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SHORT-TERM EFFECT OF A CULTURAL ADAPTATION OF VOLUNTARY COUNSELING AND TESTING AMONG FEMALE SEX WORKERS IN CHINA: A QUASI–EXPERIMENTAL TRIAL

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Abstract

This study evaluates the efficacy of cultural adaptation of a voluntary counseling and testing (VCT) intervention, in increasing condom use and decreasing rates of sexually transmitted diseases (STDs) among a group of female sex workers (FSWs) in Guangxi, China. This intervention is modeled after the "state–of–the–science" VCT program that was developed and evaluated by the Center for Disease Control and Prevention's Project RESPECT. Four hundred FSWs were assigned to either an intervention group receiving the VCT intervention or a control group receiving standard of care STD testing and treatment. Data were collected at baseline and 6 months postintervention. Outcome measures included HIV/STD related knowledge and perceptions, condom use, and history of STDs. Five common STDs were screened and tested through clinical examination and laboratory testing to serve as biomarkers. After controlling for potential confounders and baseline differences, the VCT intervention group was significantly higher than the control group in HIV/STD related knowledge ($p < .0001$) and consistent condom use with clients (odds ration [OR] = 2.23; 95% confidence interval [CI] = 1.26–3.96) at 6 months follow–up. In addition, the intervention group had a significantly lower infection rate of STDs than the control group at follow–up (OR = 0.44; 95% CI = 0.24–0.80). This quasi–experimental trial provides evidence that the brief VCT intervention, through appropriate cultural adaptation, can be efficacious in increasing condom use and reducing STD infection rate among FSWs in China.

Data from both industrialized (Kamb, Fishbein, Douglas, Rhodes, & Rogers, 1998;Rotheram–Borus, Cabtwell, & Newman, 2000) and developing countries (Coates, et al., 2000;Merson, Dayton, & O'Reilly, 2000;Painter, 2001) suggest that culturally appropriate voluntary counseling and testing (VCT) programs are effective in facilitating a change toward safer sex behavior and in reducing HIV/STD (sexually transmitted disease) transmission. In a multisite international trial in three developing countries (Kenya, Tanzania, and Trinidad), Coates and colleagues (2000) suggested that pre and posttest HIV counseling is effective as a prevention strategy for both individuals and couples. Among the 3,000 individuals enrolled in the study, the rate of unprotected sex with nonprimary partners decreased more significantly among those who received VCT than those who received only basic health information. Among the 586

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couples enrolled in the study, reduction of unprotected sex with enrolled partners was significantly greater among VCT groups than those who received health information alone.

There has been considerable debate regarding effective ways to deliver HIV/STD counseling for promoting condom use and preventing incidental STD (Kamb et al., 1998;Rotheram–Borus et al., 2000). For the past decades, the standard for counseling has been the delivery of fact–based didactic messages aimed at increasing client knowledge about STDs and related risk. The Center for Disease Control and Prevention's Project RESPECT was a multisite trial of three different styles of counseling for STD clinic patients (Kamb et al., 1998). The first group received a regular 4–session (200 minutes) theory–driven enhanced individual counseling intervention. The second group received a brief (40 minutes) theory–based counseling session, and the third and fourth groups received a didactic message typical of standard counseling for STD clinics. At the 6–month follow-up of the randomized clinical trial, the brief counseling group was equivalent to the enhanced counseling group in the increase of consistent condom use (31% vs. 30%) and the decrease of incident STDs (7.2% vs. 7.3%). Both approaches were significantly better than didactic training for increasing consistent condom use and for decreasing incident STDs (Kamb, et al., 1998). Although the brief approach is as effective as the enhanced counseling approach, it uses far fewer resources to complete than the enhanced approach.

Kelly and Kalichman (2002) noted in a comprehensive review of HIV intervention approaches that VCT intervention "used counseling procedures that sought to change self–efficacy, attitudes, and perceived norms concerning condom use, accompanied by behavior–change goal setting between sessions" (p. 727). Although the VCT program has been demonstrated to be effective in increasing condom use and in preventing new STDs in many cultural settings (Kamb et al., 1998;Rotheram–Borus et al., 2000), empirical results have been mixed. Wolitski, MacGowan, Higgins, & Jorgensen (1997) reviewed 35 domestic and international studies and found that evidence regarding the efficacy of VCT to influence HIV risk-related behaviors was inconclusive. Matovu and colleagues (2005) also found that voluntary HIV counseling and testing had no impact on sexual risk behavior and HIV acquisition among rural adults in Rakai, Uganda. Singh, Kananbala, Thongam, Devi, and Singh (2005) even observed an increasing trend of HIV seropositivity among commercial sex workers attending the voluntary and confidential counseling and testing center in Manipur, India. A meta–analysis of 27 published studies concluded that although HIV counseling and testing provides an effective means of secondary prevention for HIV–positive individuals, it is not effective as primary prevention strategy for uninfected participants (Weinhardt, Carey, Johnson, & Bickham, 1999). Inconsistent results among existing studies underscore the importance of testing the efficacy of VCT in various cultural settings, particularly in countries that are in the early stages of the HIV/AIDS epidemic, such as China.

Although the actual HIV sero–prevalence in China remains uncertain, the current official estimate of HIV infection by the Chinese government exceeds 1 million (Gill, 2005). In the absence of effective prevention strategies, it is predicted that 10 million Chinese people will carry HIV by the year 2010 (Kaufman & Jing, 2002). Although injection drug use and contaminated blood/plasma collection are the primary causes of the majority of seropositive cases, there is also evidence for the role of sexual transmission in this epidemic (Yang, Li, Stanton, Liu, et al., 2005). The largest sexual transmission rate has been reported for high-risk populations such as commercial sex workers (State Council AIDS Working Committee Office and UN Theme Group on HIV/AIDS in China, 2004). Because only a small fraction (<10%) of the 1 million estimated seropositive cases in China is aware of their own serostatus (UNAIDS, 2003), one of the greatest challenges in China is the early identification of those infected, so that they can be educated to engage in safer sex practices. Although the Chinese government, in collaboration with the international society, has prioritized HIV testing in its

action plan to fight HIV/AIDS (UNAIDS, 2003), no community–based study has been conducted in China to assess the efficacy of VCT.

Therefore, the current study was designed to adapt and test a brief VCT intervention among female sex workers in China. Although VCT has not been evaluated in China, one may reasonably speculate that this individual–oriented approach might work with female sex workers (FSWs), given the clandestine nature of their sexual practices and the individual motivation of protection in the context of a growing heterosexual HIV epidemic. We hypothesized that a cultural adaptation of a brief VCT intervention, modeled after the "state–of–the–science" VCT program developed and evaluated by the CDC's Project RESPECT, would increase HIV/STD knowledge and consistent use of condoms, and would reduce rates of STD infection among FSWs in China.

METHODS

SURVEY SITES

The study was conducted in a suburban area (which will be called "H County" in this study to preserve anonymity) of Nanning, the capital city of Guangxi Zhuang Autonomous Region ("Guangxi"). Guangxi, one of China's five autonomous and multiethnic regions, is located in southern China. Gouangxi has witnessed an alarming rise in HIV prevalence in the past decade. A total of 8,602 HIV infected persons were reported at the end of 2003, which placed Guangxi third among Chinese provinces in terms of reported HIV seropositive cases (Guangxi CDC, 2004). A prosperous economy, increased international contact, and general tourism in Guangxi have created a market for commercial sex. According to the statistics from the public security agency, there are at least 50,000 female sex workers in Guangxi. H County is about 90 kilometers from the nearest major city. There are an estimated 200 entertainment establishments, with more than 2,000 women engaging in commercial sex service in the county.

PARTICIPANTS AND SURVEY PROCEDURE

Participants in the current study were recruited from restaurants, barbershops, and hair–washing rooms in three geographic locations in H County: (a) the county seat where the county administrative offices reside, (b) a recently established development zone in rural–urban conjunction, and (c) one rural township. These locations were selected based on recommendations from local health agencies (e.g., the county health department, the county antiepidemic station). Details regarding the recruitment procedure have been described elsewhere (Yang, Li, Stanton, Fang, et al., 2005). Briefly, the research team and local health workers conducted an ethnographic mapping (Carlson, Wang, Siegal, Falck, & Guo, 1994) of entertainment establishments providing sexual services and identified 85 such establishments in the three targeted areas (53 in the county seat, 12 in the development zone, and 20 in the township). The owners/managers of these establishments were contacted for permission to conduct research in their premises. Once the research team received permission, trained outreach health workers from the county antiepidemic station and local hospitals requested women in these establishments to participate in this study. Among the 582 women contacted, 454 (78%) agreed to participate and completed a self–administered questionnaire. A final sample of 400 women was randomly selected from those who provided specimens for STD testing (n = 411) and assigned by geographic location to either the intervention group (county seat, n = 200) or the control group (development zone and township, n = 200). The decision to enroll 400 out of 411 women into the intervention trial was largely based on the consideration of a balanced design (i.e., equal sample size in both groups). Six months postintervention follow–up was available from 70% (278/400) of the baseline cohort. The attrition was approximately evenly distributed between the intervention and the control groups (29.5% vs. 31.5%). The reasons for attrition included participants' refusal to continue in the study (n = 6),

loss of contact (n = 53), and no longer being a commercial sex worker, including those who had returned home for good, had married, or worked in a different occupation (n = 63). One of the reasons for loss of contact was the closure of the establishments. During the 6 months follow–up period, 12 (21%) of the 57 participating establishments went out of business.

VCT INTERVENTION

The intervention program was modeled after a two–session "state–of–the science" VCT program developed and evaluated by the CDC's Project RESPECT (Kamb et al., 1998). The Project RESPECT counseling sessions were designed to (a) assess actual and self–perceived HIV/STD risk, (b) assist the participants in recognizing barriers to risk reduction, (c) increase self–efficacy through skill training and acquisition (modeling and practice), (d) develop an appropriate personalized risk–reduction plan, and (e) encourage participant–initiated behavioral change.

The Project RESPECT two–session VCT program was adapted by the investigation team in response to the social and cultural context of FSWs in China. There were five major modifications to the original Project RESPECT protocol. First, duration of the first session was increased to 25 minutes from the original 20 minutes. This change was to provide more time for counselors to build rapport with FSWs and to help overcome the secrecy associated with sexual risk assessment among Chinese FSWs (Huang, Henderson, Pan, & Cohen, 2004). Second, information on basic knowledge of common STD symptoms and appropriate treatment/management of these symptoms was added to the second session in response to the limited HIV/STD knowledge among FSWs (Xia & Yang, 2005). Third, focus was increased on condom use negotiation skills and condom use skills through individualized risk reduction planning, in response to lack of ability and skills in condom use among FSWs (Huang et al., 2004). Fourth, five common STDs, but not HIV, were tested as surrogates for HIV infection because of the relatively low prevalence of HIV infection among FSWs in China (e.g., about 1%), which might not be sufficiently high to allow a meaningful examination of HIV infection as a biomarker in a cost–efficient style (Rotheram–Borus et al., 2000). Finally, VCT was implemented in community settings (e.g., entertainment establishments or workplace) rather than traditional clinical settings because of FSWs' minimal use of health care facilitates (Wong & Yilin, 2003).

The first VCT session was conducted before the STD screening. Activities in this 25–minute pretest session included introduction and trust building, individualized risk assessment, risk reduction planning, barriers of the risk reduction plan, possible solutions to the barriers, and condom use skills (modeling and practice). The session ended with a behavioral goal–setting exercise. Participants were asked to achieve their risk reduction goals (e.g., increased condom use) before the second session.

The second VCT session was conducted after all the results of STD testing were available (7–10 days after the first session). This 20–minute posttest session included a discussion and interpretation of the STD test results, knowledge of common STD symptoms, reasons for the success/failure of the proposed risk reduction plan, refinement of a long–range risk reduction plan, rehearsal of condom skills, and other issues related to risk reduction. Participants also received referrals to needed medical and psychosocial services.

Both the intervention and control groups received a gynecological examination which lasted about 15 minutes. Collection of blood specimens, cervical swabs, and screening of symptomatic STDs (e.g., genital warts) were performed during the gynecological examination. Free condoms were distributed to both the intervention group and the control group during the questionnaire survey. The control group received standard care of STD testing, which included didactic messages about STD testing, treatment, and prevention from STD clinicians that lasted

about 15 minutes. The intervention group received both pretest and posttest counseling following the VCT intervention protocol. In addition, about half of the women in the intervention group were randomly selected to receive periodic visits (a maximum of four visits during the 6-month follow–up period) by health care workers from the county antiepidemic station to check on their whereabouts and to answer any questions that the FSWs might have regarding disease prevention or other health issues. The VCT intervention and standard care control were delivered by two different groups of STD clinicians or other health care workers who received separate training using standardized manuals.

STD TESTING

Screening was conducted by trained STD clinicians and laboratory technicians for five common STDs (*Neisseria gonorrhoeae, chlamydia trachomatis, trichomoniasis, syphilis,* and *genital warts)* at baseline and 6–month postintervention. Blood specimens were drawn and assessed for syphilis using the Rapid Plasma Reagin (Xinjiang Xinde Co, China). Positive results were confirmed using the Serodia Treponema Pallidum Particle Agglutination (Fujirebio, Inc., Japan) procedure. Cervical swab specimens were obtained from women to detect *N. gonorrhoeae, C. trachomatis,* and *trichomonas vaginalis. N. gonorrhoeae* was identified using the standard culture procedure. Chlamydial infection was detected by rapid antigen test (Clearview, Unipath, UK). Trichomoniasis was diagnosed by detecting the motile parasite under a microscope. Genital warts were diagnosed by clinical examination performed by the STD clinician. All STD assays were conducted at the county antiepidemic station STD Laboratory. The selection of STD assays and testing locations was based on considerations of feasibility and sustainability of the intervention approach and the capacity–building of the local health care agencies. Investigators from the China CDC National Resource Center for STD Control provided training, supervision and quality control for all STD testing and diagnosis.

STD TREATMENT

All women who were positive for any of the five STDs were provided with free treatment after screening or testing. Gonorrhea was treated with a single injection (250 mg) of ceftriaxone; chlamydial infection was treated with a single dose (1 g) of azithromycin; trichomoniasis was treated with a single dose (2 g) of metronidazole; and early syphilis was treated with a single intramuscular injection of 2.4 million units benzathine penicillin. Genital warts were treated by CO2 laser at a local hospital. The treatment was supervised by licensed clinicians from the county antiepidemic station STD clinic. No test of cure was conducted after treatment.

QUESTIONNAIRE SURVEY

All participants completed a self–administered questionnaire at baseline and 6 months postintervention. The survey was conducted in separate rooms or private spaces where participants were recruited (e.g., workplace, living quarters). The questionnaire was pilot–tested in two waves among 22 women (7 in Wave 1 and 15 in Wave 2) to ascertain that the content and language were appropriate for the study population. No person was allowed to stay with the participant during the survey except the interviewer, who provided the participant with assistance if required. For participants with limited literacy (approximately 10%), the interviewer read each question and response options from her copy of the questionnaire, while the participant marked the response on her own copy, such that the interviewer would not see the participant's answers on survey questions. The questionnaire took about 1 hour to complete. The research protocol was approved by the institutional review boards at Wayne State University in the United States and Beijing Normal University and Guangxi CDC in China.

MEASURES

Individual Characteristics—Woman's age, ethnicity including Han or non–Han (e.g., Zhuang, Jingpo, Tong, and others ethnical minorities), years of formal schooling, living arrangements (i.e., living alone, living with other FSWs, or with other family members), type of hometown (i.e., rural or urban which include county seat, medium city, and large city), marital status (i.e., never married or ever married), and sexual relationship with stable partners (e.g., husband, fiancé, boyfriend, lover, or long–term clients) were collected through questionnaire survey.

Knowledge of HIV/STD and Condom Use—Knowledge was assessed using 28 items from four scales: knowledge of STD symptoms (10 items, Cronbach's $\alpha = .82$), HIV transmission modes (6 items, Cronbach's $\alpha = .89$), misconception of HIV transmission (6 items, Cronbach's $\alpha = .77$), and correct steps of condom use (6 items, Cronbach's $\alpha = .94$). The total number of correct answers was employed as the composite score for HIV/STD knowledge, HIV transmission modes, and condom use. Conversely, the composite score of HIV misconception was created by adding the number of incorrect answers in response to the six questions regarding the possibility of HIV transmission through daily contact. To minimize the effect of possible multicollinearity among outcome measures in multivariate analysis, the total number of correct responses to the 28 knowledge questions (Cronbach's $\alpha = .87$) was retained as a single HIV/STD knowledge score, with higher scores reflecting higher levels of knowledge about HIV/STD and condom use.

Condom Use Efficacy—The questionnaire contained questions measuring self–efficacy (five items) and response efficacy (one item) of condom use. The self–efficacy scale assessed women's beliefs about their own ability to use condoms or engage in protective sexual behavior (e.g., "I could refuse to have sex if my client does not want to use a condom"). The Cronbach's α for the scale was .60. A sum score was obtained as a composite score, with a higher score indicating a higher level of self–efficacy. The response efficacy item assessed women's perception regarding the effectiveness of condoms in preventing HIV/STD (i.e., "using a condom is an important way to prevent HIV and STD").

Consistent Condom Use—Women were asked the number of times they had used a condom during their previous three sexual encounters with their clients. The consistent use of condoms was defined in this study as using a condom every time during the previous three sexual episodes.

ANALYSIS

First, baseline differences between the intervention group and control group were examined using a chi–square test (for categorical variables) or ANOVA (for continuous variables). Second, the efficacy of the intervention program was assessed using both bivariate statistics (e.g., paired *t* test and Chi–square test) and multivariate statistics adjusting for demographic factors and baseline differences. To examine the effect of the intervention on women's HIV/STD knowledge and perceptions, the change over time within each group, as well as the differences in change scores between the groups, were compared. The effect of the intervention on women's HIV/STD knowledge, which was found to be significant at the bivariate level, was further examined using a general linear model (GLM) controlling for potential confounders including age, ethnicity, years of formal schooling, hometown type (rural vs. urban), marital status, and HIV/STD knowledge at baseline.

Third, the effect of the intervention on condom use and STD infection rates was assessed using multivariate logistic regression, controlling for potential confounders including age, ethnicity, years of schooling, type of hometown, stable sexual partnership (no vs. yes), condom use (no

use vs. any use), and STD infection (no infection vs. any infection) at baseline. All statistical analyses were performed using the SAS 9.1 statistical software package. A critical value of .05 was adopted for significance testing in bivariate comparisons and multivariate analyses.

RESULTS

BASELINE CHARACTERISTICS OF THE SAMPLE

The mean ages of women in the intervention and control groups were 23.7 and 23.9 years, respectively (Table 1). The two groups did not differ with respect to ethnicity, marital status, stable sexual partnership, and living arrangements. However, a larger proportion of women in the intervention group were raised in urban areas, as compared with women in the control group (30.7% vs. 15.5%, $p < .01$). Women in the intervention group had more years of formal schooling, as compared with women in the control group (6.3 vs. 5.4, $p < .05$). Preliminary data analysis revealed no differences in outcome measures between those intervention women (about 50%) who received periodic visits from local health care workers and the remainder of the women in the intervention group who did not receive such visits.

Individual demographic characteristics and baseline behavioral outcome measures (e.g., condom use) were also compared between the 400 women who were enrolled in the intervention trial and the 54 women who were not enrolled in the trial. They differed only in ethnicity, with a greater proportion of women who were in the intervention trial being Han ethnicity (57.1% vs. 35.2%, $p < .01$). In addition, baseline demographic characteristics and key outcome measures (rates of condom use and STD infection) were compared between the 278 women who completed the postintervention assessment and the 122 women who were lost to follow–up. None of the demographics characteristics (e.g., ethnicity, schooling, living arrangement, hometown type, and marital status) and baseline outcome measures was significantly different between the follow–up sample and those who were lost to follow–up.

EFFECTS OF THE INTERVENTION ON HIV/STD KNOWLEDGE AND PERCEPTIONS

The total knowledge score increased from baseline to postintervention for women in both the intervention group and the control group. The increase among women in the intervention group was significantly larger than among women in the control group (6.5 vs. 1.3, $p < .001$). The HIV misconception scale significantly decreased for women in the intervention group, while the scores remained similar over time among women in the control group (change scores: 1.5 vs. 0.0, $p < .001$). Compared with women in the control group, women in the intervention group demonstrated significant increases over time on scores of STD symptoms, (2.6 vs. 1.0, $p < .001$), HIV transmission modes (1.3 vs. 0.6, $p < .05$), and condom use (1.0 vs. 0.2, $p < .01$) (Table 2). There was no significant intervention effect on measures of self–efficacy and response efficacy. Women in both the intervention group and the control group reported similar increases on both measures over the 6 months period (see Table 2).

As shown in Table 3, GLM analysis of HIV/STD related knowledge yielded a significant main effect of intervention ($p < .0001$) while controlling for age, ethnicity, hometown type, marital status, schooling, and baseline HIV/STD knowledge. In addition to intervention status, years of formal schooling and the baseline knowledge were significantly predictive of HIV/STD knowledge at 6 months postintervention ($p < .05$ for schooling and $p < .01$ for baseline knowledge).

EFFECTS OF THE INTERVENTION ON CONDOM USE

Among women in the intervention group, one third at baseline and more than half at postintervention, reported consistent condom use during the previous three sexual episodes with clients ($p < .0001$). By contrast, one sixth of the women in the control group at baseline

and one quarter at postintervention, consistently used condoms. As shown in Table 4, women in the intervention group demonstrated a greater increase in consistent condom use than women in the control group (18.6% vs. 9.6%, $p < .05$).

In multivariate logistic regression controlling for potential confounders and baseline condom use and STD infection rates, intervention was significantly associated with increased rates of consistent condom use at 6 months postintervention. Women in the intervention group were more likely than women in the control group to use condoms consistently during the last three sexual encounters with clients (OR = 2.23, 95% CI = 1.26–3.96). In addition, condom use at baseline was significantly predictive of consistent condom use at postintervention (OR = 1.72, 95% CI = 1.33–2.22), with women who had used condoms at baseline being more likely to use condoms consistently postintervention (Table 5, Model 1).

EFFECTS OF THE INTERVENTION ON STD INFECTION RATES AT 6–MONTH FOLLOWUP

As shown in Table 4, about 41% of the women in both groups had tested positive for at least one of the five STDs at baseline. All women who tested positive for any of theses STDs received free treatment shortly after testing. At 6–month postintervention, 29.1% of the intervention group and 41% of the control group tested positive for at least one STD ($p < .05$).

About 6% of the intervention group tested positive for syphilis at baseline and the number of syphilis cases remained the same at 6 months postintervention. However, the number of syphilis infections in the control group increased from 8.8% at baseline to 11.1% at follow–up. Gonorrhea infection was higher among women in the control group as compared with women in the intervention group, both at baseline (17.5% vs. 13.7%) and at follow–up (10.4% vs. 8.5%); however, none of these differences reached statistical significance.

Although chlamydia infection was higher among women in the intervention group compared to women in the control group at baseline (21.6% vs. 13.1%), the 6–month infection rate was lower among women in the intervention group (14.2%) as compared with women in the control group (21.5%). A similar trend was observed with trichomonas infection, with women in the the intervention group reporting a higher infection rate than the control group at baseline (7.9% vs. 7.3%). However, the 6–month infection rate was lower among women in the intervention group (5.7%) as compared with women in the control group (10.5%).

Multivariate logistic regression analysis suggest a significant reduction among the women in the intervention group on the 6–month STD infection rate (OR = 0.44, 95% CI = 0.24–0.80). Ethnicity, stable partnership and baseline STD infection rate were also significantly predictive of the 6–month STD infection rate: women who belonged to ethnic minority groups (OR = 2.12, 95% CI = 1.09–4.12), had stable sexual partners (OR = 2.12, 95% CI = 1.09–4.12), and were infected with at least one STD at baseline (OR = 2.37, 95% CI = 1.37~4.09) were more likely to test positive for an STD at the 6–month follow–up (Table 5, Model 2).

DISCUSSION

The data from this intervention trial suggest a significant increase over a 6–month period in HIV/STD–related knowledge and consistent condom use and a decrease in the same 6 month-period for STD infection rates among women in the intervention group. Women who received the culturally adapted brief VCT intervention were less likely to acquire new STD infections as compared with women who received standard care of STD testing and treatment. These results suggest that VCT intervention may have a potential impact in increasing consistent condom use and reducing STD infection among female sex workers in China.

However, data from this study did not suggest an intervention effect on perceived condom use self–efficacy and response efficacy. There are several possible reasons for this finding. First, the brief VCT intervention might not provide additional benefits over the standard care of STD testing (e.g., knowledge–based didactic messages from health care providers) in improving self–efficacy and response efficacy. Second, there may be a "ceiling effect" in the measurement as most of the women in this study had a relatively high level of perceived efficacy regarding condom use prior to intervention (e.g., almost 100% of women at baseline believed that condom use can prevent HIV/STD). Third, we might have weak measurements of efficacy (e.g., relatively low α on self–efficacy scale and a single item measuring response efficacy). Nevertheless, given the documented association between self–efficacy and condom use in the literature (Baele, Dusseldorp, & Maes, 2001), and a lack of ability and power in condom use among Chinese FSWs (Zhang & Ma, 2002), self–efficacy may remain a critical component of any effective skill–based intervention. Future studies are needed to study the impact of a brief VCT intervention on self–efficacy of condom use.

The fact that the rates of STD infection in the control group remain similar over time suggests that STD testing and treatment alone (without cognitive theory–based, skill–focused, interactive counseling) or knowledge–based didactic educational messages delivered by health care providers in China were not sufficient to reduce the STD infection. This finding is consistent with studies in the United States. For example, Landis, Earp, and Koch (1992) found that anonymous and free standard HIV testing and counseling provided by health departments in North Carolina did not result in reduction of sexual risk behaviors or increase in safer sex practices among individuals at high risk of acquiring HIV infection.

The high rates of STD infection among the study participants at both baseline and at follow–up underscore the urgency for sustained efforts of effective HIV/STD prevention intervention among this group. Although free effective treatment was offered to all women infected at baseline, the postintervention STD infection rates among both the intervention group and control group remained alarmingly high (29.1% for the intervention group and 41% for the control group). The high level of reoccurrence of STD infection among FSWs may suggest a trend of continuing unprotected sex practices after previous infections. The high rate of chlamydia infection among these women (14.2% in intervention and 21.5% in control) at 6–month follow–up may suggest a high prevalence of chlamydia infection in their male partners (clients or nonpaying partners), especially since a previous study has suggested a hidden epidemic of chlamydia in China (Parish et al., 2003). The finding that women of ethnic minority were more likely to be infected than ethnic majority (i.e., Han) at follow–up suggests that minority women might be less protective in their sexual relationships than Han women. In addition, the finding that women having stable sexual partners were more likely to be infected with an STD at follow–up, may suggest a possibility that they were reinfected by their stable sexual partners and further serves to underscore the importance of intervention measures targeting male partners of FSWs.

There are several limitations in this study. First, this study provides data for effect of a brief VCT intervention program over a relatively short time period (i.e., 6 months). As behavioral change is most effective if it is sustained, future studies with a longer term follow–up are needed to assess the duration of the effects of such an intervention program. Second, the participants were assigned by geographic site in this quasi–experimental trial. Although the intention of such an assignment was to minimize the potential intervention contamination, the intervention and control groups differed in some baseline characteristics. However, multivariate analytic approaches adjusting baseline differences yielded robust results. Third, there was a relatively high attrition rate to follow–up (i.e., 30%) in this study. Because commercial sex is illegal in China, these women were very difficult to access and retain in longitudinal follow–up owing to their fear of stigmatization, arrest, and detention. The frequent relocation or closure of

establishments offering sexual services also contributed to the high rate of loss to follow–up. However, our preliminary data analysis indicated that the follow–up sample and those who were lost to follow–up did not differ in any of the demographic characteristics and key outcome measures. Fourth, participants in our study were primarily recruited from entertainment establishments and personal service sectors in a rural county of Guangxi. Because Chinese female sex workers are a heterogeneous population in terms of their demographic characteristics and sexual practices (Huang et al., 2004), the ability to generalize and extend our findings to female sex workers in other sectors or other geographic regions may be limited.

In summary, this intervention trial provided preliminary evidence about the efficacy of cultural adaptation of a brief VCT intervention among FSWs in China. The VCT intervention is likely to increase consistent condom use and to decrease STD infections over 6 months follow–up. Further studies, especially randomized controlled trials testing long–term effect, are needed to explore the efficacy of VCT intervention in different cultural settings or in different populations at risk of HIV/STD infection.

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TABLE 1

Individual Characteristics of Female Sex Workers (FSWs), by Intervention Group Assignment (%)

Characteristics	Intervention Group Assignment		
	Overall	**Intervention**	**Control**
N	278	141	137
Mean age in years (*SD*)	23.8 (5.2)	23.7 (5.0)	23.9 (5.4)
Mean years of schooling (*SD*)	5.8 (3.2)	6.3 (3.2)	5.4 (3.2)*
Ethnicity			
Han	61.7	62.9	60.5
Non–Han (Zhuang, Jingpo, Tong, etc.)	38.3	37.1	39.5
Living arrangement			
Alone	16.2	17.7	14.6
With other FSWs	71.6	66.0	77.4
With family member/relatives	12.2	16.3	8.0
Hometown			
Rural	76.6	69.3	84.5**
Urban	23.4	30.7	15.5
Marital status			
Never married	58.1	63.6	52.6
Ever Married	41.9	36.4	47.4
Having a stable partner			
No	28.2	23.6	32.8
Yes	71.8	76.4	67.2

* *Note*. $p < 0.05$;

** $p < 0.01$.

TABLE 2

HIV/STD–Related Knowledge and Efficacy Among Female Sex Workers, by Group Assignment and Timing of Survey

HIV/STD Knowledge and Efficacy	Pretest		Posttest		Change Score[a]	
	Intervention	Control	Intervention	Control	Intervention	Control
N	141	137	141	137	141	137
Knowledge						
Knowledge of STD symptoms	4.0	3.2*	6.6	4.2***	2.6	1.0***
Knowledge of HIV transmission	4.5	4.3	5.8	4.9***	1.3	0.6*
HIV misconception	2.6	2.4	1.1	2.4***	−1.5	0.0***
Knowledge of condom use	4.9	5.0	5.9	5.2***	1.0	0.2**
Total knowledge	16.8	16.7	23.2	17.9***	6.5	1.3***
Efficacy						
Self–efficacy	3.5	3.1**	4.1	3.7**	0.6	0.6
Response efficacy	0.8	0.7	1.0	0.9	0.2	0.2

[a] Change of HIV/STD knowledge or efficacy from baseline to postintervention.

* $p < .05$;

** $p < .01$;

*** $p < .001$.

TABLE 3

General Linear Model Analysis on the Effects of Intervention on HIV/STD–Related Knowledge Among Chinese Female Sex Workers

Source of Variance[a]	Type III Sum of Square	*df*	Mean Square	*F*	*p* Value
Model	2653.60	7	379.09	24.26	<.0001
Age	31.71	1	31.71	2.03	.1555
Ethnicity	8.53	1	8.53	.55	.4606
Years of schooling	84.73	1	84.73	5.42	.0206
Hometown	40.62	1	40.62	2.60	.1081
Marital status	1.72	1	1.72	.11	.7406
HIV/STD knowledge at baseline	149.84	1	149.84	9.59	.0022
Intervention Status	1477.87	1	1477.87	94.60	<.0001
Error	4046.39	259	15.62		
Corrected total	6699.99	266			

[a]Dependent variable: knowledge score at post–intervention. R^2 = .4.

TABLE 4

Condom use with Clients and Sexually Transmitted Diseases (%) Among Female Sex Workers, by Group Assignment and Timing of Survey

	Pretest		Posttest	
Condom use and STDs	**Intervention**	**Control**	**Intervention**	**Control**
N	141	137	141	137
Consistent condom use	34.0	16.1***	52.6	25.7***
Sexually transmitted diseases				
Any STD	41.1	40.9	29.1	41.0*
Syphilis	5.7	8.8	5.7	11.1
Gonorrhea	13.7	17.5	8.5	10.4
Chlamydia	21.6	13.1	14.2	21.5
Trichomonas	7.9	7.3	5.7	10.5
Genital warts	2.8	0.7	1.4	0.7

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

TABLE 5

Logistic Regression Analysis Assessing Impact of Intervention on Consistent Condom use With Clients and 6–month STD Infection Rates at Postintervention

	Consistent Condom Use (Model 1)		STD Infection (Model 2)	
Predictors	**OR**	**95%CI**	**OR**	**95%CI**
Age (years)	1.03	0.97–1.10	0.94	0.89–1.00
Ethnicity				
Han	1.00		1.00	
Other (Zhuang, Jingpo, Tong)	1.77	0.94–3.34	1.89	1.03–3.49
Year of schooling	1.01	0.92–1.10	1.02	0.94–1.12
Hometown				
Rural	1.00		1.00	
Urban (county seat, city)	1.63	0.84–3.17	1.05	0.53–2.08
Having stable partners				
No	1.00		1.00	
Yes	1.01	0.53–1.93	2.12	1.09–4.12
Condom use at baseline				
Never	1.00		1.00	
Any use	1.72	1.33–2.22	1.16	0.63–2.14
Any STDs at baseline				
No	1.00		1.00	
Yes	0.92	0.52–1.60	2.37	1.37–4.09
Group assignment				
Control	1.00		1.00	
Intervention	2.23	1.26–3.96	0.44	0.24–0.80

Note. OR = odds ratio; CI = confidence interval.