Published in final edited form as:

AIDS Educ Prev. 2010 August ; 22(4): 344–355. doi:10.1521/aeap.2010.22.4.344.

Theory-based HIV-related sexual risk-reduction prevention for Chinese female rural-to-urban migrants

Danhua Lin, Ph.D¹, Xiaoming Li, Ph.D², Bonita Stanton, MD², Xiaoyi Fang, Ph.D¹, Xiuyun Lin, Ph.D³, Xiaoyenan Xu, B.A¹, Lixia Ma, B.A¹, and Cuicui Xia, M.A¹

¹Institute of Developmental Psychology, Beijing Normal University, Beijing, China

²Wayne State University School of Medicine Pediatric Prevention Research Center, Detroit, MI, USA

³School of Psychology, Beijing Normal University, Beijing, China

Abstract

Background—The objective of this pilot study was to evaluate the initial efficacy of a protection motivation theory-based behavioral HIV prevention intervention in increasing HIV knowledge, condom use perception, condom use intention and consistent condom use among female rural-to-urban migrants in Beijing, China.

Methods—Three hundred female migrants were assigned to the intervention group (N=200) and control group (N=100). Data were collected at baseline and a 4-month follow-up.

Results—The results suggest that HIV-related knowledge, condom use perceptions, condom use intention and condom use skills at the follow-up were significantly improved among female migrants in the intervention group compared to those in the control group. Moreover, a significantly higher rate of consistent condom use at post intervention was found compared to that at baseline in the intervention group (17.0% vs. 32.0%, $p<0.05$) but not in the control group (23.8% vs. 29.2%, ns).

Conclusion—The current study suggests that the theory-based intervention can be efficacious in increasing HIV knowledge, condom use perceptions and skills, and consistent condom use among female rural-to-urban migrants in China.

Keywords

Theory-based HIV prevention; Condom use; Chinese; Female rural-to-urban migrants

Introduction

Data from both developed and developing countries suggest that theory-based behavioral intervention programs can be effective in reducing HIV-related risks and facilitating changes towards safer sex behavior. Existing literature indicates that the health belief model, protection motivation theory (PMT), transtheoretical model, and information-motivation-behavioral skills model are the most commonly used social cognitive theories to guide HIV-related risk reduction efforts worldwide (Noar, Chabot, & Zimmerman, 2008). One of the theories, PMT, has served as the basis for an adolescent HIV prevention intervention

program entitled “Focus on Kids” (Stanton et al., 2006) and its various cultural adaptations that have been delivered to racially and ethnically diverse youth living in geographically and culturally diverse settings including both urban and rural settings in the United States (Stanton et al., 1996; Stanton et al., 2005), Namibia (Stanton et al., 1998), Viet Nam (Kaljee et al., 2005), The Bahamas (Deveaux et al., 2007), and China (Li et al., 2008). Although the PMT-based HIV programs have demonstrated to be effective in preventing HIV infection in these cultural settings, the intervention efforts were limited to children and adolescents/young adults; limited data are available regarding the feasibility and efficacy of the program among populations at high HIV risk such as female migrants in China.

China experienced a rapid expansion of HIV/AIDS epidemic over the first decade of the twenty-first century. The current official estimate of HIV infection cases by the Chinese government exceeds 740,000 (China Ministry of Health, 2009). Infection through sexual transmission has experienced the most rapid growth in recent years, although injection drug use and contaminated blood collection historically were the primary sources of HIV transmission in China. Many HIV-infected cases in China are believed to be among the nation’s 147 million rural-to-urban migrant workers (Duan, Yang, Zhang, & Lu, 2008). These migrants are individuals who move from rural areas to urban areas for jobs without establishing permanent urban residency.

Compared to their male counterparts, female migrants, who usually work in private factories, retail or domestic services, and entertainment or personal service sectors (such as nightclubs, beauty salons, massage parlors), are considered to be more vulnerable to HIV infection and transmission (Yang, Li, Stanton, Fang, et al., 2005). There are several possible reasons for the higher vulnerability among these women. First, women are biologically more susceptible to HIV during sexual intercourse (Turmen, 2003). Second, female rural migrants usually receive less education, have less knowledge of HIV/STD (Li C, et al., 2002; Wu, He, Gu, & Xu, 2007; Gao et al., 2009) and are less knowledgeable about accessing health care due to social, psychological and economic barriers (Wu et al, 2007; Hu, Li, & Chen, 2006; Zheng et al., 2001). A study in Shanghai showed about 50% of unmarried young female migrants had experienced pregnancy, and 40% of them chose not to attend public clinics for abortions (Zheng et al., 2001). Third, female migrant workers often reported high rates of HIV-related sexual risk behaviors, such as unprotected premarital sex, commercial sex and inconsistent condom use (Yang, Li, Stanton, Chen, et al., 2005). Several studies suggest that a large proportion of female sex workers in China are rural-to-urban migrants (UNAIDS, 2002; Yang, Li, Stanton, Chen, et al., 2005). Finally, in traditional cultural practices, Chinese women usually lack power and/or control over sexual negotiations with men regarding condom use, especially female migrants who are socially or financially dependent on their boyfriends or husbands during migration (UNIFE, 2002; Xia & Yang, 2004; Long, 2006). Therefore, systematic HIV prevention efforts among this vulnerable population will be of great importance in controlling the HIV epidemic in China.

HIV education efforts have increased in China in recent years (Hong & Li, 2009); however, few of the published studies employed a theoretical framework for the intervention programs. Moreover, most of the studies were primarily focused on female sex workers and IDUs and there is a lack of prevention intervention among other vulnerable populations, such as female migrant workers (Hong & Li, 2009). In this study, we aim to explore whether a cultural adaptation of a western-developed, protection motivation theory-based HIV prevention intervention is efficacious in reducing sexual risk behaviors among female rural-to-urban migrants in China.

Methods

Study site

This study was conducted in Beijing, the capital city of China. Beijing has been known to have a large migrant population, both in size and diversity of their geographic origins. According to the Beijing migrant population surveillance in 2007, there were 4.19 million rural-to-urban migrants in Beijing (Beijing Bureau of Statistics, 2008). The migrants come from all 31 of China's provinces. The majority (80%) of rural-to-urban migrants in Beijing were between 18 and 40 years of age. Beijing is among the Chinese administrative regions that are experiencing a rapid rise of HIV infection and transmission, with a 54% annual increase in HIV cases in 2007 (Beijing Bureau of Health, 2007). The majority of reported HIV infected cases in Beijing were among migrants (Beijing Bureau of Health, 2007).

Participants and survey procedure

A sample of 300 female migrants in the current study was recruited from personal service venues in Dongchen district, one of the central urban districts in Beijing. Following the recruitment procedure we used in a previous study (Li et al., 2004), we identified personal service venues that mainly employed female migrants (e.g., restaurants, public bathhouses, Karaoke halls, and hotels) as our target sampling units. After obtaining permission from the owners/managers of these venues to conduct research on their premises, the trained outreach workers from the Dongchen Women Association approached female migrants in these venues and asked them to participate in the study. All participating women completed a self-administered questionnaire at baseline and a 4-month follow-up. The questionnaire took about one hour to complete. The research protocol was approved by the Institution Review Board at Beijing Normal University in China.

Guiding model of behavioral change

The intervention program is based on the protection motivation theory (PMT). PMT proposes that environmental and personal factors create an opportunity for a behavior that would potentially threaten an individual's well-being. The perceived threat initiates a threat-appraisal pathway and a coping-appraisal pathway. Appraisal of the potential threat includes four factors: intrinsic rewards, extrinsic rewards, perceived severity, and perceived vulnerability while appraisal of the coping process includes three factors: self-efficacy, response efficacy and response cost. These two appraisal pathways are balanced by the individual to produce an intention to act in a manner with a varying degree of protection or risk, so called "protection motivation". The PMT model has widely been used as the theoretical framework in a variety of health promotion and prevention intervention efforts including HIV/AIDS, diet, and physical activities (Zhang et al., 2004; Plotnikoff & Higginbotham, 1998; Cox & Bastiaans, 2007; Plotnikoff, Trinh, Coureya, Karunamuni, & Sigal, 2009).

Description of intervention condition

The PMT-based intervention program employed in this study was a modification of a HIV intervention program that was delivered and evaluated among Chinese college students (Li et al., 2008). The college program, "My Future, My Health", was a modification of a program developed in the US entitled "Focus on Kids", for the younger adolescents (Stanton et al., 1998). The Chinese college program was further modified in response to the social and cultural context of sex risk among young female migrants. A number of quantitative and qualitative studies suggest that most female migrants lack HIV knowledge, perceive a low level of vulnerability to HIV/STDs, do not consider condoms to be an effective means of HIV/STD prevention, do not feel empowered to use a condom, and perceive substantial

barriers to using a condom (Li et al., 2004; Hong et al., 2008; Yang, Li, Stanton, Fang, et al., 2005). The revised program is a 6-session (each approximately 1.5 hours) risk-reduction intervention that emphasizes HIV/STD knowledge, negative consequence of high risk behaviors, decision making, goal setting, communication skill, condom negotiation skill, condom use skill, self-efficacy improvement, consensual relationships and empowerment. The intervention format includes games, group discussions, videos, rehearsals, role-plays, brainstorming, and homework assignments.

Randomization and intervention delivery

Intervention assignment occurred at the level of venues ($n = 16$ workplaces). A total of 200 (67%) women from 10 workplaces were randomly assigned to intervention condition, 90% of whom completed all the intervention sessions. One hundred women from six workplaces were assigned to an attention control condition. Women in the control condition participated in baseline and follow-up assessment. Women in the intervention condition received the intervention curriculum in small groups (i.e., 10–20 female migrants in each group). One facilitator and two assistants delivered the intervention curriculum to each group in 6 weekly sessions. The facilitators ($n=5$) were psychology faculty members and graduate students in a local university. The assistants ($n=10$) were either psychology graduate students or outreach workers from a local Women's Association. Prior to the implementation of the intervention, all facilitators and assistants received a 2-day training on the contents and implementation of the curriculum. The intervention was implemented in community settings (e.g., workplace).

Measures

Individual characteristics

Information on the participants' age, educational level ($\leq$ junior middle school, $\geq$ high school), marital status, and duration of migration was collected. Respondents were also asked about their involvement in substance use behaviors in the past 6 months (i.e., daily smoking, binge drinking, and alcohol intoxication) with dichotomized choices (yes/no).

HIV knowledge

Knowledge of HIV transmission was assessed using 11 true/false items including “using HIV-contaminated blood or blood products”, “from mother to fetus during pregnancy”, “having sex with an HIV infected person”, and “biting by mosquitoes or flies”. The Cronbach alpha is 0.93 for the scale. A composite score was created by summing the correct responses to 11 items (score ranged from 0–11), with a higher score indicating more knowledgeable about HIV transmission.

Condom use self-efficacy

The scale assessed individual belief about one's own ability to use condoms (e.g., “I will refuse to have sex if my partner does not want to use a condom”). The scale consisted of six items with a Cronbach alpha of 0.89. Individual scores were averaged to produce a composite score, with higher scores indicating higher levels of condom use self-efficacy.

Condom use response efficacy

The condom use self-efficacy scale assessed perceptions regarding the effectiveness of condom use (e.g., “use of condoms could reduce the chance to get HIV”). The scale consisted of six items with a Cronbach alpha of 0.75. The scores from the individual items were averaged to produce a composite score, with higher scores indicating higher levels of response efficacy.

Condom use response cost

The scale assessed the perceived costs associated with condom use (e.g., “My partner will be angry if I insist on using a condom”). The scale consisted of seven items with a Cronbach’s alpha of 0.80. An average score was obtained as a composite score, with higher scores indicating higher levels of response cost.

Vulnerability

One item was employed to assess perceived personal vulnerability to negative consequences resulting from unprotected sex (i.e., likelihood to get HIV in the future). The item has a 4-point response choice ranging from “impossible” to “very possible”. For the purpose of data analysis in the current study, the responses were dichotomized into “impossible” and “possible”.

Condom use intention

The condom use intention was measured by asking participants how often they plan to use a condom in the future. The 4-point response choice ranged from “never” to “always”. For the purpose of data analysis in the current study, the respondents who answered “always” was considered as having an “intention to use a condom”.

Intention to persuade partners to use condom

Participants were asked with a single item whether they would persuade their partners to use a condom in the future. The response choices ranged from 1= “absolutely impossible” to 5= “certainly”. For the purpose of data analysis in this study, participants who selected the responses of “possible” or “certainly” were considered having “intention to persuade partners to use condom”.

Condom use skills

The condom use skills were measured by asking participants to sort five preprinted pictorial cards describing major steps of condom use. The five steps were: (1) check the expiration date on condom wrap; (2) tear the condom package carefully, do not tear it with your nails; (3) pinch the air out of the tip and roll the condom all the way up until it wraps the whole penis; (4) after sexual intercourse, withdraw the penis before it gets soft, be sure to hold the base of the condom when doing so, and then roll the condom off; and (5) tie the used condom and throw it away in the trash can. The five cards that describe these steps were presented to the participants in a random order and only those who arranged all the five cards in correct order were considered to have correct condom use skills.

Consistent condom use

Participants were asked the number of times they had used a condom in the last three sexual episodes. Consistent condom use was defined in this study as using a condom every time they had engaged in sex during the last three sexual episodes.

Analysis

Baseline differences between the intervention group and control group were examined using Chi-square test (for categorical variables) or ANOVA (for continuous variables). The efficacy of the intervention program on HIV knowledge and HIV-related perceptions was assessed using ANOVA and multivariate statistics controlling for demographic factors and baseline differences in knowledge and perceptions. The effects of the intervention on HIV knowledge and condom use related perceptions (self-efficacy, response efficacy), which were significant at the bivariate level, were further examined using general linear model

(GLM) controlling for potential confounders including age, educational level, marital status, and HIV knowledge and perceptions at baseline.

The effects of the intervention on vulnerability, condom use intention, intention to persuade partner use, condom use skills, and consistent condom use were assessed using both bivariate statistics (i.e., Chi-square) and multivariate logistic regression controlling for potential confounders including age, educational level, marital status, and baseline measures of respective perception or skills. All statistical analyses were performed using the statistical software package SPSS for Window v. 15.0.

Results

Demographic characteristics of the sample

Among the 320 female migrants we contacted, 300 (94%) agreed to participate and completed a self-administered questionnaire at baseline. Four-month follow-up data were available from 75% (226/300) of the baseline cohort. Although the intervention group experienced a higher attrition rate than the control group (26% vs. 19%), the difference did not reach statistical significance. Reasons for attrition included loss of contact, the closure of the workplaces, returning home and change of workplaces.

The mean age of female migrants in the intervention and control groups were 22.99 and 20.48 years, respectively (Table 1). The two groups did not differ with respect to educational level, sexual experience, migration duration, and smoking and drinking behaviors. Women in the intervention group were older and were more likely to be married.

Baseline individual demographic characteristics (i.e., educational level, age, marital status) and baseline outcome measures (i.e., HIV knowledge, self-efficacy, response efficacy, response cost, vulnerability, intention to use condom, intention to persuade sexual partner to use condom, condom use skill, consistent condom use) were compared between the 226 women who completed the post intervention assessment and 74 women who were lost to follow-up. None of the demographic characteristics and baseline outcome measures was significantly different between the follow-up sample and those who were lost to follow-up.

Intervention effects on HIV knowledge, condom use perceptions and intentions

No significant difference was found between the intervention group and the control group in terms of baseline HIV knowledge, condom use perception and condom use intention. There were significant intervention effects in increasing HIV knowledge, three subscales of condom use perceptions, and condom use intention (Table 2). Compared to women in the control group, women in the intervention group reported a higher level of HIV knowledge, condom use self-efficacy, condom use response efficacy, vulnerability, intention to use a condom, and intention to persuade partner to use a condom at post-intervention.

As shown in Table 3, GLM analysis of HIV-related knowledge yielded a significant main effect of the intervention ($p < 0.0001$) controlling for age, educational attainment, marital status, and baseline HIV knowledge. In addition to intervention status, baseline HIV knowledge was significantly predictive of HIV knowledge at post-intervention ($p < 0.0001$).

Similar results were found with respect to the main effect of intervention on condom use self-efficacy ($p < 0.0001$) and condom use response-efficacy ($p < 0.0001$) at post-intervention after controlling for several confounding factors. The baseline condom use self-efficacy (Model 1 in Table 4) and condom use response-efficacy (Model 2 in Table 4) were significantly associated with the respective follow-up measures in GLM analyses.

Multivariate logistic regression showed significant effects of intervention on vulnerability, intention to use a condom, and intention to persuade partner to use a condom at post-intervention after controlling for demographic variables and baseline measures (Table 5). Compared to women in the control group, women in the intervention group were more likely to perceive themselves to be vulnerable to HIV (OR=5.22, 95% CI=1.84–14.86), intend to use a condom (OR=3.65, 95% CI=1.87–7.13) and persuade partners to use a condom in the future (OR=7.83, 95% CI=3.75–16.36).

Intervention effect on condom use skills and consistent condom use

Among women in the intervention group, 43% at baseline and 78% at post-intervention reported correct condom use skills ($p<0.0001$). By contrast, 39% in the control group at baseline and 33% at post-intervention displayed correct condom use skills (Table 2).

In multivariate logistic regression controlling for demographic variables and baseline condom use skills, intervention status was significantly associated with increased correct condom use skills at post-intervention (Table 5). Women in the intervention group were more likely than women in the control group to display correct condom use skills (OR=8.13, 95% CI=4.21–15.73).

Consistent condom use increased over time in both groups. No significant difference was found regarding consistent condom use at post-intervention between the two groups (32% vs. 29.2%). However, a significant increase was found regarding consistent condom use at post intervention compared to that at baseline in the intervention group (17% vs. 32%, $p<0.05$), but not in the control group (23.8% vs. 29.2%).

Discussion

The data from this intervention trial suggest a significant increase in HIV-related knowledge, protective perceptions regarding condom use (condom use self-efficacy, response efficacy, and vulnerability), condom use intention, and condom use skills among female migrants in the intervention group. These results suggest that PMT-based HIV prevention intervention may have a potential impact in increasing HIV knowledge, condom use perceptions, condom use intention, and condom use skills among female rural-to-urban migrants in China. The theory provides a plausible framework for designing and evaluating a HIV risk reduction program with Chinese female migrants.

The study also showed a strong motivation and willingness to participate in the HIV prevention effort among rural-to-urban female migrants in China. About 90% of female migrants in both intervention and control groups at baseline reported willingness to participate in HIV-related activities. Therefore, more efforts should be made to deliver HIV-related knowledge and behavioral skills to this vulnerable population and further explore the effective components regarding HIV prevention intervention programs.

However, results from the study did not suggest an intervention effect on consistent condom use between the intervention group and the control group at post-intervention. There are several possible reasons for this non-significant finding. First, only about one-third of participants ($N=71$) in the follow-up sample reported ever having sexual intercourse, which resulted in a limited statistical power to detect statistical significance. Second, the follow-up period in this study is short. It might need a longer time period for the conversion of relevant knowledge and perceptions (e.g., self-efficacy) into actual behavioral change. Third, no intervention effect was found regarding condom use response cost. Generally, condom use response cost is related to social stigma or rejection or perception of unequal power in sexual relationships (e.g., “my partner will be angry or abandon me if I insist on using a

condom”). In traditional Chinese culture, there has been a strong social stigma against women, especially young women, who are actively engaging in sexual intercourse or protective behaviors (e.g., using a condom) (Lou, Zhao, & Gao, 2004; Long, 2006). The stigma might prevent women from actively seeking condom use (e.g., obtaining a condom, talking to partner about condom use, or using a condom), even though they had correct HIV knowledge and appropriate attitudes. Therefore, future studies are needed to explore the impact of the PMT-based prevention program on consistent condom use and examine the links between protective perception and intention and actual behavioral change among young female migrants in China.

Another factor that could potentially affect the difference in consistent condom use between the intervention group and the control group was the higher proportion of married women in the intervention group (14%) compared to the control group (4%). The higher proportion of married women could contribute to the lower rates of consistent condom use at the baseline in the intervention group as many married women might have felt fairly certain that they were in a monogamous relationship. The fact that a group with a high percentage of married women increased consistent condom use from the baseline to the 4-month follow-up may actually give further support to the initial efficacy of the intervention program.

There are several limitations in this study. First, this study only examined a short term intervention effect. Future studies with a longer term follow-up are needed to assess the medium or long-term effects of such an intervention program. Second, there is a relatively high attrition rate at the follow-up in this study. Because female migrants are highly mobile, they frequently move from one workplace to another to seek more income. However, our preliminary analysis indicates 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. Finally, all outcomes are measured by self-report, and thus are subject to self-reporting bias (e.g., socially desirable response or error of recall).

The findings in the current study suggest that more attention should be paid to issues in the future with respect to the application of PMT theory in HIV prevention intervention across cultures. First, in a culture quite different from western countries, constructs in PMT theory may need to be re-conceptualized and culturally adapted in order to better understand which components of the PMT are more predictive of positive behavioral changes. For example, Kaljee suggested that in Vietnam where the culture places a strong emphasis on filial and societal responsibilities, PMT constructs such as intrinsic and extrinsic rewards might need to be re-conceptualized and adapted to non-Western ideals and social structures (Kaljee et al., 2005). Second, the mediating mechanisms of PMT-based HIV prevention intervention should be explored to further examine whether and how the theory (or constructs of the theory) accounts for behavioral change in the context of HIV-related sexual risk reduction.

Acknowledgments

The research is supported by the third round of Global Fund (Grant#2006-ZY-24), Chinese National Social Science Foundation (Grant# 08CSH028), and NIH Research Grant R01NR10498. Some preliminary results of the study were presented at the 3rd International Conference on Bioinformatics and Biomedical Engineering (Beijing, China, June, 11–13, 2009). The authors want to thank workers at the Dongchen District Women Association for their assistance with the project. The authors also want to thank Dr. Yan Guo and Ms. Joanne Zwemer for assistance with manuscript preparation.

References

- Beijing Bureau of Health. New HIV infection cases increased fifty percent in 2007 compared to 2006 in Beijing. *Port Health Control* 2007;12(6):43.

- Beijing Bureau of Statistics. Beijing Statistical Yearbook. 2008.
<http://www.bjstats.gov.cn/tjnj/2008-tjnj>
- Chinese Ministry of Health (CMOH). Update on the HIV/AIDS Epidemic in China by the Ministry of Health. Beijing, China: CMOH; 2009. Retrieved on January 29, 2010, from
<http://www.chinaids.org.cn/n16/n1193/n4073/302767.html>
- Cox D, Bastiaans K. Understanding Australian consumers' perceptions of selenium and motivations to consume selenium enriched foods. *Food Quality and Preference* 2007;18:66–76.
- Deveaux L, Stanton B, Lunn S, Cottrell L, Yu S, Brathwaite N, Li X, Liu H, Marshall S, Harris C. Adolescent risk reduction in developing countries: an HIV prevention intervention with and without a parental monitoring component targeting sixth grade students in The Bahamas. *Archives of Pediatrics & Adolescent Medicine* 2007;161(12):1130–1139. [PubMed: 18056557]
- Duan C, Yang K, Zhang F, Lu X. Nine patterns of changing trends among Chinese migrants since the reform and open policy. *Population research* 2008;32(6):30–43.
- Gao M, He N, Zhang J, Shen X, Qin S, Jiang Q. Willingness to Participate in Voluntary Counseling and Testing for HIV and Its Correlates Among Female Migrants in Houma City of Shanxi Province, China. *Chinese Primary Health Care* 2009;23(2):32–35.
- Hu Y, Li Z, Chen H. Analysis on the Healthy Reproduction Demand and the Service Reach Ability of Women Floating Population in Baoan District of Shenzhen City, China. *Medicine and Society* 2006;19(8):19–21.
- Hong Y, Li X. HIV/AIDS behavioral interventions in China: a literature review and recommendation for future research. *AIDS Behavior* 2009;13(3):603–613.
- Hong Y, Li X, Stanton B, Fang X, Lin D, Wang J, Mao R, Yang H. Expressions of HIV-related Stigma among Rural-to-urban Migrants in China. *AIDS Patient Care and STDs* 2008;22(10):823–831. [PubMed: 18847389]
- Kaljee L, Genberg B, Riel R, Cole M, Tho LH, Thoa LYK, Stanton B, Li X, Minh TT. Effectiveness of a theory-based risk reduction HIV prevention program for rural Vietnamese adolescents. *AIDS Education and Prevention* 2005;17(3):185–199. [PubMed: 16006206]
- Li C, Dong Q, Zhao G, Ding A, Qiu W, Tan W. Effect of social gender on STD/HIV-related knowledge, attitude and practices in Pudong district, Shanghai: a qualitative study. *Strait Journal of Preventive Medicine* 2002;8(6):47–49.
- Li X, Stanton B, Fang X, Lin D, Mao R, Wang J, Cottrell L, Harris C. HIV/STD risk behaviors and perceptions among rural-to-urban migrants in China. *AIDS Education and Prevention* 2004;16(6):538–556. [PubMed: 15585430]
- Li X, Stanton B, Wang B, Mao R, Zhang H, Qu M, Sun Z, Wang J. Cultural adaptation of the Focus on Kids program for college students in China. *AIDS Education and Prevention* 2008;20(1):1–14. [PubMed: 18312063]
- Long Q. Social and cultural reasons for Women's Susceptibility to AIDS, and coping measures—Based on an investigation in Guangdong Province. *Collection of Women's Studies* 2006;1:21–25.
- Lou C, Zhao S, Gao E. Characteristics of Premarital sexual behavior and its causes among young migrant women in Shanghai. *Sex Education and Reproductive Health* 2004;1:22–31.
- Noar S, Chabot M, Zimmerman R. Applying health behavior theory to multiple behavior change: considerations and approaches. *Preventive Medicine* 2008;46(3):275–280. [PubMed: 17825898]
- Plotnikoff R, Higginbotham N. Predicting low-fat diet intentions and behaviors for the prevention of coronary heart disease: an application of protection motivation theory among an Australian population. *Psychology and Health* 1998;10:397–408.
- Plotnikoff R, Trinh L, Courneya K, Karunamuni N, Sigal R. Predictors of aerobic physical activity and resistance training among Canadian adults with type 2 diabetes: an application of the Protection Motivation Theory. *Psychology of Sports and Exercise* 2009;10:320–328.
- Stanton B, Guo J, Cottrell L, Galbraith J, Li X, Gibson C, Pack R, Cole M, Marshall S, Harris C. The complex business of adapting effective interventions to new populations: an urban to rural transfer. *J Adoles Health* 2005;37:163.e17–163.e26.
- Stanton B, Harris C, Cottrell L, Li X, Gibson C, Guo J, Pack R, Pendleton S, Wu Y, Burns J, Cole M, Marshall S. Trial of an urban adolescent sexual risk-reduction for rural youth: A promising but imperfect fit. *Journal of Adolescent Health* 2006;38:55.e25–55.e36. [PubMed: 16387250]

- Stanton B, Li X, Kahihuata J, Fitzgerald A, Neumbo S, Kanduuombe G, Ricardo IB, Galbraith JS, Terreri N, Guevara I, Shipena H, Strijdom J, Clemens R, Zimba RF. Increased protected sex and abstinence among Namibian youth following a HIV risk-reduction intervention: a randomized, longitudinal study. *AIDS* 1998;12:2473–2480. [PubMed: 9875586]
- Stanton B, Li X, Ricardo I, Galbraith J, Feigelman S, Kaljee L. A randomized, controlled effectiveness trial of an AIDS prevention program for low-income African-American youth. *Archives of Pediatric and Adolescent Medicine* 1996;150:363–372.
- Turmen T. Gender and HIV/AIDS. *International Journal of Gynecology & Obstetrics* 2003;82:411–418. [PubMed: 14499987]
- UNIFE. Social gender and HIV. *Chinese Journal of Family Planning*. 2002 supplement:27.
- Wu Q, He N, Gu P, Xu L. Status quo of health service utilization of STD/AIDS among migrant women in a district of Shanghai. *Chinese Journal of Health Education* 2007;23(7):518–520.
- UNAIDS. Report on the global HIV/AIDS epidemic, 2002. Geneva, Switzerland: UNAIDS; 2002.
- Xia G, Yang X. HIV high risk phenomenon and social intervention in entertainment establishment - perspective of human safety. *Social Science* 2004;4:64–73.
- Yang H, Li X, Stanton B, Fang X, Lin D, Mao R, Liu H, Chen X, Severson R. Workplace and HIV-related sexual behaviors and perceptions among female migrant workers. *AIDS Care* 2005;17(7):819–833. [PubMed: 16120499]
- Yang H, Li X, Stanton B, Chen X, Liu H, Fang X, Lin D, Mao R. HIV-related risk factors associated with commercial sex among female migrants in China. *Health Care For Women International* 2005;26:134–148. [PubMed: 15804913]
- Zheng Z, Zhou Z, Zheng L, Yang Y, Zhao D, Lou C. Sexual behavior and contraceptive use among unmarried, young women migrant workers in five cities in China. *Reproductive Health Matters* 2001;9(17):118–127. [PubMed: 11468827]
- Zhang H, Stanton B, Li X, Mao R, Sun Z, Kaljee L, Clemens M, Ravendhran S, Qu M. Perceptions and attitudes regarding sex and condom use among Chinese college students: a qualitative study. *AIDS and Behavior* 2004;8(2):105–117. [PubMed: 15187473]

Table 1

Demographic characteristics and baseline HIV-related risk behaviors of rural-to-urban female migrants, by intervention group assignment

Characteristics	Intervention group assignment			P
	Overall	Intervention group	Control group	
N(%) ¹	226	145(64.2)	81(35.8)	
Age (SD)	22.37(8.52)	22.99(9.70)	20.48(2.82)	0.004
Ever Married (%)	23(10.2)	20(13.8)	3(3.8)	0.017
< Secondary Schooling (%)	116(52.7)	78(55.7)	38(47.5)	0.240
Ever had sex(%)	71(31.7)	48(33.6)	23(28.4)	0.424
Migration duration(SD)	0.96(1.02)	0.92(1.07)	1.03(0.92)	0.473
Smoking daily(%)	26(11.6)	15(10.3)	11(13.8)	0.444
Binge drinking(%)	52(23.1)	31(21.4)	21(26.3)	0.407
Alcohol intoxication (%)	31(13.8)	17(11.8)	14(17.5)	0.237

Note: 1. The table includes only migrants who completed both baseline and follow-up assessment. The baseline sample size was 300 and the follow-up rate was 75% (226/300).

Table 2

HIV-related knowledge, condom use perception, intention and behaviors among Chinese female migrants, by intervention group and timing of survey

Characteristics	Pretest		Posttest	
	Intention group	Control group	Intention group	Control group
N	145	81	145	81
HIV knowledge(SD)	6.67(2.24)	6.54(1.84)	9.93(2.05)	6.73(2.00)***
Condom use self-efficacy(SD)	2.60(0.51)	2.55(0.60)	3.07(0.48)	2.55(0.63)***
Condom use response efficacy(SD)	2.82(0.35)	2.79(0.42)	3.20(0.47)	2.71(0.39)***
Condom use response cost(SD)	2.10(0.39)	2.10(0.48)	2.06(0.41)	2.14(0.50)
Vulnerability(%)	3(2.1)	3(3.7)	34(23.6)	5(6.2)**
Intention to use condom(%)	27(19.6)	15(18.8)	71(49.7)	18(22.2)***
Intention to persuade(%)	80(55.2)	34(42.0)	125(86.8)	36(45.0)***
Condom use skills(%)	63(43.4)	32(39.5)	112(77.8)	26(33.3)***
Consistent condom use (%)	8(17.0)	5(23.8)	16(32.0)	7(29.2)

Table 3

Intervention effect on HIV-related knowledge among Chinese female migrants (General linear model)

Source of Variance [¶]	Type III Sum of Square	df	Mean Square	F	Significance
Model	572.58	5	114.52	34.59	0.000
Age	0.13	1	0.13	0.04	0.842
Educational attainment	5.61	1	5.61	1.69	0.195
Marital status	1.10	1	1.10	0.33	0.566
HIV knowledge at baseline	80.60	1	80.60	24.35	0.000
Intervention Status	454.19	1	454.19	137.19	0.000
Error	612.46	185	3.31		
Corrected total	1185.04	190			

[¶]Dependent variable: knowledge score at post-intervention. R-Square=0.47

Table 4

Intervention effects on condom use self-efficacy and response efficacy among Chinese female migrants (General linear model)

Source of Variance [†]	Type III Sum of Square	df	Mean Square	F	Significance
Model 1: Condom use Self-Efficacy ($R^2=.26$)					
Model	19.47	5	3.89	14.96	0.000
Age	0.98	1	0.98	3.76	0.054
Educational attainment	0.31	1	0.31	1.20	0.275
Marital status	0.05	1	0.05	0.21	0.650
Condom use self-efficacy at baseline	5.78	1	5.78	22.22	0.000
Intervention Status	12.08	1	12.08	46.42	0.000
Error	49.45	190	0.26		
Corrected total	68.92	195			
Model 2: Condom use Response Efficacy ($R^2=.22$)					
Model	11.71	5	2.34	12.60	0.000
Age	0.40	1	0.40	2.16	0.144
Educational attainment	0.42	1	0.42	2.25	0.135
Marital status	0.40	1	0.40	2.15	0.144
Condom use response-efficacy at baseline	0.74	1	0.74	3.95	0.048
Intervention Status	9.57	1	9.57	51.44	0.000
Error	37.19	200	0.19		
Corrected total	48.90	205			

Table 5
Intervention effects on vulnerability, condom use intention, and condom use skill (Multivariate logistic regression)

	Vulnerability		Intention to use condom		Intention to persuade		Condom use skills	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Age	0.91	0.78–1.05	1.00	0.96–1.03	1.04	0.93–1.16	0.99	0.96–1.03
Educational level	1.03	0.47–2.26	1.52	0.84–2.78	1.18	0.57–2.42	1.04	0.55–1.97
Marital status	1.97	0.41–9.50	0.69	0.25–1.89	0.71	0.15–3.44	0.56	0.20–1.58
Baseline measures	9.55*	1.41–64.74	3.54**	1.65–7.57	5.32***	2.43–11.62	1.86	0.97–3.60
Intervention status	5.22**	1.84–14.86	3.65***	1.87–7.13	7.83***	3.75–16.36	8.13***	4.21–15.73

Note: OR= odds ratio; CI= confidence interval