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Predictors of Sexual Risk Reduction Among Mexican Female Sex Workers Enrolled in a Behavioral Intervention Study

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Abstract

Objective—We recently showed efficacy of an intervention to increase condom use among female sex workers (FSWs) in Tijuana and Ciudad Juárez, situated on the Mexico–United States border. We determined whether increases in condom use were predicted by social cognitive theory and injection drug user status among women randomized to this intervention.

Methods—Four hundred nine HIV-negative FSWs aged ≥ 18 years having unprotected sex with clients within the prior 2 months received a brief individual counseling session integrating motivational interviewing and principles of behavior change (ie, HIV knowledge, self-efficacy for using condoms, and outcome expectancies).

Results—Increases in self-efficacy scores were associated with increases in percent condom use ($P = 0.008$), whereas outcome expectancies were not. Female sex workers who inject drugs (FSW-IDUs) increased condom use with clients but not to the same extent as other FSWs ($P = 0.09$). Change in HIV knowledge was positively associated with change in percent condom use among FSW-IDUs ($P = 0.03$) but not noninjection drug users.

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Conclusions—Increases in self-efficacy significantly predicted increased condom use among FSWs, consistent with social cognitive theory. Increased HIV knowledge was also important among FSW-IDUs, but their changes in condom use were modest. Enhanced interventions for FSW-IDUs are needed, taking into account realities of substance use during sexual transactions that can compromise safer sex negotiation.

Keywords

condom use; female sex workers; HIV; injection drug use; prostitution; self-efficacy

INTRODUCTION

In recent years, HIV prevalence has increased from less than 2% to 6% among female sex workers (FSWs) in Tijuana and Ciudad Juarez, Mexico,¹ which are adjacent to the US cities of San Diego, CA, and El Paso, TX, respectively. There are an estimated 9000 FSWs in Tijuana,² and at least 4000 FSWs in Ciudad Juarez.³

HIV prevalence among female sex workers who inject drugs (FSW-IDUs) in Tijuana and Ciudad Juarez is higher, at 14%,⁴ which is not surprising because these cities are situated on major drug trafficking routes.⁵ Injection drug use has increased as local drug consumption markets have emerged.⁶ The highest consumption of illegal drugs in Mexico is in Baja California, whose largest city is Tijuana.⁷ Across Mexico, Ciudad Juarez ranks second only to Tijuana in the number of illicit drug users, which is twice the national average.⁸

Based on 2 successful behavioral intervention studies with methamphetamine-using HIV-positive men who have sex with men (MSM) and HIV-negative heterosexuals,^{9,10} we designed a behavioral intervention for Mexican FSWs consisting of a brief individual counseling session integrating motivational interviewing and principles of social cognitive theory. The intervention promoted skills to negotiate condom use among clients, but because the high prevalence of substance use was not originally recognized, it did not take into account safer sex negotiation within the context of substance use or safer injection behaviors.¹¹ In a randomized trial, we showed that this intervention significantly reduced incident HIV infections and sexually transmitted infections (STIs) (ie, gonorrhea, Chlamydia, and syphilis).¹² Comparing intervention vs. control arms, we observed a 40% decline in STI cumulative incidence. Incidence density for intervention vs. control was 13.8 vs. 24.92 per 100 person-years for cumulative STIs ($P = 0.034$) and 0 vs. 2.01 per 100 person-years for HIV ($P = 0.0004$), with concomitant increases in total numbers and percentages of protected sex acts and decreases in total numbers of unprotected sex acts with clients ($P < 0.05$).¹²

Few evaluations have dismantled HIV intervention effects to examine which theoretical components are associated with successful behavioral outcomes¹³⁻¹⁶ and which subgroups seem refractory to behavioral change. A priori, we hypothesized that reductions in unprotected sex among FSWs randomized to the intervention would be mediated by increases in HIV knowledge, self-efficacy (eg, confidence in one's ability to use condoms), and outcome expectancies (eg, belief that using condoms successfully reduces the risk of acquiring HIV/STIs), consistent with social cognitive theory.¹¹ In addition to testing these hypotheses, we determined whether efficacy of this intervention was reduced among FSW-IDUs, given that high proportions of these FSWs reported that they and/or their clients use drugs during sexual transactions.⁴

METHODS

Study Population

Between January 2004 and January 2006, outreach workers and municipal and community health clinics recruited 924 FSWs in Tijuana and Ciudad Juarez into a behavioral intervention study to increase condom use described in detail elsewhere.¹¹ Eligibility requirements included an age of at least 18 years and having traded sex for drugs, money, or other material benefit within the previous 2 months. Participants were also required to have had unprotected vaginal sex with at least 1 client in the past 2 months and were excluded if they had previously tested HIV positive. After providing informed consent, an interviewer-administered survey was conducted in Spanish in a private location. Participants also provided a blood draw and cervical swab and were compensated US \$30. Study protocols were approved by the Institutional Review Boards in the United States and Mexico.

Randomization to either the intervention ["Mujer Segura" (healthy woman) intervention] or the didactic control condition was performed on a weekly basis within each city using a fixed computer-generated randomization scheme. Because the emphasis of the current article was to determine within-group factors that predicted response to the intervention, the current analysis was restricted to 409 FSWs randomized to the intervention arm.

Baseline Interview

Trained female counselors administered an interview covering a range of topics including sexual risk behaviors, working conditions, financial need, victimization and trauma, use of alcohol and illicit drugs, social support, social influence, life experiences, mood, self-esteem, social cognitive factors, sociodemographic characteristics, and physical and psychiatric health variables. The interview also addressed such behavioral outcomes as frequency of unprotected sex with clients and spouse/steady partner, number of clients, number and type of other sex partners (nonclients), self-reported number and type of STIs, and alcohol and drug use. The follow-up survey was nearly identical but referred to behaviors taking place over the prior 6 months.

Mujer Segura Intervention

This intervention was based on pilot work in Tijuana¹⁷ and our experience conducting sexual risk reduction interventions in the United States.^{9,10} A detailed description of the intervention is given elsewhere.¹¹ In brief, clinic-based health care staff and indigenous *promotoras* (outreach workers) were trained as counselors to deliver a culturally sensitive sexual risk reduction intervention that was tailored to the needs, values, beliefs, and behaviors of FSWs. The intervention was based on social cognitive theory¹⁸ and sought to increase knowledge, self-efficacy, and outcome expectancies regarding safer sex. To increase participants' motivations to practice safer sex, we utilized motivational interviewing techniques (eg, key questions, reflective listening, summarization, affirmation, and appropriate use of cultural cues).¹⁹ The intervention focused on: (1) identifying motivations for practicing safer sex (eg, protecting one's own health, avoiding STIs) and unsafe sex (eg, financial gain); (2) barriers to condom use (eg, threat of physical violence, client refusal) and motivations for using condoms (eg, to feel clean); (3) negotiation of safer sex with clients; and (4) enhancing social support. Participants role-played interactions with clients and were asked to weigh advantages and disadvantages of practicing the behavior using the "decisional balance" approach.¹⁹ Once awareness of the problem was achieved and the balance began to shift in favor of positive change, the participant and counselor developed an action plan and problem-solved barriers to implementation.

Measures

Measures were translated into Spanish and back-translated into English. Behavioral outcomes included frequency of unprotected sex with clients and protected sex ratio (number of protected sex acts divided by total number of acts). FSWs also reported the number of times they engaged in vaginal, oral, and anal sex without a condom (or dental dam) with clients and their spouse/steady partner during the past month. Potential mechanism of change variables are described below.

HIV/AIDS Knowledge

Our measure of knowledge²⁰ consisted of 18 items, which assessed participants' awareness of the importance of condom use with respect to HIV prevention (eg, People who have been infected with HIV quickly show serious signs of being infected; a person will not get HIV if she or he is taking antibiotics). Response categories were True (1) or False (0). Total scores on this measure corresponded to the number of items correctly answered.

Self-Efficacy

Our 5-item measure of self-efficacy¹¹ asked participants to indicate the extent to which they were able to use a condom properly with clients. Responses were coded on a 4-point scale (1 = strongly disagree to 4 = strongly agree), with an overall score corresponding to the mean response to the 5 items.

Outcome Expectancies

Participants responded to 5 items using a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree).¹¹ An example of a positive outcome expectancy is: "I believe that condoms will protect me from getting HIV." Mean scores for the 5 items were calculated with higher scores indicating more positive outcome expectancies.

Statistical Analysis

Before analyses, we calculated residualized change scores for 4 variables of interest: (a) HIV/AIDS knowledge, (b) outcome expectancies, (c) self-efficacy for using condoms, and (d) percent condom use with clients during vaginal and anal sex. There were no incident HIV cases in the intervention arm and 23 incident STIs; low power thus precluded an assessment of the mediating effects of theoretically important constructs on HIV/STI incidence. Similarly, because we had only 12.5% power to examine the effect of injection drug user status on STI incidence, this outcome was not studied here.

Residualized change scores were calculated by regressing postintervention values for these variables onto their respective baseline values. Hierarchical linear regression was used to analyze change in percent condom use from preintervention to post intervention. Block 1 consisted of 4 variables: (a) the number of years the participant had been a sex worker, (b) whether or not she had >9 years of education, (c) whether or not she had children, and (d) whether or not she had a history of injection drug use. In block 2, change in social cognition constructs was entered, including changes in HIV knowledge, outcome expectancies, and self-efficacy. Block 3 consisted of interaction variables to determine if injection drug use moderated the relations between change in social cognition variables and change in condom use behavior. Therefore, this block consisted of the following interaction terms: (a) injection $\times$ change in HIV knowledge, (b) injection $\times$ change in outcome expectancies, and (c) injection $\times$ change in self-efficacy.

RESULTS

Of 409 FSWs who were randomized to the intervention, 66 (16.1%) had injected drugs. Overall, 342 (84%) returned for a 6-month follow-up visit. FSWs lost to follow-up were younger ($P = 0.012$), had experienced a shorter duration of sex work ($P < 0.001$), and had fewer episodes of unprotected vaginal sex with clients within the past month but otherwise did not differ significantly compared with FSWs who returned (Table 1).

With the exception of a slightly longer median duration of time since initiating sex work, FSW-IDUs reported similar baseline characteristics to noninjectors (Table 1). In the overall sample, median age was 32 years (interquartile range: 26.0–40.0), most had minimal formal education, a quarter were married or living in common-law relationships, and most (92.4%) had children.

As seen our final model (Table 2), greater increase in self-efficacy was associated with greater increase in percent condom use ($t = 2.66$, $P = 0.008$). This effect was not moderated by injection drug use (t for interaction = 0.78, $P = 0.44$), suggesting that change in self-efficacy was associated with change in condom use regardless of injection status. In contrast, there was a significant interaction between injecting drug use and change in HIV knowledge ($t = 2.13$, $P = 0.034$), suggesting that injection drug use may modify the relation between change in knowledge and change in condom use. A post hoc analysis indicated that among FSW-IDUs, change in knowledge was positively associated with change in percent condom use ($t = 2.26$, $P = 0.025$). However, among FSWs who were noninjection drug users, change in HIV knowledge was not significantly associated with change in percent condom use ($t = 0.06$, $P = 0.950$). Repeating all analyses controlling for site yielded no appreciable differences.

DISCUSSION

In examining the theoretical components of our intervention that were associated with successful behavioral changes among Mexican FSWs, we report 3 central findings. First, improvements in self-efficacy were predictive of significant increases in condom use with clients among FSWs receiving the intervention. Second, although FSW-IDUs also reported increased condom use, this subgroup benefited less from the intervention than noninjectors. Third, FSW-IDUs who improved in HIV knowledge were more likely to increase condom use with clients. Because our trial is one of the few to demonstrate significant improvements in condom use among a high-risk sample of community-based women in a developing country setting, these findings have important implications for translating this intervention from research to practice and informing the design of future interventions.

Our behavioral intervention generated change in a theoretically important construct (ie, self-efficacy for using condoms), as it was originally designed.¹¹ These findings support other studies showing the importance of self-efficacy in increasing condom use among high-risk HIV-negative women and girls,^{10,21,22} HIV-positive women,^{23,24} and substance users.^{9,15,25} Future HIV interventions among high-risk women in these settings should target self-efficacy as an important intermediate end point in combination with HIV/STIs and assess intervention fidelity by monitoring self-efficacy as a process measure.

In contrast, increases in outcome expectancies were not associated with a significant increase in condom use among FSWs, which was also the case in our previous interventions with HIV-negative heterosexuals and HIV-positive MSM methamphetamine users.^{9,10} The reasons for this are unclear but could suggest problems with measurement of this construct. It is also possible that our measure of outcome expectancies may capture not only the belief in women's ability to successfully negotiate condom use, but also reflect their personal perceptions and partner-related barriers to condom use, which were shown as important predictors of condom

use among African American women.²⁴ Couple-based studies of FSWs and their partners would assist in addressing this issue.

Interestingly, FSW-IDUs who demonstrated increases in HIV knowledge were significantly more likely to report increased condom use at follow-up, but this was not the case among noninjectors. Although baseline HIV knowledge scores among FSW-IDUs were similar to those of noninjectors, because FSW-IDUs are more marginalized, they may have been more receptive to educational messages because they tended to encounter the health care system less frequently.

Despite these findings, increases in condom use with clients were modest for FSW-IDUs. This is not surprising because the important role of substance use in FSWs' transactions with clients in Tijuana and Ciudad Juarez was not anticipated when our intervention was designed.¹¹ At a minimum, our study suggests that FSW-IDUs require enhanced interventions that take into account the disinhibiting effects of substance use on sexual behaviors and the extent to which substance use occurring in the context of sex work may compromise judgment and the ability to negotiate safer sex. Future interventions should integrate a harm reduction component promoting both safer injection and safer sex negotiation. For example, Ross et al²⁵ have documented the need to alter both affective self-efficacy (ie, beliefs that condom use can be sexually and emotionally satisfying) and situational self-efficacy (ie, the belief that condoms could be used in challenging situations, such as when drunk or high) among substance using populations. We are in the process of tailoring our intervention to address these critical needs among FSW-IDUs in both border cities.

This study was limited somewhat by low power to detect significant interactions. Because our follow-up period was relatively short, it is possible that intervention effects may have waned over time. However, a similar brief intervention based on the same theoretical principles led to sustained improvements more than 18 months among MSM in San Diego, CA.²² Although outcomes in this analysis were self-reported, we previously showed that the behavioral changes we observed were consistent with reductions in HIV and STI incidence, which is the ultimate test of overall intervention effectiveness. Because we studied a relatively large number of FSWs from 2 Mexico–United States border cities, our findings may not be generalizable elsewhere in Mexico or to other countries. Strengths of our intervention include its brevity and its ability to be delivered by trained counselors with little to no formal education. Our binational team, together with Mexican health officials, is poised to translate this intervention and evaluate it at a community level in an effort to ensure that the concentrated HIV epidemics in these cities do not become generalized.

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TABLE 1

Baseline Characteristics of FSWs Who Inject and Do not Inject Drugs in Tijuana and Ciudad Juarez

Variable	Total (N = 409)	FSW-IDUs (n = 66)	Non-IDU (n = 343)	P
Median age (IQR), yr	32 (26–40)	31 (27–35)	33 (26–41)	0.22
Median no. years in sex work (IQR)	4 (2–10)	5 (3–10)	4 (2–10)	0.03
>9 years of education (%)	10.6	12.1	10.3	0.66
Has children (%)	92.4	93.9	92.1	0.80
Fellow FSWs use drugs/alcohol with clients (%)	88.7	92.4	88.0	0.40
Median no. unprotected vaginal sex acts with clients (last month) (IQR)	12 (4–26)	16 (6–34)	12 (4–24)	0.17
Median HIV knowledge score (IQR)	12 (10–14)	12.5 (11–14)	12 (10–14)	0.57
Median outcome expectancy score (IQR)	2.6 (2.4–3)	2.7 (2.4–3)	2.6 (2.4–3)	0.93
Median self-efficacy score (IQR)	3.0 (2.75–3.25)	3 (2.5–3.5)	3 (2.75–3.25)	0.63
Median percent condom use (IQR)	61.4 (37.5–80.0)	60 (36.4–74.6)	62.5 (37.5–80.0)	0.47
Ever been tested for HIV	52.8	50.0	53.3	0.69
Returned for 6-month Follow-up visit (%)	85	84	85	0.86

IDU, injection drug user; IQR, interquartile range.

TABLE 2
Regression Model Predicting Change in Sexual Risk Behavior

Variable	Block 1	Block 2	Block 3
Years in sex work	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)
>9 years of education	0.034 (0.049)	0.030 (0.048)	0.045 (0.048)
Has children	−0.100 (.064)	−0.100 (0.063)	−0.093 (0.062)
Ever injected drugs	−0.102 (0.040) *	−0.093 (0.039) *	−0.106 (0.040) *
Change in HIV knowledge	—	0.005 (0.007)	0.000 (0.007)
Change in outcome expectancy	—	0.003 (0.036)	0.028 (0.040)
Change in self-efficacy	—	0.033 (0.009) *	0.027 (0.010) *
Inject-by-change in HIV knowledge	—	—	0.016 (0.025) *
Inject-by-change in outcome expectancy	—	—	−0.176 (0.105)
Inject-by-change in self-efficacy	—	—	0.059 (0.024)
<i>F</i> value	2.73 *	4.01 *	3.68 *
<i>df</i>	4286	7283	10,280
Total <i>R</i> square	0.037	0.084	0.105

Values outside parentheses are unstandardized coefficients. Values inside parentheses are standard errors.

* $P < 0.05$.