



Published in final edited form as:

*AIDS Behav.* 2009 October ; 13(5): 892–901. doi:10.1007/s10461-008-9418-9.

## Promoting HIV Testing and Condom Use Among Filipina Commercial Sex Workers: Findings from a Quasi-Experimental Intervention Study

**Chi Chiao,**

Institute of Health and Welfare Policy, School of Medicine, National Yang-Ming University, Taipei, Taiwan

**Donald E. Morisky,**

Department of Community Health Sciences, School of Public Health, University of California at Los Angeles, Los Angeles, CA, USA

**Kate Ksobiech,** and

Department of Communication Studies, University of Nevada-Las Vegas, Las Vegas, NV, USA

**Robert M. Malow**

AIDS Prevention Program, Stempel School of Public Health, Florida International University, Miami, FL, USA

Chi Chiao: cchiao@ym.edu.tw

### Abstract

This study examines the effects of a multi-level social action-based theory (SABT) intervention to increase HIV testing and consistent condom use among female commercial sex workers (FCSWs). Respondents in four socio-demographically similar Philippine cities received an SABT intervention based on: (1) peer influence; (2) manager training; (3) combined peer/manager influence; or (4) usual care (control condition). HIV testing increased 86% from baseline ( $N = 980$ ) to follow-up ( $N = 903$ ), and was significantly associated with higher HIV/AIDS knowledge, lower probability of contracting HIV and increased condom use. After adjusting for socio-demographic, HIV knowledge and perceived control variables, FCSWs in the manager training and combined peer/manager conditions were significantly more likely to engage in consistent condom use. Mediation analyses revealed higher HIV/AIDS risk perceptions and a supportive work environment related to increased condom use. These findings support a growing body of research suggesting the need for multilevel sexual risk reduction interventions among FCSWs.

### Keywords

Social action-based theory intervention; HIV testing; Consistent condom use; Female commercial sex worker; The Philippines

### Introduction

Establishment-based female sex workers have increasingly played a major role in spreading HIV in southeast Asia (Hanenberg and Rojanapithayakorn 1998; UNAIDS 2006). Because

HIV testing and consistent condom use have shown to be effective strategies for STI control and HIV prevention among female commercial sex workers (FCSWs) sexual risk reduction and HIV testing interventions have been targeted toward this population (Jackson et al. 1997; Steen and Dallabetta 2003; Wi et al. 2006). To promote HIV testing as well as consistent condom use, understanding how they relate to workplace variables, such as work-related health policy, perceived benefits to both employees and employers, time frame, territory and other labor/management issues is crucial. Additionally, consideration of internal relationships between workers and employers as well as external relationships between these groups and community agencies must also be considered in the intervention design.

Most studies on promoting HIV testing and consistent condom use in the commercial sex context have focused on the important, but complicated relationships between psychosocial-determinant variables and sexual health related behaviors. While this individual-level approach has had limited success, scholars have increasingly turned to the contextual approach in an effort to improve the likelihood of HIV testing and condom use by FCSWs (Bloom et al. 2002; Kerrigan et al. 2003; Logan et al. 2002; Sahlul et al. 1999; Tobin et al. 2004).

Past research has rarely been guided by a comprehensive conceptual framework for understanding how multi-level contextual factors incorporated into intervention program designs impact the protective health practices among FCSWs. Social action-based theory (SABT) offers a comprehensive conceptual framework and may be heuristic in guiding intervention refinement (Ewart 1991; Hepworth 2004; Remien et al. 2006). SABT predicts health protection behavior is an interaction among three major domains: (1) the self-regulation capabilities of the individual; (2) the larger environmental context; and (3) responses to internal affective states.

Elements in the self-regulation process include cognitive and attitudinal factors, such as positive outcome expectancies, risk reduction self-efficacy, normative perceptions favoring risk avoidance, and behavioral intentions to avoid transmission risk practices. With its emphasis on contextual variables, such as settings and enabling resources, this model also draws attention to how they correspond to changes in personal health practices. For this study, HIV testing and consistent condom use of FCSWs are thus attributable to factors that enable these women to seek out such health protective practices within the context of surrounding positive environmental resources (Von Lengerke et al. 2004; Weinhardt 2005).

Previous studies (Asthana and Oostvogels 1996; Jana et al. 2006; Kelly 2004; Fishbein 2000) identified social influence modeling and peer education at the individual level, and manager training and FCSW reinforcement at the organizational level, as common intervention approaches. Few studies were conducted using a combination of peers and managers. Building upon SABT, we developed three intervention strategies that included (1) peer counseling, (2) manager training, and (3) a combination of peer counseling and manager training.

The peer counseling approach underscores the importance of self-regulation processes in behavior change through peers. The manager training group emphasizes the effects of context-related variables on behavior change. We hypothesize that these self-regulatory process and contextual factors will be positively associated with two health behavioral change outcomes, HIV testing and consistent condom use in FCSWs. In accordance with SABT, the self-regulation process variables include FCSWs' cognitive and attitudinal factors, and the context related variables include supportive normative expectancies and health policies. In addition, there may well be particular socio-demographic characteristics

associated with protective behaviors among FCSWs and differential intervention effects. To better understand the relationships of interest, we controlled for FCSW age, education attainment, weekly wages, work duration, and current partner status in the data analyses.

## Methods

### Data Collection and Data Quality

The research design was a simple randomized quasi-experimental approach in which numbers for each of the four sites were placed in a box and the first number selected was the peer site, the second the manager training site, the third the combination site and the fourth was the usual care (control condition) site. Numbers were drawn with replacement, providing equal probability for all selected sites. The staff carrying out the interventions were from the two participating universities (University of the Philippines and UCLA). Data was collected by trained interviewers residing in the study communities with language competencies. Face-to-face interviews, via baseline and posttest surveys, were conducted with FCSWs working for establishments on four islands (Legaspi Cebu Cagayan de Oro and Ilo-Ilo) in southern Philippines. Figure 1 presents a flowchart depicting the participant process. The participation rates of FCSWs at baseline and posttest assessments were over 95% (Morisky et al. 2002b, 2006), reducing the likelihood of a biased participant pool.

Data were collected by locally trained interviewers with previous experience in conducting personal interviews. All interviewers attended a 1-week intensive training session. Establishment-based FCSWs in the peer education experimental group were either recommended by the establishment manager to be trained as peer educators or volunteered to participate. All educational and motivational materials were turned over to the peer educators after successful completion of the training program.

Quality assurance and quality control procedures were implemented with trained coordinators from the University of the Philippines assigned to each study site. These site coordinators met monthly with the FCSW peer educators to discuss issues in the delivery of STI prevention messages to other workers in the establishments, problems encountered and suggesting alternative interpersonal approaches. The site coordinator met monthly with the research manager who visited each site monthly, going over all the data being collected from the social hygiene clinic (SHC), and independently conducting a validation assessment of a 10% random sample of all clinic visits and outcomes during the previous month. Results indicated less than a 3% discrepancy between the findings of site coordinator and research manager.

The 5-day intervention training program was followed up with monthly reinforcement sessions (meetings) for both peer educators and managers. The actual cost of the intervention includes the cost of the training (\$7,500) and monitoring (\$7,200). This total amount (\$14,700) breaks down to approximately \$9.50 per FCSW intervention and \$1.60 per each manager intervention. Many of the original components of the intervention have been incorporated into the ongoing STI/HIV prevention program of the City Health Department in each of the training sites as well as in the control community. During the training, monitoring and reinforcement phases of the intervention, we partnered with local non-governmental organizations (NGOs) at each site to assist with the training activities. These NGOs continue to work with establishment owners and managers and provide STI/HIV educational workshops for both managers/supervisors and FCSWs. The City Health Department also continues to monitor and enforce registration and SHC examinations with each establishment owner/manager. As a result, a roll-out of this community participatory structural intervention has already taken place and the City Health Department at each site continues to incorporate components of the intervention into its delivery system.

## Sample

This study included only FCSWs who were employed at establishments and who self-reported ever engaging in commercial sex. Excluded from the current analyses were women who failed to provide key information about their HIV testing and condom use behaviors in the study. This procedure yielded a total of 980 women at baseline and 903 at posttest interviews. Baseline participants ranged in age from 15 to 54, and averaged 9 years of education. Over two-thirds did not live with a regular partner (either boyfriend or husband). On average, these women had been employed at their current workplace for 11 months, ranging from <1 month to 228 months, although half were employed at the workplace site for less than 6 months. Average weekly earnings were 1,202 pesos (\$45.50 USD), ranging from 40 pesos (\$1.50 USD) to 9,000 pesos (\$340.69 USD). At baseline assessment across the four cities, employers in Ilo-Ilo were more actively involved in communicating with their employees about sexual health issues than those in Cebu, Legaspi and Cagayan de Oro. Establishment managers in both Ilo-Ilo and Cagayan de Oro had more positive attitudes toward city ordinances and governmental regulation than the managers in the other two cities.

## Outcome Measures

FCSW responses to two sexual and protective behaviors were used: (1) HIV testing and (2) consistent condom use. Information about HIV testing was collected by self-report from FCSWs regarding whether they had been tested for HIV in the past six months (yes/no). Consistent condom use was assessed by a validated six-item scale (Morisky et al. 2002a) with a reliability coefficient of .82 (Cronbach's alpha). These six scaled questions, ranging from 1 (never) to 5 (always), asked how often FCSWs "use a condom when engaging in vaginal sex," "suggest using a condom to their partner," "carry a condom on her person," "do not use a condom for making more money," "do not use a condom because one was not available," and "ask a customer to bring a condom when engaging in sex." The average score was computed by a summated score divided by six after reversed-coded adjustment for two scale items. The higher the score, the more consistently FCSWs used condoms.

## Interventions

The intervention was conducted by trained staff from the University of the Philippines in cooperation with the City Health Officer, a physician and a nurse from the local SHC. A well-known and respected NGO in the community assisted with condom use skill development role playing for the peer education group. FCSWs in the study received one of four interventions: (1) peer education, (2) manager training, (3) a combination of peer education and manager training, or (4) usual care (control). The peer counseling intervention was implemented in all participating establishments in Legaspi. In consultation with the manager/owner, two FCSWs from each establishment were selected and trained during a 5-day period at a nearby location. Travel allowances and a daily stipend were provided to defray expenses and lost work time. Content areas of the training program included basic information on STIs and HIV, modes of transmission, interpersonal relationships with peers and clients in the work establishment, sexual negotiation, role playing/modeling and normative expectations.

The manager training intervention in Cagayan de Oro consisted of the same topics as the peer counselors, plus additional training on the manager/supervisor's social influence role through providing positive reinforcement of their employee's healthy sexual practices. Managers were encouraged to implement a continuum of educational policies, beginning with current practices, and gradually increasing to greater levels of involvement. These policies consisted of meeting regularly with their employees, monitoring their attendance at the SHC, providing educational materials on HIV/AIDS prevention, reinforcing positive STI

prevention behaviors, attending monthly manager's advisory committee meetings, promoting AIDS awareness in the establishments (through posters, pamphlets, and brochures), providing educational materials to customers, making condoms available to both FCSWs and customers, and instituting a 100% condom use policy (both oral and written).

Ilo-Ilo, the usual care (control) site, continued to receive standard treatment which consisted of regular examinations at the SHC. The combined intervention of peer counselors and manager training was implemented in two contiguous cities in Cebu. In the combined intervention condition, examples of interactions between the peer counselors and the manager was one training component; additionally, the site coordinator would discuss issues raised with each study group at the individual meetings of managers or peer educators. For instance, a finding of recurrent STI among a small group of workers indicated that the entire recommended course of drug therapy had not been purchased by FCSWs due to cost. Consequently, the managers provided a loan system with FCSWs so they could purchase the entire regimen and no longer be affected by recurrent infection and loss of income (Morisky et al. 2002b). Managers in the combined intervention site were also more involved in the follow up of peer educators by making certain there were always at least two peer educators at each establishment; however, this was not the case in the peer education condition. Finally, managers worked closely with peer educators to reinforce the establishment's policy of regular STI check-ups in SHC and consistent condom use.

The four study sites are geographically dispersed throughout the southern Philippines; therefore, contamination between intervention sites highly unlikely. For more details about the development and implementation of these interventions, see Morisky et al. (2006). The key explanatory (independent) variable is which intervention condition a FCSW received. This polytomy entered into the regressions as a set of dummy variables with the "usual care" group serving as the point of reference.

This study also examines whether changes in individual attributes and workplace environment influence patterns of personal HIV testing and consistent condom use. Individual cognitive attributes, such as HIV knowledge and perceived HIV control were assessed as well as work place-related variables (i.e., employer attitudes toward condom use at each establishment. Other individual controls include FCSW age (in years), years of schooling, weekly wage (in pesos), length of employment (in months), and partnership status (yes/no). Table 1 shows the distribution of the individual and workplace variables.

### Analytic Strategy

The analysis was conducted using a pooled sample that contains data from both baseline and posttest surveys. We used logistic regression models to estimate the odds of getting an HIV test. Our primary interest is in overall HIV testing changes in FCSWs test from the baseline to posttest assessments. All models include a dichotomous indicator of survey year that distinguishes interviews conducted in the baseline assessment from those obtained in the posttest assessment. Model 1 estimates odds of getting an HIV test via considering only intervention groups, an indicator of survey period, and individual background controls. Of particular interest is assessing whether changes in protective behaviors are related to type of intervention. Model 2 adds interaction terms between intervention and survey year to Model 1 to test for our hypothesis regarding group differences in getting an HIV test. In Model 3, we include self-regulatory indicators of HIV-related knowledge, perceived control and perception to examine how much of the intervention effect in getting an HIV test is accounted for by the differential distribution of these variables.

The final goal of this study was to investigate intervention effects on changes in consistent condom use. Multiple regression models were used to predict consistent condom use. As in

Model 1, Model 4 includes intervention groups, an indicator of survey year and individual controls. Model 5 includes interaction terms between survey year and intervention effect, testing for differences in the intervention effects between the baseline and posttest period. Model 6 includes information about self-regulatory variables as well as workplace factors to understand how much of the intervention influence on consistent condom use is explained by these variables. The final Model 7 adds the HIV testing variable to explore the association between HIV testing and consistent condom use. Analyses were conducted with Stata version 9.0 SE software. All regression models adjust for the clustering of multiple workers employed at the same workplace. Given that potential differences in socio-demographic variables of FCSWs may be observed between four study sites at the baseline and posttest assessments, all the analyses controlled for individual background variables for adjustments.

## Results

### HIV Testing

Table 2 presents the adjusted odds ratios and 95% confidence intervals for getting an HIV test. All models control for age, education, weekly wage, work duration, and current partner status. Model 1 shows an 86% increase in overall HIV testing between baseline and posttest surveys (AOR = 1.86,  $P < 0.05$ ). Model 2 adds interaction terms between intervention status and survey year. Peer education and manager training increased the likelihood of getting an HIV test for FCSWs. Women in the peer education group were four times more likely to get an HIV test than those in the usual care group (where the effect was  $0.24 \times 16.83 = 4.04$ ). Compared to the usual care group, FCSWs in the manager training condition were approximately 11 times more likely to be tested for HIV (the effect was  $0.03 \times 361.07 = 10.83$ ). While there were significant differences by group, surprisingly, there was no significant increase in getting an HIV test for the combined peer educator/manager group.

Model 3 progressively adds self-regulatory factors (e.g., HIV knowledge and perceived control and severity) to Model 2. FCSWs in peer education and manager training groups had significantly higher likelihoods of getting an HIV test than women in the control group. The manager training group increased the likelihood of getting an HIV test by approximately 9.36 times (where the effect was  $0.02 \times 467.84 = 9.36$ ). Inclusion of self-regulatory variables, however, decreased the intervention effect of manager training by about 14% [ $(10.83 - 9.36) / 10.83 = 13.57\%$ ], but not for the peer educator group. FCSWs with greater HIV knowledge were more likely to get an HIV test, and FCSWs who believed HIV testing lowers their risk of contracting AIDS were significantly more likely to be tested for than those whose perceived their HIV risk was low. Demographically, FCSWs who were older, better educated, and employed longer were more likely to have had an HIV test. FCSWs with regular sex partners and a higher monthly wage also had higher odds of having an HIV test.

### Consistent Condom Use

Models 4 and 5 tested intervention effects with regard to consistent condom use. Adjusting for individual socio-demographic characteristics, FCSWs in the combined group were significantly more likely to consistently use condoms than those in the control group. Model 6 added the variables of individual HIV/AIDS knowledge, perceived control and severity as well as workplace characteristics. Compared to FCSWs in the control group, FCSWs in the manager training group (where the effect was  $0.75 - 0.07 = 0.68$ ) and the combined group (where the effect was  $0.49 + 0.26 = 0.75$ ) were significantly more likely to consistently use condoms and from baseline to posttest. Comparing Model 6 to Model 5, inclusion of self-regulatory variables and contextual factors significantly decreased the magnitude of

consistent condom use in the combined group. This reduction is explained by individual perceived severity of contracting AIDS and most workplace variables.

Model 6 included the variable of HIV testing and continued to show significant effects on consistent condom use. HIV testing and consistent condom use were positively correlated. FCSWs who had a recent HIV test scored higher on consistent condom use. As for individual background, FCSWs who were employed longer, had higher monthly wages, and a regular sex partner were more likely to consistently use condoms than their counterparts (Table 3).

## Discussion

Using baseline and posttest assessments, this quasi-experimental study demonstrated interventions utilizing both peers and managers significantly influenced the likelihood of consistent condom use and HIV testing. Results of the present study provide empirical data that support SABT, emphasizing and demonstrating the importance of workplace context on behavior change. When adjusting for individual characteristics, the manager group had the most significant increase in HIV testing and consistent condom use. Consistent with the finding of Ewart (1991), Ghys et al. (2002), and Sedyaningsih-Mamahit (1999), the attitudes, beliefs and relative status of the establishment managers, with the development of an infrastructure related to promoting healthy practices (such as the loan plan to FCSWs for STI medications previously described), led FCSWs to the desirable, protective behavioral actions of condom use and HIV testing. This result argues persuasively for the importance of developing management organizations and/or associations that address and reinforce protective practices in the workplace.

We also found that protective health behaviors were positively correlated. FCSWs who sought HIV testing were more likely to use condoms consistently than those who chose not to be tested. Given HIV status is one of the principle protective factors to control STI and HIV transmission, it was encouraging that FCSWs who perceived themselves at greater risk, related to substandard health protective behaviors, were more likely to use condoms consistently than those who perceived themselves at lower risk. Although HIV testing is a self-reported measure, individual FCSWs could obtain their own infectious status from the confidential HIV test. All employed workers in each establishment were instructed by their managers to visit the HIV testing site every 6 months; this was reinforced at each weekly meeting. All HIV testing was conducted anonymously at the local provincial hospital and there is no record of testing for any individual. The only data received from the Hospital is the number of tests conducted among females who had blood tests during each 6 month period (January–June and July–December for each year). Future studies in this area thus may use a certificate of HIV testing or devise procedures to monitor the “actual” behavior of FCSWs through an anthropological approach and clinical records as opposed to relying on self-reports.

Our findings suggest that factors at multiple levels are linked to changes in protective behaviors. HIV testing was related to an individual’s AIDS-related knowledge, perceived control and perception of risk. Consistent condom use was associated with perceived control and perception of risk. These factors appear to be related to the FCSW’s perceived level of from both managers and peers.

The analyses also suggest that observed effects associated with level of manager involvement are due to supportive attitudes of the manager and a structural intervention. Model 4 tests the total association between consistent condom use and intervention groups, adjusting for survey year and individual background controls. Models 5 and 6 progressively

add adjustments for HIV knowledge, AIDS perceived control and severity, and workplace variables to Model 4. Comparing  $R$ -squares in Model 6 ( $R^2 = 0.64$ ) with Model 5 ( $R^2 = 0.17$ ), the adjustments explained an additional 47% of the variance in the association ( $0.64 - 0.17 = 0.47$ ). Further, the workplace variables had a significant effect on consistent condom use. The coefficients for the combined group significantly decreased from Model 5 to Model 6. We thus conclude that the observed workplace effects (e.g., manager supportive attitude, condom policy and availability) are positively associated with condom use. When managers encourage or reinforce protective health behavior via regular meetings, they appear to shape normative behaviors and facilitate protective practices among FCSWs. Unmeasured factors from other interpersonal and organizational domains may also have some influence on individual condom use behavior.

These findings need to be interpreted within the context of the study's limitations. We examined changes in HIV testing and condom use knowing of threats to internal validity and problems related to endogeneity. This study's quasi-experimental design does have methodological limitations, with the most serious being the lack of random assignment of participants, making it more difficult to establish causal inference to the intervention (Cook and Campbell 1979; Marcantonio and Cook 1994). Random assignment is not feasible in a community-based intervention due to the cross-contamination through the migration between those assigned to the experimental and control cities. The use of quasi-experimental comparison group design with extended posttest observations thus permitted examination over time of the sustainability of the effect (Cook and Campbell 1979) and is a strength of this research. The causal inference is also supported by demonstrating observed change from baseline levels across the treatment groups at different points in time.

One of the main concerns of this study's design is if the potential effects of the country's history and individual maturation, impact the treatment conditions differently. In our situation, the history effects are not likely because at the time of the study there was no focus on HIV risk reduction throughout the Philippines. However, any major events in the will likely affect all groups equally since all intervention groups are located in the same country. Similarly, the age range in all FCSW groups are comparable; therefore, maturation effects will be similar in all groups. Loss of subjects due to attrition is another common concern in the quasi design, but the usual care (control) group allows comparisons between groups. This study has high retention rates across the intervention sites, and retention rates are similar in each study group.

Specific attributes of an individual's workplace might also be a concern. Given that recruitment into the sex industry is related to social networking (Sedyaningsih-Mamahit 1999), it is likely that the FCSWs were not randomly allocated to the various intervention groups created for this study. Although individual differences were controlled for at both baseline and posttest assessment, it was impossible to take all work-related factors into account. The nature of the cross-sectional data analyzed herein cannot conclusively establish the causal links suggested. However, this theory-based study using the multilevel analytical approach provides important insights, identifying the importance of contextual influence on individual behavior change.

Lastly, we observe that the results of this investigation are consistent with studies in the US and other countries focused on social networking and peer groups (Emerson et al. 2005; Ksobiech 2006; Von Lengerke et al. 2004). It is clear that those associated with a particular FCSW, whether manager or peer, significantly influence the behavior of the FCSW. Such has been the case in a variety of other studies, leading to the conclusion that interventions including or encouraging behavioral change via persons closely associated with the study participants have a far greater likelihood of success than those presented by organizations

and/or media with whom the “target” has little, if any, relationship. In short, we are more likely to act upon suggestions of those directly in our social network than suggestions coming from unknown and/or anonymous individual sources. Identifying and targeting high-risk groups in the social connection context may be an effective strategy for promoting preventive behaviors (Friedman et al. 1997).

## Acknowledgments

The authors thank the Editor and three anonymous reviewers for their useful comments and suggestions to improve the quality of this paper. The study of female entertainment establishment worker in the Philippines was funded by the National Institute of Allergy and Infectious Diseases (R01-AI33845), UCLA AIDS (AI-28697), and Universitywide AIDS Research (D04-LA-400). The findings from this research were presented at the annual meeting of the American Public Health Association in Washington, DC (2007).

## References

- Asthana S, Oostvogels R. Community participation in HIV prevention: Problems and prospects for community-based strategies among female sex workers in Madras. *Social Science and Medicine*. 1996; 43(2):133–148. [PubMed: 8844919]
- Bloom SS, Urassa M, Isingo R, Ng’weshemi J, Boerma JT. Community effects on the risk of HIV infection in rural Tanzania. *Sexually Transmitted Infections*. 2002; 78(4):261–266. [PubMed: 12181463]
- Cook, T.; Campbell, D. *Quasi-experimentation: Design & analysis issues for field settings*. Boston: Houghton Mifflin; 1979.
- Emerson C, Brown T, Illemsky S, Jean-Jacques L, et al. Use of social networks to identify persons with undiagnosed HIV infection—seven US cities, October 2003–September 2004. *Morbidity and Mortality Weekly Report*. 2005; 54(24):601–605. [PubMed: 15973240]
- Ewart CK. Social-action theory for a public-health psychology. *The American Psychologist*. 1991; 46(9):931–946. [PubMed: 1958012]
- Fishbein M. The role of theory in HIV prevention. *AIDS Care*. 2000; 12(3):273–278. [PubMed: 10928203]
- Friedman SR, Neaigus A, Jose B, et al. Sociometric risk networks and risk for HIV infection. *American Journal of Public Health*. 1997; 87:1289–1296. [PubMed: 9279263]
- Ghys PD, Diallo MO, Ettiegne-Traore V, Kale K, Tawil O, Carael M, et al. Increase in condom use and decline in HIV and sexually transmitted diseases among female sex workers in Abidjan, Cote d’Ivoire, 1991–1998. *AIDS (London, England)*. 2002; 16(2):251–258.
- Hanenberg R, Rojanapithayakorn W. Changes in prostitution and the AIDS epidemic in Thailand. *AIDS Care*. 1998; 10(1):69–79. [PubMed: 9536203]
- Hepworth J. Public health psychology: A conceptual and practical framework. *Journal of Health Psychology*. 2004; 9(1):41–54. [PubMed: 14683568]
- Jackson DJ, Rakwar JP, Richardson BA, Mandaliya K, Chohan BH, Bwayo JJ, et al. Decreased incidence of sexually transmitted diseases among trucking company workers in Kenya: Results of a behavioural risk-reduction programme. *AIDS (London England)*. 1997; 11(7):903–909.
- Jana S, Rojanapithayakorn W, Steen R. Harm reduction for sex workers. *Lancet*. 2006; 367(9513):814. [PubMed: 16530572]
- Kelly JA. Popular opinion leaders and HIV prevention peer education: Resolving discrepant findings, and implications for the development of effective community programmes. *AIDS Care*. 2004; 16(2):139–150. [PubMed: 14676020]
- Kerrigan D, Ellen JM, Moreno L, Rosario S, Katz J, Celentano DD, et al. Environmental-structural factors significantly associated with consistent condom use among female sex workers in the Dominican Republic. *AIDS (London England)*. 2003; 17(3):415–423.
- Ksobiech K. Beyond needle sharing: Meta-analyses of social context risk behaviors of injection drug users attending needle exchange programs. *Substance Use & Misuse*. 2006; 41(10–12):1379–1394. [PubMed: 17002988]

- Logan TK, Cole J, Leukefeld C. Women, sex, and HIV: Social and contextual factors, meta-analysis of published interventions, and implications for practice and research. *Psychological Bulletin*. 2002; 128(6):851–885. [PubMed: 12405135]
- Marcantonio, R.; Cook, T. *Handbook of practical program evaluation*. Jossey-Bass; 1994.
- Morisky DE, Ang A, Sneed CD. Validating the effects of social desirability on self-reported condom use behavior among commercial sex workers. *AIDS Education and Prevention*. 2002a; 14(5):351–360. [PubMed: 12413181]
- Morisky DE, Peña M, Tiglao TV, Liu K. The impact of the work environment on condom use among female bar workers in the Philippines. *Health Education & Behavior*. 2002b; 29(4):461–472. [PubMed: 12137239]
- Morisky DE, Stein JA, Chiao C, Ksobiech K, & Malow R. Impact of a social influence intervention on condom use and sexually transmitted infections among establishment-based female sex workers in the Philippines: A multilevel analysis. *Health Psychology*. 2006; 25(5):595–603. [PubMed: 17014277]
- Remien RH, Stirratt MJ, Dognin J, Day E, El-Bassel N, Warne P. Moving from theory to research to practice. Implementing an effective dyadic intervention to improve antiretroviral adherence for clinic patients. *Journal of Acquired Immune Deficiency Syndromes*. 2006; 43 Suppl 1:S69–S78. [PubMed: 17133206]
- Sahlu T, Kassa E, Agonafer T, Tsegaye A, Rinke de Wit T, Gebremariam H, et al. Sexual behaviours, perception of risk of HIV infection, and factors associated with attending HIV post-test counselling in Ethiopia. *AIDS (London England)*. 1999; 13(10):1263–1272.
- Sarker M, Milkowski A, Slanger T, Gondos A, Sanou A, Kouyate B, et al. The role of HIV-related knowledge and ethnicity in determining HIV risk perception and willingness to undergo HIV testing among rural women in Burkina Faso. *AIDS and Behavior*. 2005; 9(2):243–249. [PubMed: 15933843]
- Sedyaningsih-Mamahit ER. Female commercial sex workers in Kramat Tunggak, Jakarta, Indonesia. *Social Science & Medicine*. 1999; 49:1101–1114. [PubMed: 10475673]
- Steen R, Dallabetta G. Sexually transmitted infection control with sex workers: Regular screening and presumptive treatment augment efforts to reduce risk and vulnerability. *Reproductive Health Matters*. 2003; 11(22):74–90. [PubMed: 14708399]
- Tobin KE, Tang AM, Gilbert SH, Latkin CA. Correlates of HIV antibody testing among a sample of injection drug users: The role of social and contextual factors. *AIDS and Behavior*. 2004; 8(3): 303–310. [PubMed: 15475677]
- UNAIDS. *AIDS epidemic update 2006: December 2006*. 2006. on-line accessed in [http://data.unaids.org/pub/EpiReport/2006/2006\\_EpiUpdate\\_en.pdf](http://data.unaids.org/pub/EpiReport/2006/2006_EpiUpdate_en.pdf)
- Von Lengerke T, Vinck J, Rutten A, Reitmeir P, Abel T, Kannas L, et al. Health policy perception and health behaviours: A multilevel analysis and implications for public health psychology. *Journal of Health Psychology*. 2004; 9(1):157–175. [PubMed: 14683577]
- Weinhardt LS. Changing HIV and AIDS-related behavior: Promising approaches at the individual, group, and community levels. *Behavior Modification*. 2005; 29(2):219–226. [PubMed: 15657409]
- Wi T, Ramos ER, Steen R, Esguerra TA, Roces MC, Lim-Quizon MC, et al. STI declines among sex workers and clients following outreach, one time presumptive treatment, and regular screening of sex workers in the Philippines. *Sexually Transmitted Infections*. 2006; 82(5):386–391. [PubMed: 17012514]



**Fig. 1.** Participation flow diagram in the study by establishment-based Filipina commercial sex workers in the randomized intervention cities. *Note:* \*Eligibility criteria in baseline and posttest were FCSWs who self reported engaging in commercial sex

Table 1

Summary statistics for individual and workplace variables used in statistical analysis of consistent condom use and HIV testing by intervention groups, community surveys of FCSWs at baseline and posttest period

	Legaspi: Peer education		Cagayan de Oro: Manager training		Cebu: Combined		Ilo-Ilo: Control					
	Baseline (n = 200)	Posttest (n = 149)	p- value	Baseline (n = 410)	Posttest (n = 198)	p- value	Baseline (n = 302)	Posttest (n = 415)	p- value	Baseline (n = 68)	Posttest (n = 141)	p- value
<i>Background variables</i>												
Age (in years)	23.64 (5.15)	22.25 (4.52)	0.009	23.87 (5.34)	23.09 (3.68)	0.070	22.59 (3.80)	22.63 (4.16)	0.884	21.60 (3.53)	21.26 (3.13)	0.472
Years of education	8.43 (2.14)	8.62 (2.08)	0.419	9.50 (2.15)	9.85 (2.43)	0.070	8.76 (2.15)	8.81 (2.33)	0.751	9.31 (1.70)	9.30 (2.00)	0.989
Months of work	6.83 (8.31)	11.75 (11.00)	<0.001	15.77 (23.78)	14.01 (11.27)	0.323	8.16 (9.63)	9.63 (11.60)	0.073	8.38 (9.68)	11.32(14.25)	0.127
Weekly wage (in pesos)	778.49 (550.13)	1717.13 (1413.46)	<0.001	1236.05 (1024.18)	1237.68 (640.32)	0.984	1329.64 (1182.71)	1365.71 (985.31)	0.657	2001.49 (1719.89)	1445.75 (1073.59)	0.005
Currently with sex partner (%)	31.50	36.24	0.353	32.93	41.41	0.041	26.16	25.78	0.910	26.47	38.30	0.092
<i>HIV-related knowledge</i>												
AIDS knowledge index (0–9)	6.46 (1.57)	6.98 (1.30)	0.001	5.96 (1.62)	6.31 (1.44)	0.010	5.84 (1.77)	6.79 (1.39)	<0.001	5.25 (1.87)	5.90 (1.43)	0.006
<i>AIDS perceived control (%)</i>												
To avoid AIDS contraction	73.50	75.84	0.620	63.10	83.33	<0.001	64.24	74.94	0.002	61.76	75.18	0.046
To control AIDS contraction	75.00	78.52	0.443	62.20	89.39	<0.001	36.42	70.60	<0.001	75.00	84.40	0.102
To lower chance of getting AIDS	44.00	39.60	0.410	62.20	62.63	0.918	54.64	88.43	<0.001	64.71	53.19	0.115
<i>AIDS perceived severity</i>												
Chance of getting AIDS (1–5)	3.12 (1.60)	1.76 (1.37)	<0.001	2.15 (1.38)	2.80 (1.72)	<0.001	1.67 (1.13)	2.38 (1.25)	<0.001	2.74 (1.51)	3.23 (1.69)	0.043
Worry about getting AIDS (1–5)	4.10 (0.99)	2.83 (1.67)	<0.001	3.67 (1.49)	3.61 (1.62)	0.652	3.14 (1.44)	3.35 (1.34)	0.042	3.16(1.17)	3.85 (1.47)	<0.001
<i>Workplace variables (%)</i>												
Employer's supportive attitude	40.50	14.77	<0.001	38.29	11.11	<0.001	45.03	47.71	<0.478	60.29	28.37	<0.001
To talk to employer about using condoms	45.00	14.09	<0.001	29.51	20.20	0.015	41.72	60.72	<0.001	58.82	41.84	0.021
Condom use policy	38.00	30.20	0.130	39.76	19.70	<0.001	50.66	61.93	0.003	55.88	43.97	0.106
Condoms available at workplace	27.00	18.12	0.052	24.88	7.58	<0.001	32.45	48.43	<0.001	50.00	40.43	0.191
HIV testing (%)	75.50	90.60	<0.001	39.27	96.46	<0.001	36.75	22.65	<0.001	94.12	68.09	<0.001
Consistent condom use (1–5)	2.00 (1.52)	1.61 (1.24)	0.013	3.00 (1.66)	1.79 (1.26)	<0.001	2.74 (1.75)	3.04 (1.87)	0.040	2.81 (1.36)	1.70 (0.97)	<0.001

Tests for difference conducted using  $\chi^2$ -tests for categorical variables and *t*-tests for continuous variables

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Table 2

Adjusted odds ratios for getting an HIV test of FCSW's

	Model 1		Model 2		Model 3	
	AOR	95% CI	AOR	95% CI	AOR	95% CI
Intervention groups (Control omitted)						
Peer education (Legaspi)	1.87	0.82-4.24	0.24**	0.09-0.63	0.16***	0.06-0.44
Manager training (Cagayan de Oro)	0.48	0.22-1.06	0.03***	0.01-0.09	0.02***	0.01-0.06
Combined (Cebu)	0.12***	0.05-0.27	0.04***	0.04-0.10	0.03*	0.01-0.08
Posttest assessment (Baseline omitted)	1.86*	1.13-3.04	0.14**	0.05-0.43	0.10***	0.03-0.31
Interaction effect (Baseline + Control omitted)						
Posttest × Peer education			16.83***	4.59-61.77	26.20***	6.76-101.61
Posttest × Manager training			361.07***	82.09-1588.17	467.84***	108.38-2019.50
Posttest × Combined			3.33	0.90-12.29	2.49	0.71-8.79
HIV related knowledge						
AIDS knowledge index					1.29***	1.18-1.41
AIDS perceived control						
To avoid AIDS contraction					1.13	0.83-1.53
To control AIDS contraction					1.18	0.89-1.56
To lower chance of getting AIDS					2.00***	1.51-2.64
AIDS perceived severity						
Chance of getting AIDS					1.09	0.98-1.21
Worry about getting AIDS					1.05	0.96-1.14
Background variables						
Age (in years)	1.05***	1.02-1.09	1.06***	1.03-1.10	1.06***	1.03-1.09
Years of education	0.96	0.90-1.03	0.95	0.89-1.02	0.92*	0.85-0.98
Months of work	1.01*	1.003-1.02	1.02**	1.01-1.03	1.01*	1.003-1.02
Weekly wage (in pesos)	1.0004***	1.0003-1.0006	1.00***	1.00-1.00	1.0004***	1.0002-1.0005
Currently with sex partner	1.58***	1.26-1.96	1.57***	1.23-2.01	1.59***	1.25-2.02
Model $\chi^2$	209.16***		397.08***		467.41***	

	Model 1		Model 2		Model 3	
	AOR	95% CI	AOR	95% CI	AOR	95% CI
Wald tests of groups of additional covariates			187.92***		258.25***	

\*  $p < 0.05$ ;

\*\*  $p < 0.01$ ;

\*\*\*  $p < 0.001$

Table 3

Predicting consistent condom use of FCSWs

	Model 4	Model 5	Model 6	Model 7
	Coefficient	Coefficient	Coefficient	Coefficient
	Robust S.E.	Robust S.E.	Robust S.E.	Robust S.E.
Intervention groups (Control omitted)				
Peer education (Legaspi)	-0.31	-0.58	-0.21	-0.18
	0.25	0.43	0.21	0.21
Manager training (Cagayan de Oro)	0.46	0.33	0.75**	0.84***
	0.28	0.42	0.22	0.22
Combined (Cebu)	0.85**	0.06	0.49*	0.59*
	0.30	0.49	0.24	0.25
Posttest assessment (Baseline omitted)	-0.44	-0.97**	-0.47*	-0.43
	0.24	0.36	0.23	0.23
Interaction effects (Baseline + Control omitted)				
Posttest × Peer education		0.32	0.74**	0.68**
		0.49	0.25	0.26
Posttest × Manager training		-0.16	-0.07	-0.22
		0.43	0.24	0.25
Posttest × Combined		1.24*	0.26	0.26
		0.62	0.29	0.29
HIV related knowledge				
AIDS knowledge index		-0.004	0.02	0.02
AIDS perceived control (None omitted)				
To avoid AIDS contraction		-0.02	0.06	0.06
		0.04	0.07	0.07
To control AIDS contraction		0.38***	0.07	0.37***
		0.07	0.07	0.07
To lower chance of getting AIDS				
AIDS perceived severity (None omitted)				
Chance of getting AIDS		0.06**	0.02	0.06**
		0.06	0.02	0.02
Worry about getting AIDS		0.06**	0.02	0.06**
		0.06	0.02	0.02
Workplace variables (None omitted)				
Employer's supportive attitude		1.62***	0.11	1.61***
		0.17	0.09	0.17
To talk to employer about using condoms				
Condom use policy		0.49***	0.10	0.47***
		0.48***	0.09	0.47***
Condoms available at workplace				
HIV testing (None omitted)				
				0.17*
				0.08

	Model 4		Model 5		Model 6		Model 7	
	Coefficient	Robust S.E.	Coefficient	Robust S.E.	Coefficient	Robust S.E.	Coefficient	Robust S.E.
Background variables								
Age (in years)	0.004	0.01	0.00	0.01	0.01	0.01	0.01	0.006
Years of education	-0.13***	0.03	-0.13***	0.03	-0.05**	0.01	-0.04**	0.01
Months of work	0.01*	0.004	0.01	0.00	0.004	0.002	0.003	0.002
Weekly wage (in pesos)	0.0003***	0.0001	0.00***	0.00	0.0001**	0.00003	0.0001**	0.00002
Currently with sex partner	-0.14	0.10	-0.10	0.09	-0.07	0.06	-0.08	0.06
Intercept	3.02***	0.39	3.37***	0.51	0.58*	0.27	0.53	0.27
$R^2$	0.1369		0.1676		0.6395		0.6411	

\*  $p < 0.05$ ;\*\*  $p < 0.01$ ;\*\*\*  $p < 0.001$