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ORIGINAL ARTICLE

Stages and Processes of Change Utilized by Female Sex Workers Participating in an Alcohol-Reduction Intervention in Mombasa, Kenya

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Background: According to the transtheoretical model (TTM) behavior change occurs through a series of steps when an individual becomes aware of a behavior, prepares to change, and executes those changes using certain processes. This model has not yet been used to describe alcohol-reduction behavior change processes in resource-limited settings. **Objective:** This qualitative analysis aimed to describe and characterize the stages and processes of change employed by female sex workers in Mombasa, Kenya during the course of their participation in a 6-month alcohol reduction intervention. **Methods:** In 2011–2012, clinical interviews were conducted with 45 female sex workers. One interview was conducted each month during the intervention period, resulting in a total of six transcripts per participant. During each interview, the counselor noted the participant's stage of change and recent alcohol use. The clinical notes were analyzed via qualitative coding techniques and organized into matrices to classify alcohol reduction strategies discussed by participants. **Results:** Participants discussed using the stage-specific processes of change described by the TTM to reduce their alcohol use and maintain the behavior change. Participants who were HIV-positive at the start of the intervention seemed to progress to the action/maintenance stage more quickly than HIV-negative participants. **Conclusions/Importance:** Results suggest that the TTM constructs may be relevant in understanding the alcohol reduction behavior change process of an at-risk population in a resource-limited setting. Future quantitative research should seek to validate the TTM's application internationally. Alcohol interventions should consider tailoring content to participants' stages of change and HIV-status for increased effectiveness.

Keywords transtheoretical model (TTM), stages of change, process of change, female sex workers, alcohol, Kenya

INTRODUCTION

The stages of change, described in the transtheoretical model (TTM), have been used to model behavior change for a variety of health behaviors, including alcohol use and HIV/AIDS prevention (Prochaska & DiClemente, 1984; Prochaska & Norcross, 2010; J. M. Prochaska et al., 2004; Prochaska et al., 1994; J. O. Prochaska et al., 2004). The TTM provides an important theoretical basis for health interventions because it emphasizes that individuals may not be prepared to change their behavior and would not be influenced by one-stage fits all interventions (Glanz, Rimer, & Viswanath, 2008; Prochaska & DiClemente, 1984). This research used the stages of change theory to describe and characterize the behavior change process among a cohort of Kenyan female sex workers (FSWs) who participated in a 6-month alcohol reduction intervention study.

The Stages of Change Model

The stages of change model has been utilized in the development and evaluation of alcohol interventions primarily in developed countries. Individuals who receive tailored interventions based on their readiness to change have been shown to be more likely to reduce their drinking behavior than those who receive standard interventions (Carbonari & DiClemente, 2000; Evers et al., 2012; Naar-King, Kolmodin, Parsons, & Murphy, 2010; Noordman, de Vet, van der Weijden, & van Dulman, 2013). These interventions classify individuals based on the stages they progress through as they reduce their alcohol use: *pre-contemplation*, *contemplation*, *preparation*, *action*, and *maintenance* (DiClemente & Hughes, 1990). Individuals

in pre-contemplation have not considered altering their drinking; those in contemplation intend to reduce drinking within 6 months; those in preparation have made steps to reduce drinking within the next month; those in action have reduced drinking for less than 6 months; and those in maintenance have no temptation to resume drinking (DiClemente & Hughes, 1990; Glanz et al., 2008; Prochaska & DiClemente, 1984).

Processes of change are strategies used by individuals to enable progression through the stages of health behavior change. *Consciousness raising*, *environmental reevaluation*, and *dramatic relief* are necessary to progress from pre-contemplation to contemplation; *self-reevaluation* and *self-liberation* are used to progress from contemplation to preparation and action; and *helping relationships*, *counter-conditioning*, *reinforcement management*, and *stimulus control* help to achieve behavior change maintenance (Glanz et al., 2008; Migneault, Adams, & Read, 2005; Prochaska & DiClemente, 1984). Although, the TTM constructs have been validated for use in developed countries, little work has been conducted to apply and understand the processes of change among populations in developing countries (Carbonari & DiClemente, 2000; Migneault et al., 2005; Prochaska, J. M., et al., 2004; Prochaska, J. O., et al., 2004).

Interventions for FSWs in Kenya

The stages of change model could have great relevance for understanding the alcohol reduction behavior change process among at-risk populations and may be helpful for designing behavioral interventions in resource-limited settings. Mombasa, Kenya has a large concentration of FSWs, a group with high HIV incidence and risk of transmitting infection (Cote et al., 2004; Martin et al., 1994; Ngugi, Wilson, Sebstad, Plummer, & Moses, 1996; Simonsen et al., 1990; Voeten, Egesah, Ondiege, Varkevisser, Habbema, 2002). Targeting this population with behavioral interventions, such as condom promotion and STI/HIV education, is a key strategy for the reduction of HIV/AIDS throughout Kenya (Rekart, 2005; Steen & Dalabetta, 2003; WHO, 2005). Alcohol use among FSWs can undermine the effectiveness of these interventions (Chersich et al., 2007; Chersich, Rees, Scorgie, & Martin, 2009). Several studies have demonstrated an association between alcohol use and unprotected sex with clients and partners, resulting in an increased risk of STIs among FSWs (Chersich et al., 2007; Kalichman, Simbayi, Jooste, & Cain 2007; Li, Li, & Stanton, 2010; Samet et al., 2010; Simbayi et al., 2006).

Behavioral interventions to reduce drinking among FSWs have been shown to increase condom use and reduce HIV/AIDS and STI prevalence (Room, Babor, & Rehm, 2005; WHO, 2001). Participants of alcohol use interventions conducted in South Africa and Mongolia showed reductions in unprotected sex and alcohol use in sexual contexts (Kalichman et al., 2007; Witte et al., 2011; Witte, El-Bassel, Gilbert, Wu, & Chang, 2010). Viewing alcohol reduction interventions among FSWs through

a stages of change model may provide helpful information on the factors associated with alcohol reduction over time and strategies to aid in alcohol reduction intervention design for high-risk populations in low-income countries.

The present qualitative study sought to understand contextual factors related to alcohol consumption, reduction, and abstinence among moderate-drinking FSWs who participated in a 6-month alcohol reduction intervention study, which incorporated elements of the TTM constructs. The study had two primary objectives: (1) to describe the strategies FSWs used throughout their intervention participation to reduce drinking behavior, and (2) to characterize those strategies within the stages of change model over the course of the six intervention sessions. Results from this qualitative analysis will help to contextualize quantitative and clinical findings from the alcohol intervention study and may inform tailored, alcohol-reduction behavioral interventions for FSWs in Kenya and other settings.

METHODS

Participants

The alcohol intervention study aimed to decrease alcohol use in order to decrease STI/HIV infections among moderate-drinking FSWs in Mombasa, Kenya. Participants were recruited for the study from three AIDS, Population, Health, and Integrated Assistance (APHIA II) project locations called drop-in-centers (DICs). The three DICs in Mombasa serve more than 15,000 FSWs by providing peer-education, condoms, and access to healthcare services. The Chaani site serves FSWs who report frequent encounters with travelers near the port and along the town's major roads. These women also tended to have low levels of education and high poverty rates. The Kisauni DIC serves FSWs who mainly work in bars and nightclubs. Likoni, the site of the third DIC, is the headquarters of the Kenyan Navy, and FSWs visiting this center often have clients who are affiliated with the military.

Study participants were initially recruited through peer educators and community mobilizers affiliated with the DICs, and eligibility screening, enrollment, data collection, and counseling were conducted at the three DICs. Research staff approached 1,953 women to explain the study and assess their eligibility. Eligible participants were 18 years of age or older, living in Mombasa, negative for STIs at enrollment, and moderate drinkers. Alcohol use was measured by the WHO (2001) Alcohol Use Disorders Identification Test (AUDIT) questionnaire, and participants were classified as moderate drinkers if they received a score between 7–19, which indicated “harmful” or “hazardous” drinking behavior. Of those deemed eligible ($n = 1022$), 38 women declined to participate (3.7%) and 166 (16.2%) did not complete all enrollment procedures. A total of 818 moderate-drinking, FSWs provided written informed consent and were enrolled and randomly assigned to a six-month brief alcohol

reduction intervention ($n = 410$) or a control arm receiving nutrition information ($n = 408$). Data collection for all participants occurred at baseline and six and twelve months post-randomization and included the AUDIT questionnaire, a behavior interview, a gynecological exam, and a rapid HIV test. Behavioral and clinical impact from the alcohol intervention study using this quantitative data is reported elsewhere (L'Engle, Mwarogo, Kingola, Sinkele, & Weiner, 2014). Ethical approval for the study was obtained from FHI 360 and the Kenyatta National Hospital ethical review boards.

The majority of all enrolled participants (60.6%) were over age 24, 47% were never married, and 55% reported primary education or less. Most of them reported meeting clients at a bar or night club (78.5%). Enrollment totals were comparable across the three DICs and demographic characteristics were similar between intervention and control groups at baseline (L'Engle et al., 2014). Approximately one-fifth of all participants were HIV-positive at baseline and were equally represented in the intervention and control groups. About 65% of participants in each group were classified as harmful drinkers (AUDIT score of 7–15) and the remaining participants were hazardous drinkers (AUDIT score of 16–19) at baseline. The mean AUDIT scores were also comparable between both groups (mean = 13.7 for intervention and 13.4 for control groups) (L'Engle et al., 2014).

Intervention

Each participant in the alcohol intervention group ($n = 410$) met with a trained nurse counselor once per month, for approximately 20 minutes per session, during the 6-month intervention period. During each session, counselors and participants reviewed drinking behavior over the previous month, discussed challenges and successes in reducing drinking, developed goals and strategies for reducing alcohol use in the next month, and assessed current stage of change using a “readiness ruler.” Scores from 1–3 on the “readiness ruler” represented precontemplation, scores from 4–6 represented contemplation, scores from 7–8 represented preparation, and scores from 9–10 represented action or maintenance. The counselors recorded detailed notes from these sessions using a Data, Assessment, and Plan (DAP) form, which included sections on the participants' current alcohol use and stage of change, facilitators and barriers to reducing drinking, and a plan for reducing drinking over the next month.

Participants in the nutrition control group also received six, 20-minute sessions delivered by the nurse counselors. These sessions aimed to address nutritional needs for women and their children, including those living with HIV and/or taking antiretroviral medications. They included an assessment of the women's nutritional status and counselors worked with participants to develop and monitor tailored nutrition care plans. Counselors did not record DAP notes and stage of change for these control participants. Therefore, this manuscript reports the analysis

of DAP notes only for the intervention participants and serves to describe the stages and processes of change they went through during their participation in the intervention sessions. Participants in both the intervention and nutrition control group were reimbursed for the cost of their travel to the DIC as compensation for their time during each visit.

There was one counselor for each of the three DICs, which ensured that each participant met with the same counselor at all six sessions. Counselors received a multi-day training covering intervention-related content, and how to conduct the intervention, counsel participants, and handle ethical issues. An alcohol-counseling expert from Support for Addictions Prevention and Treatment in Africa made visits to each drop-in center once per month to monitor intervention implementation and fidelity to the intervention curriculum over the six sessions. During these visits the expert: (1) observed 1–2 intervention sessions; (2) met privately with the nurse counselor at that DIC and had her present at least one participant case; (3) randomly reviewed the DAP notes and discussed them with the counselor; (4) discussed any specific challenges encountered by the counselor (e.g., client not talking much or resisting any change in drinking behavior). The expert also gave further instructions on Motivational Interviewing to better address specific challenges among the clients.

Sampling for DAP Notes Analysis

Of the 410 participants assigned to the alcohol intervention, 292 (71.9%) completed all six counseling sessions indicating high retention rates. These 292 participants were stratified by AUDIT scores and HIV status and then 45 were randomly selected so that 15 had AUDIT scores of 16 or less (harmful drinkers) and 30 had AUDIT scores of 17 or greater (hazardous drinkers), and 15 were HIV-positive and 30 were HIV-negative. We were interested in sampling both HIV-positive and negative participants because we theorized that frequency of alcohol use, stressors related to alcohol use, and motivations or barriers to change drinking behavior may be different between these two groups. These sampled participants ranged from 19–48 years old (mean age = 29) and represented participants from all three DICs. DIC was not used as a stratification variable for choosing the study sample, since alcohol use and HIV status were the two factors of interest for this analysis.

A total of 270 interview sessions were analyzed (six sessions per 45 participant). The session notes were combined such that for each participant there was one transcript that included notes from all sessions.

Coding

Two research assistants (RAs) based in Kenya and a supervisor in North Carolina conducted the coding of the DAP notes. Coders were initially blinded to demographics, HIV status, and AUDIT score of participants to reduce bias in

TABLE 1. Operationalization of process of change for alcohol use among participants

Stage of change	TTM process of change	Codebook description
Pre-contemplation	Consciousness raising	Reported physical health consequences Reported mental health consequences
	Environmental reevaluation	Reported effect of drinking on family Reported effect of drinking on friends Reported effect of drinking on partners Reported effect of drinking on sex work Reported effect of drinking on livelihood Other reported negative effects of drinking
Contemplation	Dramatic relief	Anxiety about drinking
	Self-reevaluation	Goal setting and planning to reduce drinking
Preparation	Self-liberation	
Action	Helping relationships	Actions taken to reduce drinking (i.e. spending more time with friends who don't drink, taking soda instead of alcohol, removing alcohol from home, quitting sex work)
	Counter conditioning	
	Reinforcement management	
	Stimulus control	

Note. This table provides a list of TTM processes of change constructs and the equivalent operationalized codes that were included in the codebook.

coding. The coders were not blinded to session number for the participants because the DAP notes were combined in order of the sessions to create a full set of DAP notes for each participant in the study sample. QRS NVivo version 9 (2010) was used to organize and code data.

Coding was conducted in five steps. First, the study team read over five transcripts from alcohol intervention study participants not selected for this analysis, and developed the initial codebook through a standard iterative process (Moreno, Egan, & Brockman, 2011). Deductive and inductive codes were selected based on TTM constructs and salient themes that were mentioned in the counselor notes. The processes of change were operationalized for this analysis to correspond to specific topics mentioned in the DAP notes (see Table 1).

Second, RAs practiced structurally and thematically coding the DAP notes by independently coding the five practice transcripts using the codebook. Third, RAs met with the supervisor to discuss the code definitions and iteratively updated the codebook to incorporate emerging themes. Each of the five practice transcripts were re-coded and reviewed by the RAs and supervisor using this updated codebook, and the RAs began coding independently only after 100% agreement was reached on all five practice transcripts. Fourth, the finalized codes were applied to the 45 transcripts, which were evenly divided between the two coders. Both coders independently coded every tenth transcript and agreed on approximately 88% of the coding for these four transcripts (the percentage of coding agreement ranged from 86–90% for the different codes). The coders met with the supervisor each week to review all coding. Coding disagreements were resolved by consensus, and if consensus could not be reached the supervisor became the final arbitrator. Lastly, after the initial coding of all transcripts, coders were un-blinded to participant demographics and coded these attributes for each participant.

Analysis

Coded data was thematically analyzed in three steps. First, the study team generated code reports for each stage and process of change. Each report was reviewed and the team discussed preliminary interpretations of the data. Next, the supervisor developed matrices of the coded processes of change by each stage of change to compare the strategies participants mentioned for reducing alcohol use over the six sessions. Finally, code reports were compared between HIV-positive and HIV-negative respondents and harmful and hazardous drinkers to identify differences in their progression through the stages.

RESULTS

Stages of Change

In sessions 1–3, the counselors labeled most participants as being in pre-contemplation, contemplation, or preparation. In sessions 4–6, the counselors labeled most participants as being in action and maintenance. Given the small number of participants in each stage, the stages of change were reduced from five to three for analysis: pre-contemplation, contemplation/preparation, and action/maintenance. Participants in pre-contemplation had not yet considered reducing their drinking; those in contemplation/preparation recognized a need to reduce their drinking and made a plan to change; and those in action/maintenance reduced or abstained from drinking and were working to maintain this change. Changes in alcohol use described here were determined only by participants' self-report during the counseling session; their AUDIT scores were not assessed and analyzed at each time point to confirm changes in alcohol use.

In counseling session one, eight participants were in the pre-contemplation stage, 32 were in the contemplation/

preparation stage, and five were in the action/maintenance stage. While AUDIT score at enrollment did not seem to effect participants' experiences in the intervention, counselors reported different progressions through the stages of change for HIV-positive and HIV-negative participants. Those who were HIV-positive at baseline were more likely to be in the contemplation/preparation stage at session one, and reached the action/maintenance stages in fewer sessions than those who were HIV-negative. This was primarily because they had been told about the negative effects of drinking when they learned their HIV status and they reported anxiety about the effects of alcohol on their ability to adhere to HIV medications and clinic appointments. Among the five participants in the action/maintenance stage at baseline, four were HIV-positive and had already reduced their drinking as a result of their status. By session six, all 45 participants were designated as being in the action/maintenance stage because they told counselors that they had either abstained from or reduced alcohol use.

Processes of Change

Table 2 provides a summary of processes of change used by participants according to their stage of change. In pre-contemplation, participants mainly reported using environmental reevaluation, consciousness raising, and dramatic relief techniques. In contemplation/preparation, participants most commonly said they used self-reevaluation and self-liberation techniques. In action/maintenance, participants most often reported using helping relationships, counter-conditioning, reinforcement management, and stimulus control strategies. Participants in the contemplation/preparation and action/maintenance stages also mentioned using processes more relevant to previous stages.

Pre-contemplation

Participants in the pre-contemplation stage had trouble discussing the negative effects of their drinking ("When she drinks, she feels she can do anything and nobody can stop her"). Many participants also discussed alcohol as a way to facilitate sex work, which made them reluctant to consider reducing their drinking early in the intervention ("She gets courage to approach clients and negotiate price and condom use when she drinks"). Several women reported barriers to reducing their alcohol use related to recruiting clients in bars ("Sometimes I lose clients when I refuse to drink"; "some clients refuse to buy me a soft drink").

To move from pre-contemplation to contemplation/preparation, participants needed to recognize the negative effects of their behavior on themselves (consciousness raising) and the people around them (environmental reevaluation), and they expressed anxiety about the potential consequences of their drinking (dramatic relief). By counseling session 2, most participants discussed the harmful ways that drinking affected their relationships and their lives as sex workers ("She becomes abusive which has led to fights with her friends and clients"; "She forgets

TABLE 2. Process of change mentioned by participants according to their stages of change

Process of change	Stages of change		
	Pre-contemplation	Contemplation/preparation	Action/maintenance
Consciousness raising	5	10	3
Environmental reevaluation	8	8	2
Dramatic relief	2	7	3
Self-reevaluation	1	23	4
Self-liberation	0	17	5
Helping relationships	0	0	19
Counter-conditioning	0	0	21
Reinforcement management	0	0	15
Stimulus control	0	0	26

Note. This table provides a summary of the processes of change used by participants in various stages of change.

to use condoms when she is drunk"; "Alcohol can lead her to being used without being paid, being insulted, and getting beaten"). Those who were HIV-positive at baseline discussed the potentially negative ways that drinking could impact their illness ("She is aware that she should not use alcohol when she is taking antiretroviral drugs"), while those who were HIV-negative at baseline talked about reducing their drinking as a way to avoid contracting HIV ("She is worried that her alcohol taking could lead her to HIV infection").

Contemplation/Preparation

Participants were typically classified in the contemplation/preparation stage during sessions two and three, when they realized the negative effects of drinking and made a plan for changing their behavior ("She plans to reduce her alcohol intake this month and then stop altogether"). These participants wanted to alter their drinking to become more respected in their communities and better parents and partners ("She fails in carrying out responsibilities for her children and partner because of drinking"). Most participants aimed to reduce their drinking to about half their current intake, but some aimed to abstain entirely. They discussed goals to reduce alcohol use and potential strategies to facilitate reduced drinking with the counselor.

Participants in the contemplation/preparation stage reevaluated their goals and discussed ways to liberate themselves from their unhealthy drinking behaviors. They were mainly interested in avoiding friends who drank and would be a challenge in their behavior change. Participants also discussed plans for reducing drinking while conducting sex work, which was when the majority con-

sumed alcohol (“I will drink slowly when my clients buy me drinks; I will throw the drink away and take soda”). They made action plans as part of their counseling session and many discussed ways they could save money so that they could stop sex work (“I plan to save money so I can start a catering business”).

Action/Maintenance

Participants were in the action/maintenance stage often by session four. Three HIV-negative participants with high baseline AUDIT scores relapsed briefly into harmful or hazardous drinking once they were in this stage, while the majority of participants reported maintaining behavior change. Participants relied on relationships with important others to help them reduce their drinking (“My boyfriend encourages me to become responsible with my drinking”).

Many participants also reported counter conditioning, reinforcement management, and stimulus control strategies to maintain their behavior (“I avoid friends who drink”; “I took alcohol out of my home”; “I put soda in beer bottles that clients buy for me”). By saving the money that they would have spent on alcohol and spending it for other uses, participants recognized the rewards of reducing drinking, which encouraged them to maintain their behavior change (“I have saved enough money to start my business and support my children”).

By counseling session six, seventeen participants stated that they quit sex work to maintain their reduced drinking, improve relationships with boyfriends, or start a business with money they saved as a result of reduced alcohol use. For those who continued with sex work ($n = 28$), counselors reported that the intervention had positive effects on the consistency of their condom use with clients and regular partners (“She now remembers to use condoms with all clients”).

DISCUSSION

The results of this qualitative analysis describe the stages and processes of change used by FSWs in Kenya during their participation in a six-month alcohol reduction intervention. All participants were moderate drinkers at intervention enrollment, as was measured by their AUDIT scores (a score a 16 or less was “harmful drinking” while a score of 17 or more was “hazardous drinking”). Few women discussed relapsing in drinking over the course of the six sessions and they reported utilizing processes of change that aligned well with the TTM stages (Prochaska & DiClemente, 1984). Findings from the present study help to describe the specific strategies used by intervention participants to reduce their alcohol use and may add to the evidence base on the behavior change process for FSWs in low-resource African settings (Agha & Nchima, 2004; Chersich et al., 2007; Wechsberg, Luseno, Lam, Parry, & Morojele, 2006; Wojcicki, 2002).

Women in our sample mentioned challenges to reducing their drinking that were consistent with research con-

ducted with FSWs in other settings. For example, studies in Kenya and South Africa reported that FSWs commonly had sex with clients while inebriated and that men often buy women alcohol to pay for sex (Chersich et al., 2007; Wojcicki, 2002; Wojcicki & Malala, 2001). The results of this study may be particularly relevant for other populations of FSWs who commonly meet clients in bars or nightclubs. Nurse counselors provided participants with strategies to reduce their alcohol use that they learned during intervention training, and these strategies were echoed and often adopted by participants. Many of these strategies were similar to those discussed in other research and could be incorporated into alcohol reduction interventions (Kalichman et al., 2008; Sivaram et al., 2004; Wechsberg et al., 2006). For example, several participants said they sip alcohol more slowly now or they refuse to talk to clients for an extended time at the bar, which were also strategies mentioned by FSWs in Laos and South Africa (Phrasisombath, Thomsen, Hagberg, Sychareun, & Faxelid, 2012; Wechsberg et al., 2006). Alcohol use among FSWs is most pervasive in bar-based venues and alcohol reduction interventions are particularly needed for this population (Bautista et al., 2008; Chersich et al., 2007; Yadvav et al., 2005).

The majority of participants sampled for this analysis were in the contemplation/preparation stage in the first session, and they indicated a general awareness of the negative effects of alcohol and a desire to reduce drinking. This could be explained in part by their involvement with educational activities at the drop-in centers. We also saw differences in participants’ motivations for reducing alcohol use or altering their drinking behavior depending on their HIV status. Based on our findings, moderate-drinking FSWs in Kenya, particularly those who are HIV-positive or perceive a high risk of becoming HIV-positive, may have a high readiness to change, and future interventions should be tailored toward helping them to prepare for, enact, and maintain healthy behavior change.

The positive effects of the intervention carried over into other aspects of participants’ lives besides their alcohol use. Many participants reported being able quit sex work or open new businesses, largely because they were spending less money on alcohol and were able to negotiate with clients for higher prices while they were sober. They also reported being better able to negotiate condom use with clients when they weren’t intoxicated, and this finding is consistent with the conclusions of other published studies (Chersich et al., 2007; Kalichman et al., 2007; Li et al., 2010; Samet et al., 2010; Simbayi et al., 2006).

There were several strengths and limitations to this data analysis. FSWs who were more willing to reduce their drinking may have been more likely to enroll in the study and complete all sessions. Also, the DAP notes were recorded by the nurse counselors and participants’ actions were noted in the third person. The counselors were not aware of the participants’ actual drinking behavior between sessions or the accuracy of the self-reported data and we were unable to analyze changes in AUDIT scores

over the six sessions to corroborate the qualitative data reports. Finally, coders were not blinded to session number, which could have influenced their coding of participants' stages and processes of change.

We tried to reduce these potential biases in the analysis by randomly selecting 45 participants irrespective of the DIC where they completed the intervention sessions. In addition, the participant responses were validated against notes from all their sessions and coders were blinded to demographics, HIV status, and AUDIT score. While we could not triangulate the qualitative data by analyzing change in AUDIT score over time, the quantitative data did demonstrate that participants in the intervention group significantly reduced frequency of drinking alcohol, overall binge drinking, and binge drinking with paying and nonpaying partners in the last 30 days by the end of the 6- and 12-month intervention periods, in comparison to the control group (L'Engle et al., 2014). Lastly, while it was difficult to train coders remotely, the supervisor had weekly phone calls and constant email communication with the coders to resolve discrepancies as they arose. It should also be noted that the nurse counselors in this study were highly trained, including education in brief motivational interviewing and supervision for counseling. Implementing this counseling model in non-study situations may yield different results and should be approached with rigor and ongoing support from alcohol experts.

In conclusion, the stages and process of change may provide a useful theoretical framework in describing the alcohol reduction behavior change process for moderate-drinking FSWs in Mombasa, Kenya. This study has shown that when moving from pre-contemplation, contemplation, and preparation to action/maintenance, participants rely on stage-specific processes to reduce their alcohol use. Furthermore, these strategies can be employed to promote behavior change in this population even when contextual factors like pressure from clients present barriers to alcohol reduction. Results from this work may be used to develop future alcohol interventions for FSWs in resource-limited settings by tailoring materials to their appropriate stages of change and HIV-status.

GLOSSARY

Alcohol Use Disorders Identification Test (AUDIT): An instrument developed by the WHO for the identification of hazardous and harmful patterns of alcohol consumption. An AUDIT score of 7.15 indicates "harmful drinking." A score of 16.19 indicates "hazardous drinking."

Consciousness raising: A process of change used to progress from the pre-contemplation stage to the contemplation stage by learning new information and gaining an understanding about the problem behavior.

Counter-conditioning: A process of change used to achieve behavior change maintenance by substituting healthy alternatives for the problem behavior.

Data, Assessment, and Plan form (DAP): Clinical forms which include sections on patients, alcohol use, stage

of change, facilitators and barriers to reducing drinking, and future plans for reducing drinking.

Dramatic relief: A process of change used to progress from the pre-contemplation stage to the contemplation stage by expressing feelings about the potential negative consequences of the problem behavior.

Drop-in-centers (DICs): Centers supported by the AIDS, Population, and Integrated Assistance (APHIA II) program to provide venue-based services for people most at risk for HIV, including female sex workers. Services provided at these centers include: peer education, HIV testing and counseling, STI screening and treatment, family planning, and condom distribution.

Environmental reevaluation: A process of change used to progress from the pre-contemplation stage to the contemplation stage by realizing how the problem health behavior affects one's environment.

Female sex workers (FSWs): Women who report having sex in exchange for goods (i.e. money, drugs, food, housing).

Helping relationships: A process of change used to achieve behavior change maintenance by using the support of others.

Processes of change: Strategies used by individuals to help them to progress through the stages of behavior change. They include: consciousness raising, environmental reevaluation, dramatic relief, self-reevaluation, self-liberation, helping relationships, counter-conditioning, reinforcement management, and stimulus control.

Reinforcement management: A process of change used to achieve behavior change maintenance by rewarding oneself for making a positive behavior change.

Self-liberation: A process of change used to progress from the preparation stage to the action stage by making a commitment to change the problem behavior.

Self-reevaluation: A process of change used to progress from the contemplation stage to the preparation stage by assessing one's values and determining how they are compromised by the problem behavior and may be strengthened by a healthier behavior.

Stages of change: Categories for the behavior-change process along a continuum of motivational readiness. The stages include pre-contemplation (not taking action on problem behavior), contemplation (considering behavior change in the next six months), preparation (making steps to change behavior in the next month), action (making specific behavior changes within the last six months), and maintenance (making behavior changes for more than six months with no temptation to resume unhealthy behavior).

Stimulus control: A process of change used to achieve behavior change maintenance by restricting one's environment to avoid cues to engage in the problem behavior and to add those that promote the healthy behavior.

Transtheoretical model (TTM): A model for the behavior-change process that focuses on an individual's decision-making process and readiness to alter problematic behavior through a continuum of stages.

During these stages, one becomes increasingly aware of the negative consequences of the behavior, gains confidence to change, and develops strategies to maintain a healthier behavior.

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DECLARATION OF INTEREST

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Jennifer Velloza, MPH, conducted this work as a Research Fellow at FHI 360's Social and Behavioral Health Sciences Department. She has been engaged in the field of global HIV prevention and treatment research for the past 5 years, and is primarily interested in intersecting issues of substance use and HIV transmission among most-at-risk populations. Ms. Velloza

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