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Acceptability of vaginal microbicides among female sex workers and their intimate male partners in two Mexico-U.S. border cities: a mixed methods analysis

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Abstract

Background—Female sex workers (FSWs) may benefit from pre-exposure prophylaxis (PrEP) including microbicides for HIV prevention. Since adherence is a key factor in PrEP efficacy, we explored microbicide acceptability and potential barriers to use within FSWs' intimate relationships in Tijuana and Ciudad Juárez, Mexico, where HIV prevalence is increasing.

Methods—FSWs and their verified intimate (non-commercial) male partners completed quantitative and qualitative interviews from 2010–2012. Our complementary mixed methods design followed an iterative process to assess microbicide acceptability, explore related relationship dynamics, and identify factors associated with concern about male partners' anger regarding microbicide use.

Results—Among 185 couples (n=370 individuals), interest in microbicides was high. In qualitative interviews with 28 couples, most participants were enthusiastic about microbicides for sex work contexts but some explained that microbicides could imply mistrust/infidelity within their intimate relationships. In the overall sample, nearly 1 in 6 participants (16%) worried that male partners would become angry about microbicides, which was associated with higher self-esteem among FSWs and lower self-esteem and past year conflict causing injury within relationships among men.

Conclusions—HIV prevention interventions should consider intimate relationship dynamics posing potential barriers to PrEP acceptability and adherence, involve male partners, and promote risk communication skills.

Keywords

HIV; pre-exposure prophylaxis; microbicides; relationships; adherence

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Introduction

Female-initiated pre-exposure prophylaxis (PrEP) including microbicides holds great promise in preventing HIV acquisition among women, who comprise half of all HIV infections globally (UNAIDS 2010b). Although efforts to develop safe, effective, and acceptable vaginal microbicides have been underway for more than 2 decades (Rosenberg and Devlin 2012), recent clinical trials have demonstrated efficacy of oral tenofovir/emtricitabine combinations, including a 62% reduction among HIV-negative men and women (Thigpen *et al.* 2012) and a 75% reduction among serodiscordant heterosexual couples (Baeten *et al.* 2012). A tenofovir vaginal gel inserted vaginally also reduced HIV incidence by 39% among high risk women (Abdool Karim *et al.* 2010). While several recent trials have been unable to demonstrate efficacy (Van Damme *et al.* 2012), clinical evaluation of multiple microbicide candidates continues (Rosenberg and Devlin 2012). Following the recent United States (U.S.) approval of tenofovir/emtricitabine for HIV prevention among men who have sex with men (MSM) (Food and Drug Administration (FDA) 2012), it is likely that PrEP will become a promising HIV prevention modality for other high risk populations including women (Centers for Disease Control and Prevention (CDC) 2011).

Divergent results of recent PrEP trials may partly depend on suboptimal product adherence (van der Straten *et al.* 2012). Although PrEP could benefit disempowered women who struggle to negotiate consistent condom use, poor microbicide acceptability of and men's authority over its use could adversely affect adherence (Montgomery *et al.* 2008). Qualitative research among serodiscordant heterosexual couples in Uganda revealed that relationship dynamics including trust and stability influence microbicide acceptability and ultimate adherence (Ware *et al.* 2012). Unfortunately, little research has investigated relationship dynamics influencing microbicide acceptability or barriers to adherence among high risk and marginalised couples (Mantell *et al.* 2005), particularly in resource-limited settings in the Western Hemisphere.

Globally, female sex workers (FSWs) experience 13 times higher risk of HIV acquisition than other women of reproductive age (Baral *et al.* 2012) through unprotected sex with commercial and non-commercial (intimate) male partners. Condom use has improved in many commercial sex settings (Foss *et al.* 2007), yet drug abuse and related financial need often compromise FSWs' ability to negotiate safe sex with clients (Cusick 2006), and FSWs rarely use condoms with their intimate male partners (Deering *et al.* 2011, Ulibarri *et al.* 2012) due to emotional connectedness and lower perceived risk (Jackson *et al.* 2009). FSWs would likely benefit from microbicides that effectively protect them within commercial and intimate relationships, but research on social influences over microbicide acceptability, and ultimate product adherence within high risk FSWs' intimate relationships remains insufficient (Deering, *et al.* 2011).

Sex work is socially tolerated in the Mexico-U.S. border cities of Tijuana, Baja California, and Ciudad Juárez, Chihuahua, where FSWs' HIV prevalence has risen from less than 2% in 2004 to nearly 6% in 2006 (Patterson *et al.* 2008). A recent study among FSWs who inject drugs (FSW-IDUs) found that interest in using female condoms was associated with history of physical and sexual abuse, suggesting a need for female-initiated HIV prevention technologies in the region (Stockman *et al.* 2012). Since nearly half of FSWs in these cities have intimate male partners with whom they are twice as likely to have unprotected sex compared to clients (Ulibarri, *et al.* 2012), the overall objective of our study was to assess microbicide acceptability within this understudied population of heterosexual couples.

We drew from the Theory of Gender and Power (Connell 1987), which helps conceptualise how gendered social norms reinforce power dynamics within heterosexual relationships and

promote men's control over health-related behaviours (Wingood and DiClemente 2000). In line with this framework, we used qualitative methods to explore relationship dynamics surrounding microbicide acceptability. We also used quantitative methods to identify factors associated with reduced microbicide acceptability (e.g., perceived anger regarding microbicides). Based on our qualitative findings, theoretical framework, and the literature on microbicide acceptability among couples, we hypothesised that high trust and recent conflict within relationships would be associated with perceived male anger regarding microbicides in the quantitative phase of our study.

Methods

Study design and population

We drew from *Proyecto Parejas* [Couples Project], a prospective, mixed methods study of the social epidemiology of HIV/STIs within 214 FSWs' intimate relationships in Tijuana and Ciudad Juárez. As previously described (Syvertsen *et al.* 2012), from 2010–2011, we recruited women first and assessed their eligibility: ≥18 years of age; in a non-commercial (intimate) relationship for ≥6 months; reporting recent sex with that intimate partner and exchanging sex with clients (past-month); ever using heroin, cocaine, crack, or methamphetamine; not planning to move away or break up with partners; and not fearing severe intimate partner violence (IPV) resulting from potential participation. Eligible FSWs (71% of women screened) brought their partners to study offices to assess men's eligibility (≥18 years of age) and complete relationship verification screeners (Syvertsen, *et al.* 2012). Enrolled couples (90% of couples screened) provided written informed consent for qualitative and quantitative interviews and HIV/STI testing at baseline and every 6 months for 2 years. This study draws from quantitative and qualitative follow-up visits of *Proyecto Parejas*, as described below. Institutional review boards of the University of California, San Diego, the Hospital General and El Colegio de la Frontera Norte in Tijuana, and the Universidad Autónoma de Ciudad Juárez approved all study protocols.

Methodological framework

Our complementary mixed methods design utilised the prospective nature of *Proyecto Parejas* and followed an iterative process throughout multiple, integrated phases of data collection and analysis (Creswell and Plano Clark 2007). While quantitative and qualitative interviews were conducted during the first year of the study, preliminary quantitative descriptive statistics on microbicide interest, acceptability, and perceived self-efficacy, which were generally positive, identified an unexpected concern regarding male partners' anger about microbicides. This prompted additional qualitative inquiry during follow-up visits to explore relationship dynamics possibly influencing this barrier to acceptability. Emergent qualitative themes guided hypothesis development and variable selection for quantitative analyses identifying factors independently associated with this anger concern.

Quantitative data collection

From 2010–2011, 214 couples completed individual interviewer-administered baseline questionnaires programmed into laptop computers. Individual socio-demographics and personal factors included age, educational attainment, income and self-esteem (Rosenberg 1965). Drug and sexual behaviours included lifetime and recent (past 6 months) consumption and injection of illicit drugs, sex work (among women), concurrent sexual partnerships (UNAIDS 2010a), and condom use with various partners. Based on our theoretical framework (Connell 1987), intimate relationship measures included relationship duration, trust (Sherman and Latkin 2001), relationship satisfaction (Johnson *et al.* 2006), sexual satisfaction, and four types of conflict: psychological aggression, physical assault, injury, and sexual assault (Straus and Douglas 2004).

From 2011–2012, 185 complete couples (i.e., not broken up or lost to follow-up) completed follow-up questionnaires at 6-month study visits that assessed changes in behaviours and relationships and microbicide interest, acceptability, and perceived self-efficacy. Based on preliminary descriptive statistics and qualitative interviews (described below), our dependent variable was measured using the true/false item, 'Your steady male partner [you] would get angry if he [you] found out that you [your steady female partner] were using a vaginal gel to prevent HIV.'

Qualitative data collection and analysis

In 2010, we purposively selected couples from the cohort for maximum variation (Johnson 1990) in age, relationship duration, drug abuse and male employment. Trained interviewers engaged participants in semi-structured baseline individual and joint (couple) interviews exploring relationship dynamics surrounding HIV/STI risk. For this study, we re-interviewed a subsample of 28 qualitative couples at 12-month follow-up visits in 2011 to assess relationship dynamics relating to microbicide acceptability within and outside of their intimate relationships, including perceived comfort discussing and using microbicides together, potential concerns regarding microbicides, and appropriate contexts for microbicide use.

Qualitative interviews were digitally recorded and transcribed. We kept all data in the source language (Spanish, English, bilingual) throughout analyses to maximise accuracy and evaluate connotations (Lopez *et al.* 2008). We employed a primarily deductive coding strategy to follow-up data because themes were determined *a priori* (Patton 2002). We carefully reviewed all individual and couple transcripts for microbicide content, recorded detailed memos about interesting, important, and unique findings, identified broader crosscutting themes (e.g., interest in and perceived appropriateness of microbicides within different relationship contexts), and compared data relating to these themes within individual and couple interviews for inconsistencies. We organised data according to these themes and selected illustrative examples that were translated into English as necessary.

Quantitative data analysis

Qualitative findings guided the selection of measures and hypothesis development for our quantitative assessment of concern about male partners' anger regarding microbicides. Our binary dependent variable was concern that male partners would become angry. We calculated means and frequencies for key variables stratified by this anger concern (i.e., to compare participants with and without the anger concern). We used bivariate probit regression to examine associations between each key variable and the anger concern (i.e., bi-variable analyses). We individually entered variables that were relevant to our theoretical framework or qualitative findings and/or attained statistical significance ($p<.20$) in bi-variable analyses into multivariable models while comparing the fit of nested models, assessing multicollinearity, and controlling for potential confounders (e.g., city, age). We calculated marginal effects to interpret coefficients as probabilities of anger concern.

Results

Preliminary quantitative findings

Sample characteristics—Among 185 FSWs and their 185 intimate male partners (n=370 individuals; Tijuana: n=158; Juárez: n=212), median age was 36 years (interquartile range [IQR]: 30–42) and 65% of participants had monthly income under USD $200 (Table 1). Median relationship duration was 3 years (IQR: 2–6), trust between study partners was high (median 8 out of 10 points; IQR: 8–10), and most couples were satisfied with their relationships (median 15 out of 20 points; IQR: 13–15). However, conflict was relatively

common, with couples reporting past-year psychological aggression (75% of couples), physical assault (45%), injury (23%), and sexual coercion (15%). Unprotected sex within steady relationships was routine (median 100% of past-month vaginal sex acts with study partners were unprotected; IQR: 80–100%). Recent drug abuse was common: participants used heroin (58% of participants), methamphetamine (26%), crack and (11%) cocaine (8%), and injected drugs (58%) in the past 6 months.

Microbicide acceptability—Most participants were highly interested in microbicides (89%) and felt that they could discuss microbicides with their intimate partners (85%). However, 16% of participants were concerned that male partners would become angry about microbicides (21% of women thought their male partners would become angry if they used microbicides; 12% of men reported that they themselves would become angry). Concordance between partners' anger concern within couples was limited: both women and men reported the anger concern in only 6 couples (3%; Table 2). These preliminary statistics prompted additional qualitative inquiry into relationship dynamics surrounding microbicide acceptability. [Table 2 near here]

Qualitative findings

Among 28 couples completing qualitative interviews (n=56 individuals; 14 Tijuana couples, 14 Juárez couples), demographics, risk behaviour profiles, and microbicide-related concerns mirrored those of the cohort, and 10 participants (18%) were concerned that male partners would become angry about microbicides.

In their individual interviews, FSWs were enthusiastic about microbicides for sex work contexts, in which condom negotiation was not always feasible: 'When clients don't want to use condoms, I try to convince them, but I can't force them' (Tijuana FSW-IDU, age 44, individual interview). Microbicides could provide women with 'back-up' protection to condoms because 'accidents happen' especially 'for a person who has sex as often as us'. Although several FSWs would want to keep their microbicide use discreet while at work, most were unconcerned about disclosing microbicide use to clients and explained that, most importantly, microbicides would empower them to have more control over their health during sex work:

> It would be super perfect because it would be like extra protection that I'd be responsible for…I'd be in charge of myself, of my body, of my health, and I wouldn't have to put my life in someone else's hands. (Tijuana FSW-IDU, age 29, individual interview)

Most male partners also expressed high levels of interest in and support for their FSW-partners' use of microbicides in sex work contexts, explaining that microbicides would help protect their intimate relationship from this outside risk (sex work). Several men also echoed women's view of microbicides as a 'back-up' to condoms, which they rarely used within their intimate relationships: 'It would be good for both of us. It would be an extra point of protection, right? If an accident happens, it would reinforce our protection and be easier and more convenient for everyone than condoms' (Tijuana male IDU, age 33, couple interview). Support for microbicides was particularly strong among men who perceived heightened HIV risk in their lives due to their drug use, sex work, and the local risk environment more generally:

> I would support her decision [to use microbicides] because, these days, you never know who is sick, and with the syringes, you never know… (Juárez male IDU, age 36, individual interview)

> I think that [Tijuana], and other cities [with] a lot of prostitution, [is] where there should be [microbicides]. If there was a gel for men, I would use it, too! (Tijuana male IDU, age 29, individual interview)

When asked about their intimate relationships in individual and couple interviews, most participants reported that they would be able to discuss microbicides openly, citing the importance of health-related communication as well as trust, support, and love. Two men also explained that microbicides could be viewed as another way to demonstrate affection and concern for partners' health: 'Everything that is good for her health, I agree with, because we have a mutual support, trust, and that is how you can show the love that you have for someone' (Juárez male IDU, age 53, individual interview). However, in several women's individual interviews, concerns were raised about explaining microbicides to intimate partners. Women who were less confident about discussing microbicides explained that they would emphasise that microbicides were 'just for work' (sex work). Interestingly, partners' responses within couples did not always converge on this point, as some of these women's male partners were actually highly enthusiastic about microbicides regardless of the relationship context in which they would be used.

Two couples in our qualitative sample reported specific concerns of microbicides implying mistrust or infidelity within their intimate relationships:

> Male partner: She trusts me, and I'm not sick. It's obvious that I don't have it [HIV], and she doesn't have it either, so where would we get it? It would be like she's saying she doesn't trust me and thinks I'm sick.
>
> Female partner: Yeah, or vice versa, that I'm the one who's sick. (Tijuana IDU couple, ages 30 and 31, couple's interview)

Two men also explained in their individual interviews that because they expected their steady female partners to always use condoms with clients, introducing microbicides into their intimate relationships would imply that women were being dishonest:

> Well, I'd be a little bit uncomfortable because she tells me that she takes care of herself [*se cuida*; uses condoms] and that she always has. But I've heard that people sometimes offer more money for sex without condoms. So if she tells me, "Hey, let's use this gel," well, I'm going to trust her a little bit less and it will make me think something…because supposedly she's taking care of herself. So why should we use it when it is for people who don't use condoms? (Juárez male IDU, age 29, individual interview)

Although no participants explicitly stated that microbicides would make male partners angry or violent, several men expressed reluctance to discuss microbicides in individual or couple interviews, explaining that it would only be appropriate for sex work and not within their intimate relationships because, similar to condoms, microbicides would make them feel like 'just another client'. Using these findings and our theoretical framework as a guide, we returned to the quantitative data to identify factors associated with concern about male partners' anger regarding microbicides as a potential relationship barrier to adherence.

Final quantitative model

Factors associated with concern regarding male partners' anger—In bi-variable analyses, concern about male partners' anger was more common in Tijuana than Ciudad Juárez, among participants with lower self-esteem, and among couples with past-year conflict causing physical injury (Table 1). Concern about anger was less common among individuals who were sexually satisfied with their intimate relationship. Men having any outside sex partners (past 6 months), FSWs having steady concurrent partners including

regular clients (past year), and methamphetamine users were more likely to be concerned about men's anger.

In our final multivariable model controlling for city, age, income, and relationship duration, self-esteem and past-year conflict causing physical injury were independently associated with the anger concern (Table 3). While women with higher self-esteem were less likely to be concerned about male partners' anger (4% decrease in the probability of concern per point increase in self-esteem), men with higher self-esteem were more likely to report that they would become angry (3% increase in the probability of anger per point increase in self-esteem). Men in relationships with any past-year conflict causing physical injury were 9% more likely to report that they would become angry about microbicides.

Discussion

In our study of FSWs and their intimate male partners in two Mexico-U.S. border cities, microbicide interest and acceptability were high, and most participants did not perceive any major barriers to microbicide adherence. However, in nearly one in six couples, at least one partner was concerned that male partners would become angry about microbicide use. In qualitative interviews, participants described microbicides as being appropriate for women's sex work rather than for their intimate relationships, in which most were not using condoms and did not perceive heightened HIV risk. Some couples explained that microbicides could imply mistrust, suspicion of infidelity, or lack of appropriate precaution during women's sex work if introduced into their intimate relationships, all of which could threaten relationship stability and the bonds between intimate partners. Although our qualitative and quantitative findings did not converge, we believe that the multiple, different epistemological underpinnings and measurement strategies inherent in our mixed methods design are an important strength of our study (Creswell and Plano Clark 2007), which yielded findings with the potential to inform future microbicide research and interventions among highly understudied populations.

Based on our qualitative findings that trust and other relationship dynamics can adversely influence microbicide acceptability, we returned to our quantitative data to identify correlates of one specific, important barrier to microbicide acceptability: perceived male partner anger regarding microbicides. Although we did not find trust to be associated with perceived anger in our quantitative models, as originally hypothesised, we identified two other factors (self-esteem and violent conflict) that may reflect the gendered social norms and power dynamics within heterosexual relationships that are emphasised within our theoretical framework (Connell 1987). We believe that these complementary qualitative and quantitative findings underscore the unique contribution of mixed methods approaches in assessing microbicide acceptability. While qualitative interviews allowed participants to explain how microbicides could imply mistrust/infidelity, our three quantitative findings highlighted the importance of personal factors and interpersonal conflict within relationships in influencing perceptions of male partners' anger.

First, we found that women with higher self-esteem were less likely to worry about male partners' anger, perhaps reflecting greater agency in health-related decisions and supporting our theoretical framework (Wingood and DiClemente 1998). In support of this interpretation, in their qualitative interviews, several women described how microbicides could be empowering within sex work contexts, revealing a confidence in adopting HIV prevention technologies that could be leveraged by PrEP interventions. At the same time, women with lower self-esteem may have been more likely to be concerned about men's anger if they have experienced IPV, while women with higher self-esteem were less likely to acknowledge existing conflict. Either way, caution will be required to avoid inciting

increased conflict within their intimate relationships while promoting microbicides, particularly in programmes seeking to increase women's agency. Interventions could involve separate, individual training modules followed by counselling tailored to specific couples' profiles (Burton *et al.* 2010, El-Bassel *et al.* 2010). Additional research is also needed to assess FSWs' self-esteem, agency in making health-related decisions, and empowerment in different relationship contexts.

Second, we found that men with lower self-esteem were more likely to anticipate being angry if their female partners used microbicides. The Theory of Gender and Power posits that men traditionally enjoy greater control over economic and related resources within heterosexual relationships (Connell 1987), yet many men in our sample struggled with unemployment while their FSW partners earned higher incomes. This reversal of traditional gender roles may lead some men to perceive reduced control over financial and health decisions, making them frustrated, emasculated or angry. Complementary to this interpretation, men with higher self-esteem may be more confident in trusting their FSW-partners and less likely to become jealous or angry regarding microbicides. This finding suggests that PrEP interventions should involve men in in positive ways. 'Male involvement' in HIV prevention has been criticised for encouraging men to support women's health decisions without enhancing men's own agency in promoting healthy relationships (Higgins *et al.* 2010). Role-playing exercises within couple-based HIV prevention programmes are one promising way to engage and empower male partners to become more positively and actively involved in their partners' health (Montgomery et al. 2011).

Third, we found that past-year conflict that caused physical injury was positively associated with men's anger concern, consistent with our hypothesis that conflict could negatively affect microbicide acceptability. Men with a propensity for violent conflict may anticipate that microbicides would make them angry, especially if they believe that microbicides would imply infidelity or mistrust, as described in their qualitative interviews and found in condom research (Wingood and DiClemente 1998). However, this association did not persist for women in our final quantitative model, suggesting that men, who are more likely to perpetrate severe, injury-causing IPV, may be more likely to acknowledge this violence or anticipated triggers in a survey. Women, on the other hand, may be less willing to acknowledge their intimate partners' violent behaviours in a quantitative survey context in which little rapport has been established (Creswell and Plano Clark 2007). Taken together with the high discordance between partners' anger concern within couples (Table 2), and the discrepancies between men's and women's perceptions described in qualitative interviews, these findings imply that some participants may have low awareness of their intimate partner's health-related beliefs and/or poor communication within their intimate relationships. Although additional research is needed on the types/severity of and triggers for IPV within these couples, interventions promoting microbicides must exercise great caution to avoid provoking men in relationships with a known history of conflict and/or poor communication between partners regarding anger and other emotions. Rather than directly promoting microbicides to such couples, anger management, conflict resolution, and other services may be needed for women first.

Since the majority of microbicide acceptability research has focused on products' physical characteristics (Mantell *et al.* 2005) and perceived safety and efficacy (Bentley *et al.* 2004), our study contributes an enhanced understanding of relationship dynamics that could adversely affect microbicide acceptability and ultimate adherence among high risk couples. We found that microbicides could imply mistrust or make some male partners angry, suggesting that couple-based PrEP interventions should consider reframing microbicides to shift the focus away from 'risk' while emphasising other, relationship-oriented advantages

of PrEP such as demonstrating care and concern for partners' wellbeing (El-Bassel *et al.* 2011). By validating positive relationship dynamics (e.g., commitment, trust, and love), HIV prevention interventions can empower couples to discuss and enact protective behaviours together (Bluthenthal and Fehringer 2011). Although anger and potential conflict resulting from microbicides are real concerns that urgently require additional research, our findings suggest that positive relationship dynamics could be leveraged to introduce microbicides in a 'safe space' involving counsellors trained in conflict resolution (El-Bassel *et al.* 2001).

Our study had several limitations. First, our unique sample is unlikely to represent other high risk couples globally. Although initial exclusion of couples experiencing severe IPV, attrition, and censoring of couples who broke up may have biased our sample toward more stable, lower risk couples, we believe that this approach was justified on ethical grounds and the paucity of data on FSW-intimate partner dyads. Second, we relied on self-report of sensitive health beliefs, behaviours, and relationship dynamics, possibly causing underreporting and social desirability bias. Third, we focused on male partners' anger regarding microbicides, which represents only one specific barrier to microbicide acceptability and ultimate adherence. Nevertheless, we believe that PrEP interventions should recognis and understand this concern among high risk couples. Finally, our study focused on the relationship level of analysis; additional research is needed on how poverty, social marginalisation, and other structural factors shape the acceptability of new health technologies in this population.

Conclusions

Although interest in and acceptability of microbicides was generally high among FSWs and their intimate male partners, some couples were concerned that microbicides could imply mistrust and cause anger within their relationships. Interventions promoting female-initiated methods of PrEP must recognise the centrality of intimate relationship dynamics and reframe PrEP to shift the focus away from risk toward more positive relationship qualities. Although some individuals may require enhanced counselling or additional IPV services first, couple-based interventions should carefully but actively involve male partners through training in risk communication within safe spaces. Ultimately, the efficacy of any female-initiated PrEP modality must recognise how complex negative and positive relationship dynamics interact with broader, gendered social norms to influence adherence.

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Table 1

Characteristics associated with female sex workers' and intimate male partners' concerns of male partners' anger[a] regarding microbicide use in Tijuana and Ciudad Juárez, Mexico (n=370).

	Concerned about male partners' anger[a] (n=59, 17%)	Not concerned about male partners' anger[a] (n=311, 83%)	Overall (n=370, 100%)	Concerned about male partner's anger: marginal effect (robust standard error)[b]	
				Women (n=185)	Men (n=185)
Socio-Demographics					
Female gender (vs. male)	37 (63%)	148 (48%)	815 (50%)	--	--
Study site is Tijuana (vs. Ciudad Juárez)	54 (92%)	104 (33%)	158 (43%)	0.34*** (0.04)	0.27*** (0.06)
Median age in years (IQR [c])	37 (29–44)	35 (30–42)	36 (30–42)	0.00 (0.00)	0.00 (0.00)
Median educational attainment in years (IQR)	7 (6–9)	6 (6–9)	6 (6–9)	0.00 (0.01)	0.01 (0.01)
Income ≥2500 pesos per month (>USD $200)	39 (66%)	201 (65%)	240 (65%)	0.01 (0.06)	0.00 (0.05)
Median Rosenberg self-esteem score (IQR)	13 (12–14)	14 (12–14)	14 (12–14)	−0.05*** (0.01)	0.01 (0.02)
Relationship Factors					
Median relationship duration in years (IQR) [d]	3 (2–5)	3 (2–6)	3 (2–6)	0.00 (0.01)	0.00 (0.01)
Median trust of partner on 10-point scale (IQR)	8 (7–10)	8 (8–10)	8 (8–10)	−0.02 (0.02)	−0.01 (0.01)
Median relationship satisfaction on 20-point scale (IQR)	15 (10–15)	15 (14–15)	15 (13–15)	−0.03** (0.01)	0.01 (0.02)
Male financial dependence on FSW's income[d]	24 (41%)	88 (28%)	112 (30%)	0.11* (0.06)	0.03 (0.05)
Any psychological aggression, past year[d]	46 (78%)	232 (75%)	278 (75%)	0.01 (0.07)	0.05 (0.06)
Any physical assault, past year[d]	30 (51%)	138 (44%)	168 (45%)	0.03 (0.06)	0.04 (0.05)
Any sexual coercion, past year[d]	13 (22%)	43 (14%)	56 (15%)	0.06 (0.08)	0.09* (0.06)
Any injury, past year[d]	22 (37%)	64 (22%)	86 (23%)	0.07 (0.07)	0.14*** (0.05)
Sexual Behaviours					
Sexually satisfied with steady partner (vs. not satisfied)	44 (75%)	284 (91%)	328 (89%)	−0.18** (0.07)	−0.15** (0.07)
Male partner had any outside sex partners (past 6 months; men only)	14 (64%)	52 (32%)	66 (36%)	0.19*** (0.05)	0.13*** (0.05)
Had any 'steady' concurrent sex partners (including regular clients; past year)	18 (31%)	42 (14%)	60 (16%)	0.15** (0.06)	0.07 (0.09)
FSW often/always uses condoms with clients (vs. rarely/never; past month; FSWs only)	17 (77%)	99 (84%)	116 (83%)	−0.06 (0.08)	0.63*** (0.16)

	Concerned about male partners' anger[a] (n=59, 17%)	Not concerned about male partners' anger[a] (n=311, 83%)	Overall (n=370, 100%)	Concerned about male partner's anger: marginal effect (robust standard error)[b]	
				Women (n=185)	Men (n=185)
Drug Abuse (past 6 months)					
Heroin	30 (51%)	186 (60%)	216 (58%)	−0.05 (0.06)	−0.05 (0.05)
Cocaine	6 (10%)	24 (8%)	30 (8%)	−0.03 (0.10)	0.11 (0.08)
Crack	3 (5%)	37 (12%)	40 (11%)	−0.09 (0.10)	−1.05*** (0.17)
Methamphetamine	33 (54%)	64 (21%)	97 (26%)	0.24*** (0.05)	0.16*** (0.05)
Injected any drugs	29 (49%)	184 (59%)	213 (58%)	−0.06 (0.06)	−0.06 (0.05)

[a] FSWs' concern that intimate male partners would become angry if she used microbicides; male partners' concern that they would become angry if FSW-partner used microbicides.

[b] Marginal effects calculated from bivariate probit models; represents change in probability of anger concern associated with a 1-unit change of variable.

[c] Interquartile range.

[d] Dyad average of both partners' responses within a given couple.

* $p<.10$,

** $p<.05$,

*** $p<.01$.

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Table 2

Concern about male partners' anger at microbicide use within FSW-intimate partner dyads in Tijuana and Ciudad Juárez, Mexico (n=185 couples).

		FSWs' concern that male partners would become angry about microbicide use	
		No anger concern	**Has anger concern**
Male partners' concern that they would become angry if FSW-partner used microbicides	**No anger concern**	132 (71%)	31 (17%)
	Has anger concern	16 (9%)	6 (3%)

Table 3

Marginal effects[a] for factors independently associated with concern about male partners' anger at microbicides use within FSW-intimate partner dyads in Tijuana and Ciudad Juárez, Mexico (n=370 individuals; 185 couples).

	Concerned about male partner's anger: marginal effect (robust standard error) [a]	
Variable	**Women**	**Men**
Rosenberg self esteem score (per point increase)	−0.04*** (0.01)	0.03* (0.01)
Any injury, past year	−0.01 (0.05)	0.09** (0.04)

[a]Marginal effects calculated from final bivariate probit model controlling for city, age, income, relationship duration, and other couple-specific effects; represents change in probability of anger concern associated with a 1-unit change in each independent variable.

*$p<.05$,

**$p<.01$,

***$p<.001$.