that the curriculum did not include specific references to marijuana (although it was discussed if a participant brought it up during a session), due to focus group feedback indicating that these young adults were not interested in attending a program that addressed their marijuana use. Nonetheless, we found positive intervention effects on motivation to change marijuana use among lower severity users, as well as motivation to change other drug use in the full sample. It may be the case that when AWARE participants began reducing their alcohol use, they became more motivated to make positive changes in their marijuana and other drug use. In future research evaluating the longer-term effectiveness of AWARE, it will be important to examine whether and how these initial effects on motivation to change might lead to changes in marijuana and other drug use behavior over time.

In the existing literature on brief MI for AOD use, there is less evidence of MI's effectiveness with people meeting criteria for AOD use disorders (Saitz, 2007). In this evaluation we did not want to withhold a potentially beneficial treatment from any individual who was interested in the program; thus, we did not exclude those with a high probability of past year alcohol or marijuana use disorder (as assessed by the GAIN Short Screener) from this evaluation. We therefore tested for differences in treatment effect by severity of AOD use. Overall, our results suggest that the AWARE program is appropriate and beneficial for homeless young adults in general, and not just those who are at relatively low risk. However, one finding worth noting is that higher severity AWARE participants reported a greater decrease at follow-up in importance and readiness to reduce/quit their marijuana use compared to higher severity control participants. This may have occurred because MI is focused on exploring ambivalence in a nonjudgmental way; thus, the more severe marijuana users in the group were free to voice that they were unmotivated to change. If so, publicly airing these attitudes may have served to strengthen the individual's certainty about them over time (Holland, Verplanken & van Knippenberg, 2003). However, it is important to note that we did not find any evidence that higher severity AWARE participants were more likely to escalate their drug use compared to control participants. This is similar to other group work with youth indicating that although use of MI may encourage youth to openly discuss their alcohol or drug use in the group setting, this type of discussion does not necessarily produce iatrogenic effects if the sessions are conducted skillfully and in a nonjudgmental and collaborative way (D'Amico et al., 2013, 2015).

Importantly, this pilot evaluation provides strong evidence for acceptability and feasibility of the AWARE program. Intervention group participants were similar demographically to control group participants, as well as to probability-based samples of homeless young adults in Los Angeles County (e.g., Tucker et al., 2012b), suggesting that certain subgroups of young adults (e.g., female, sexual minority) were not disproportionately less inclined to participate in a group-based program focusing on sensitive topics such as sexual risk behavior. The program also attracted higher-risk young adults, which is critical given prior work indicating that homeless youth with the greatest health needs are also those less likely to engage in services (Pedersen et al., 2016). Participants found program content acceptable and helpful in their daily lives, and our graduation rate of 48% was excellent given the transience of the population (indeed, anecdotally we found that participants often did not complete the program due to moving out of the study area rather than lack of interest). Another important issue when providing programs in community setting is fidelity (D'Amico, Chinman, Stern, & Wandersman, 2009), and we found excellent adherence to both the AWARE protocol content and MI delivery across sessions.

Several limitations of this study should be noted. As with most research of this nature, we relied on self-reported behavior, the limitations of which are well-known (although possibly exaggerated; Chan, 2008). Although the evaluation was conducted in agencies located in two distinct areas of Los Angeles County, it is unclear whether results would generalize to other agencies located in other geographic regions. In addition, the sample size for this pilot study of 100 per group resulted in insufficient power to detect smaller, but nonetheless potentially important group differences. For example, we lacked power to examine intervention effects on sexual behavior among young adults with multiple partnerships, and were not able to test

intervention effects on different types of drug use other than marijuana because only about 10–35% (depending on the drug) of participants reported using the drug in the past 3 months. In the latter case, the composite drug use severity measure we used may have lacked sensitivity. Another limitation is the 3 month follow-up period; further research is needed to determine whether the short-term effects that we found are sustained over a longer period of time. Finally, in this pilot study we assessed several potential outcomes and models and therefore there is risk of type I error rate inflation. Thus, p-values should be treated with the appropriate degree of caution, and replication in a larger sample would provide more confidence in our results.

5. Conclusions

This is the first study to provide results of a brief, group based MI intervention for homeless young adults that addresses both AOD use and sexual risk behavior. The program was developed in response to a significant need in settings where homeless youth typically seek services for an evidence-based and feasible program addressing these interrelated problems. Developed with stakeholder input, results from AWARE are promising. Participants were engaged in the program, found the information helpful and used it in their daily life. This resulted in positive changes in frequency of alcohol use, motivations to reduce drug use, condom use, and condom self-efficacy. Further work is needed to more fully evaluate the efficacy of AWARE on AOD behavior and sexual risk behavior outcomes, assess the longer-term efficacy of the program, and examine potential mediating mechanisms.

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References

- Baer JS, Garrett SB, Beadnell B, Wells EA, Peterson PL. Brief motivational intervention with homeless adolescents: Evaluating effects on substance use and service utilization. *Psychology of Addictive Behaviors*. 2007; 21:582–586. [PubMed: 18072842]
- Bandura, A. *Social foundations of thought and action: A social cognitive theory*. Upper Saddle River, NJ: Prentice-Hall, Inc; 1986.
- Bauer DJ, Sterba SK, Hallfors DD. Evaluating group-based interventions when control participants are ungrouped. *Multivariate Behavioural Research*. 2008; 43:210–236.
- Begun S. The paradox of homeless youth pregnancy: A review of challenges and opportunities. *Social Work in Health Care*. 2015; 54:444–460. [PubMed: 25985287]
- Bender K, Brown SM, Thompson SJ, Ferguson KM, Langenderfer L. Multiple victimizations before and after leaving home associated with PTSD, depression, and substance use disorder among homeless youth. *Child Maltreatment*. 2015; 20:115–124. [PubMed: 25510502]
- Booth RE, Zhang Y, Kwiatkowski CF. The challenge of changing drug and sex risk behaviors of runaway and homeless adolescents. *Child Abuse & Neglect*. 1999; 23:1295–1306. [PubMed: 10626612]
- Boudreaux ED, Sullivan A, Abar B, Bernstein SL, Ginde AA, Camargo CA. Motivation rulers for smoking cessation: A prospective observational examination of construct and predictive validity. *Addiction Science and Clinical Practice*. 2012; 7:1–19. [PubMed: 22966407]

- Brafford LJ, Beck KH. Development and validation of a condom self-efficacy scale for college students. *Journal of American College Health*. 1991; 39:219–225. [PubMed: 1783705]
- Bryan A, Ray LA, Cooper ML. Alcohol use and protective sexual behaviors among high-risk adolescents. *Journal of Studies on Alcohol and Drugs*. 2007; 68:327–335. [PubMed: 17446971]
- Bryan AD, Schmiede SJ, Magnan RE. Marijuana use and risky sexual behavior among high-risk adolescents: Trajectories, risk factors, and event-level relationships. *Developmental Psychology*. 2012; 48:1429–1442. [PubMed: 22390666]
- Carmona J, Slesnick N, Guo X, Letcher A. Reducing high risk behaviors among street living youth: Outcomes of an integrated prevention intervention. *Children and Youth Services Review*. 2014; 43:118–123. [PubMed: 25104870]
- Center for Behavioral Health Statistics and Quality. Behavioral health trends in the United States: Results from the 2014 National Survey on Drug Use and Health. 2015. HHS Publication No. SMA 15-4927 NSDUH Series H-50 Retrieved from <http://www.samhsa.gov/data/>
- Chan, D. So why ask me? - Are self-report data really that bad?. In: Lance, CE., Vandenberg, RJ., editors. *Statistical and methodological myths and urban legends: Received doctrine, verity, and fable in the organizational and social sciences*. Hillsdale, NJ: Erlbaum; 2008. p. 309-336.
- Cooper ML. Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol, Supplement(s14)*. 2002:101–117.
- Covey J, Rosenthal-Stott HES, Howell SJ. A synthesis of meta-analytic evidence of behavioral interventions to reduce HIV/STIs. *Journal of Behavioral Medicine*. 2016; Online first publication. doi: 10.1007/s10865-016-9714-1
- D'Amico, EJ., Chinman, M., Stern, SA., Wandersman, A. Community prevention handbook on adolescent substance abuse prevention and treatment: Evidence-based practices. In: Leukefeld, CG, Gullotta, TP., Staton-Tindall, M., editors. *Adolescent substance abuse: Evidence-based approaches to prevention and treatment*. NY: Springer; 2009. p. 213-249.
- D'Amico, EJ., Feldstein Ewing, SW., Engle, B., Hunter, SB., Osilla, KC., Bryan, A. Group alcohol and drug treatment. In: Naar-King, S., Suarez, M., editors. *Motivational interviewing with adolescents and young adults*. NY: Guilford; 2010. p. 151-157.
- D'Amico EJ, Houck JM, Hunter SB, Miles JNV, Osilla KC, Ewing BA. Group motivational interviewing for adolescents: Change talk and alcohol and marijuana outcomes. *Journal of Consulting and Clinical Psychology*. 2015; 83:68–80. [PubMed: 25365779]
- D'Amico EJ, Hunter SB, Miles JNV, Ewing BA, Osilla KC. A randomized controlled trial of a group motivational interviewing intervention for adolescents with a first time alcohol or drug offense. *Journal of Substance Abuse Treatment*. 2013; 45:400–408. [PubMed: 23891459]
- Dennis ML, Chan YF, Funk RR. Development and validation of the GAIN Short Screener (GSS) for internalizing, externalizing and substance use disorders and crime/violence problems among adolescents and adults. *American Journal on Addictions*. 2006; 15(S1):80–91. [PubMed: 17182423]
- DeVellis, BM., DeVellis, RF. Self-efficacy and health. In: Baum, A., Revenson, TA., Singer, JE., editors. *Handbook of health psychology*. Mahway, New Jersey: Lawrence Erlbaum Associates; 2001. p. 235-247.
- Dotson KB, Dunn ME, Bowers CA. Stand-alone personalized normative feedback for college student drinkers: A meta-analytic review, 2004 to 2014. *PLoS ONE*. 2015; 10(10):e0139518. [PubMed: 26447792]
- Garvey R, Pedersen ER, D'Amico EJ, Ewing BA, Tucker JA. Recruitment and retention of homeless youth in a substance use and HIV risk reduction program. *Field Methods*. (in press).
- Gaume J, Bertholet N, Faouzi M, Gmel G, Daeppen J. Counselor motivational interviewing skills and young adult change talk articulation during brief motivational interventions. *Journal of Substance Abuse Treatment*. 2010; 39:272–281. [PubMed: 20708900]
- Gleghorn AA, Clements KD, Marx R, Vittinghoff E, Lee-Chu P, Katz M. The impact of intensive outreach on HIV prevention activities of homeless, runaway, and street youth in San Francisco: The AIDS evaluation of street outreach project (AESOP). *AIDS & Behavior*. 1997; 4:261–271.

- Gleghorn AA, Marx R, Vittinghoff E, Katz MH. Association between drug use patterns and HIV risks among homeless, runaway, and street youth in Northern California. *Drug and Alcohol Dependence*. 1998; 51:219–227. [PubMed: 9787995]
- Golinelli D, Tucker JS, Ryan GW, Wenzel SL. Strategies for obtaining probability samples of homeless youth. *Field Methods*. 2015; 27:131–143.
- Henry, M., Watt, R., Rosenthal, L., Shivji, A. Part 1: Point-in-Time Estimates of Homelessness. Washington, DC: 2016. The 2016 Annual Homeless Assessment Report (AHAR) to Congress. Retrieved from <https://www.hudexchange.info/resources/documents/2016-AHAR-Part-1.pdf>
- Holland RW, Verplanken B, van Knippenberg A. From repetition to conviction: Attitude accessibility as a determinant of attitude certainty. *Journal of Experimental Social Psychology*. 2003; 39:594–601.
- Ingram BL, Flannery D, Elkavich A, Rotheram-Borus MJ. Common processes in evidence-based adolescent HIV prevention programs. *AIDS & Behavior*. 2008; 12:374–383. [PubMed: 18330687]
- Kahler CW, Strong DR, Read JP. Toward efficient and comprehensive measurement of the alcohol problems continuum in college students: The brief young adult alcohol consequences questionnaire. *Alcoholism, Clinical and Experimental Research*. 2005; 29:1180–1189.
- Kahneman, D., Tversky, A. *Choices, values, and frames*. NY: Cambridge University; 2000.
- Keogh-Brown M, Bachmann M, Shepstone L, Hewitt C, Howe A, Ramsay C, Song F, Miles J, Torgerson D, Miles S, Elbourne D, Harvey I, Campbell M. Contamination in trials of educational interventions. *Health Technology Assessment*. 2007; 11:1–107.
- Kerr DCR, Washburn IJ, Morris MK, Lewis KAG, Tiberio SS. Event-level associations of marijuana and heavy alcohol use with intercourse and condom use. *Journal of Studies on Alcohol and Drugs*. 2015; 76:733–737. [PubMed: 26402353]
- Kiene SM, Barta WD, Tennen H, Armeli S. Alcohol, helping young adults to have unprotected sex with casual partners: Findings from a daily diary study of alcohol use and sexual behavior. *Journal of Adolescent Health*. 2009; 44:73–80. [PubMed: 19101461]
- Kort-Butler LA, Tyler KA. A cluster analysis of service utilization and incarceration among homeless youth. *Social Science Research*. 2012; 41:612–623. [PubMed: 23017796]
- Lewis MA, Neighbors C, Lee CM, Oster-Aaland L. 21st birthday celebratory drinking: Evaluation of a personalized normative feedback card intervention. *Psychology of Addictive Behaviors*. 2008; 22:176–185. [PubMed: 18540715]
- Lewis MA, Patrick ME, Litt DM, Atkins DC, Kim T, Blayney JA, et al. Randomized controlled trial of a web-delivered personalized normative feedback intervention to reduce alcohol-related risky sexual behavior among college students. *Journal of Consulting and Clinical Psychology*. 2014; 82:429–440. [PubMed: 24491076]
- Marshall BDL, Kerr T, Shoveller JA, Patterson TL, Buxton JA, Wood E. Homelessness and unstable housing associated with an increased risk of HIV and STI transmission among street-involved youth. *Health and Place*. 2009; 15:753–760. [PubMed: 19201642]
- Medlow S, Klineberg E, Steinbeck K. The health diagnoses of homeless adolescents: A systematic review of the literature. *Journal of Adolescence*. 2014; 37:531–542. [PubMed: 24931556]
- Merrill JE, Wardell JD, Read JP. Is readiness to change drinking related to reductions in alcohol use and consequences: A week-to-week analysis. *Journal of Studies on Alcohol and Drugs*. 2015; 76:790–798. [PubMed: 26402360]
- Miller, WR., Rollnick, S. *Motivational interviewing: Helping people change*. 3rd. NY: Guilford Press; 2012.
- Moyers TB, Martin T, Houck JM, Christopher PJ, Tonigan JS. From in-session behaviors to drinking outcomes: A causal chain for motivational interviewing. *Journal of Consulting & Clinical Psychology*. 2009; 77:1113–1124. [PubMed: 19968387]
- Moyers, TB., Martin, T., Manuel, JK., Miller, WR., Ernst, D. Revised Global Scales: Motivational Interviewing Treatment Integrity 3.1.1 (MITI 3.1.1). 2010. Retrieved from <http://casaa.unm.edu/mimanuals.html>
- Murray, DM. *Design and analysis of group-randomized trials*. Oxford: Oxford University Press; 1998.

- Naranbhai V, Abdool Karim Q, Meyer-Weitz A. Interventions to modify sexual risk behaviours for preventing HIV in homeless youth. *Cochrane Database of Systematic Reviews*, Issue 1. Art. No.: CD007501. 2011
- Paddock SM, Savitsky TD. Bayesian hierarchical semiparametric modelling of longitudinal post-treatment outcomes from open enrolment therapy groups. *Journal of the Royal Statistical Society*. 2013; 176:795–808.
- Pedersen ER, Tucker JS, Kovalchik SA. Facilitators and barriers to drop-in center use among homeless youth. *Journal of Adolescent Health*. 2016; 59:144–153. [PubMed: 27238839]
- Peterson PL, Baer JS, Wells EA, Ginzler JA, Garrett SB. Short-term effects of a brief motivational intervention to reduce alcohol and drug risk among homeless adolescents. *Psychology of Addictive Behaviors*. 2006; 20:254–264. [PubMed: 16938063]
- Rendina HJ, Moody RL, Ventuneac A, Grov C, Parsons JT. Aggregate and event-level associations between substance use and sexual behavior among gay and bisexual men: Comparing retrospective and prospective data. *Drug and Alcohol Dependence*. 2015; 154:199–207. [PubMed: 26190557]
- Rotheram-Borus MJ, Ingram BL, Swendeman D, Flannery D. Common principles embedded in effective adolescent HIV prevention programs. *AIDS & Behavior*. 2009; 13:387–398. [PubMed: 19224358]
- Rotheram-Borus MJ, Koopman C, Haignere C, Davies M. Reducing HIV sexual risk behaviors among runaway adolescents. *Journal of the American Medical Association*. 1991; 266:1237–1241. [PubMed: 1870249]
- Rotheram-Borus MJ, Song J, Gwadz M, Lee M, Van Rossem R, Koopman C. Reductions in HIV risk among runaway youth. *Prevention Science*. 2003; 4:173–187. [PubMed: 12940468]
- Saitz R. Screening and brief intervention enter their 5th decade. *Subst Abuse*. 2007; 28:3–6.
- Salomonsen-Sautel S, Van Leeuwen JM, Gilroy C, Boyle S, Malberg D, Hopfer C. Correlates of substance use among homeless youths in eight cities. *American Journal on Addictions*. 2008; 17:224–234. [PubMed: 18464000]
- Scott-Sheldon LA, Carey MP, Carey KB. Alcohol and risky sexual behavior among heavy drinking college students. *AIDS & Behavior*. 2010; 14:845–853. [PubMed: 18648928]
- Slesnick N, Dashora P, Letcher A, Erdem G, Serovich J. A review of services and interventions for runaway and homeless youth: Moving forward. *Children and Youth Services Review*. 2009; 31:732–742. [PubMed: 20161294]
- Slesnick N, Kang M. The impact of an integrated treatment on HIV risk reduction among homeless youth: A randomized controlled trial. *Journal of Behavioral Medicine*. 2008; 38:45–99.
- Slesnick N, Prestopnik JL, Meyers RJ, Glassman M. Treatment outcome for street-living, homeless youth. *Addictive Behaviors*. 2007; 32:1237–1251. [PubMed: 16989957]
- Tucker JS, Burnam MA, Sherbourne CD, Kung F, Gifford AL. Substance use and mental health correlates of adherence to antiretroviral medications in a nationally representative HIV-infected sample. *American Journal of Medicine*. 2003; 114:573–580. [PubMed: 12753881]
- Tucker JS, Edelen MO, Ellickson PL, Klein DJ. Running away from home: A longitudinal study of adolescent risk factors and young adult outcomes. *Journal of Youth and Adolescence*. 2011; 40:507–518. [PubMed: 20640881]
- Tucker JS, Hu J, Golinelli D, Kennedy DP, Green HD Jr, Wenzel SL. Social network and individual correlates of sexual risk behavior among homeless young men who have sex with men. *Journal of Adolescent Health*. 2012a; 51:386–392. [PubMed: 22999840]
- Tucker JS, Ryan GW, Golinelli D, Ewing B, Wenzel SL, Kennedy DP, Green HD Jr, Zhou A. Substance use and other risk factors for unprotected sex: Results from an event-based study of homeless youth. *AIDS & Behavior*. 2012b; 16:1699–1707. [PubMed: 21932093]
- Tucker JS, Sussell J, Golinelli D, Zhou A, Kennedy DP, Wenzel SL. Understanding pregnancy-related attitudes and behaviors: A mixed-method study of homeless youth. *Perspectives on Sexual and Reproductive Health*. 2012c; 44:252–261. [PubMed: 23231333]
- Valente A, Auerswald CL. Gender differences in sexual risk and sexually transmitted infections correlate with gender differences in social networks among San Francisco homeless youth. *Journal of Adolescent Health*. 2013; 53:486–491. [PubMed: 23871131]

- Veniegas RC, Kao UH, Rosales R. Adapting HIV prevention evidence-based interventions in practice settings: An interview study. *Implementation Science*. 2009; 4:76. [PubMed: 19930653]
- Weinhardt LS, Carey MP. Does alcohol lead to sexual risk behavior? Findings from event-level research. *Annual Review of Sex Research*. 2000; 11:125–157.
- Wenzel SL, Tucker JS, Golinelli D, Green HD Jr, Zhou A. Personal network correlates of alcohol, cigarette, and marijuana use among homeless youth. *Drug and Alcohol Dependence*. 2010; 112:140–149. [PubMed: 20656423]

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Highlights

- High rates of substance use and sexual risk behavior among homeless young adults
- AWARE is a 4-session group motivational interviewing risk reduction intervention
- Cluster cross-over randomized controlled trial with $N=200$ homeless youth
- Results from this pilot evaluation of AWARE are promising

Table 1

Descriptive statistics for outcomes at baseline and follow-up

Outcome	Control Mean (SD)/%		Intervention Mean (SD)/%	
	Baseline	Follow up	Baseline	Follow up
Alcohol use frequency, 3 months	2.68 (2.27)	2.78 (2.33)	2.60 (2.20)	2.05 (2.07)
Alcohol use status, 30 days				
Non-drinker (%)	31.00	25.58	28.00	37.89
Non-heavy drinker (%)	22.00	29.07	25.00	23.16
Heavy drinker (%)	30.00	25.58	27.00	26.32
Frequent heavy drinker (%)	17.00	19.77	20.00	12.63
Average # drinks per day, 30 days	2.31 (7.44)	1.52 (4.04)	2.24 (8.74)	1.04 (2.31)
Alcohol consequences	7.12 (6.28)	5.65 (5.77)	6.49 (5.70)	5.48 (6.11)
Alcohol importance ruler	5.81 (4.03)	5.52 (4.11)	5.59 (4.04)	6.07 (4.06)
Alcohol readiness ruler	5.52 (4.02)	5.66 (4.28)	5.86 (3.90)	6.28 (3.94)
Alcohol confidence ruler	5.84 (4.05)	6.07 (4.03)	6.35 (3.75)	7.13 (3.66)
Marijuana use frequency, 3 months	4.92 (2.86)	4.14 (2.98)	4.60 (2.76)	3.99 (3.02)
Marijuana importance ruler	3.88 (4.22)	4.07 (4.18)	3.45 (4.20)	4.21 (4.34)
Marijuana readiness ruler	4.09 (4.32)	4.30 (4.22)	3.38 (3.96)	4.03 (4.34)
Marijuana confidence ruler	4.07 (4.31)	4.44 (4.26)	3.79 (4.13)	4.77 (4.53)
Other drug use frequency, 3 months	0.36 (0.64)	0.26 (0.59)	0.62 (1.15)	0.45 (0.94)
Other drug importance ruler	6.49 (4.27)	6.48 (4.37)	5.79 (4.35)	7.37 (3.89)
Other drug readiness ruler	6.85 (4.13)	6.67 (4.25)	5.91 (4.24)	7.69 (3.61)
Other drug confidence ruler	7.04 (4.12)	6.60 (4.39)	5.87 (4.21)	7.67 (3.57)
Proportion of unprotected sexual events, 3 months	0.44 (0.45)	0.41 (0.47)	0.47 (0.46)	0.42 (0.45)
# sex partners, 3 months	2.36 (2.71)	2.17 (3.82)	2.54 (3.08)	2.56 (3.43)
Condom self-efficacy	2.18 (0.70)	2.31 (0.63)	2.15 (0.70)	2.44 (0.56)
Condom importance ruler	6.25 (4.06)	6.05 (4.14)	5.81 (4.31)	5.92 (4.24)
Condom readiness ruler	6.12 (4.07)	6.21 (4.07)	5.96 (4.14)	5.86 (4.25)
Condom confidence ruler	6.16 (4.02)	6.04 (4.02)	5.90 (4.21)	5.69 (4.23)

Notes. Past 3 month substance use: 0=never, 1=less than once per month, 2=once a month, 3=2-3 times a month, 4=once a week, 5=2-3 times a week, 6=4-5 times a week, 7=every day. Rulers: 0=not at all to 10=extremely. Condom self-efficacy: 1=strongly agree to 4 = strongly disagree. The only statistically significant baseline differences between the intervention and control groups are for frequency of other drug use ($p = 0.0497$) and other drug confidence ruler ($p = .048$).

Table 2

Parameter estimates from multivariable regression models for substance use outcomes

Outcome	Overall Treatment Effect		Treatment × Severity Interaction	
	Estimate (95% CI)	<i>p</i> =		<i>p</i> =
Alcohol				
Frequency of drinking, past 3 months	−0.68 (−1.20, −0.15)	.01		
Alcohol use status, past 30 days				
Non-heavy (OR)	0.55 (0.24, 1.27)	.16		
Heavy (OR)	0.70 (0.30, 1.62)	.40		
Frequent heavy (OR)	0.34 (0.11, 1.01)	.05		
Average # drinks per day, past 30 days	−0.38 (−1.31, 0.55)	.42		
Alcohol consequences	0.22 (−1.28, 1.71)	.77		
Importance ruler	0.60 (−0.57, 1.77)	.31		
Readiness ruler	0.55 (−0.65, 1.75)	.37		
Confidence ruler	0.99 (−0.16, 2.14)	.09		
Marijuana				
Marijuana use, past 3 months	0.04 (−0.74, 0.81)	.92		
Importance ruler	0.20 (−0.91, 1.31)	.72		.002
Readiness ruler	−0.04 (−1.16, 1.08)	.94		.001
Confidence ruler	0.34 (−0.84, 1.52)	.57		.02
Other drugs				
Other drug use, past 3 months	0.04 (−0.16, 0.25)	.67		
Importance ruler	0.99 (−0.15, 2.13)	.09		.03
Readiness ruler	1.27 (0.17, 2.37)	.02		
Confidence ruler	1.43 (0.28, 2.57)	.02		

Note. Past 30 day alcohol use reference group = non-drinker. Interaction compares treatment effects for low severity and high severity GAIN-SS groups at baseline. Models adjust for baseline outcome and covariates. OR = odds ratio.

Table 3

Parameter estimates from multivariable regression models for sexual behavior outcomes

Outcome	Overall Treatment Effect	
	Estimate (95% CI)	<i>p</i> =
Proportion of unprotected sexual events, past 3 months	0.01 (−0.11, 0.14)	.99 ^a
# sex partners, past 3 months	0.25 (−0.82, 1.33)	.64
Condom use self-efficacy	0.16 (0.00, 0.032)	.055
Condom importance ruler	0.11 (−0.99, 1.20)	.85
Condom readiness ruler	−0.24 (−1.29, 0.81)	.66
Condom confidence ruler	−0.23 (−1.32, 0.85)	.67

Notes. Models adjust for baseline outcome and covariates. Three participants are missing data on number of sex partners.

^aIn a secondary analyses restricted to youth who reported having multiple partners at both assessments, AWARE participants showed a significant reduction in proportion of unprotected sexual events, whereas control participants did not (see text).

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