Published in final edited form as:

Soc Sci Med. 2009 June ; 68(11): 2037–2044. doi:10.1016/j.socscimed.2009.03.009.

“Talking the talk, walking the walk: Social network norms, communication patterns, and condom use among the male partners of female sex workers in La Romana, Dominican Republic”

Clare Barrington, Carl Latkin, Michael Sweat, Luis Moreno, Jonathan Ellen, and Deanna Kerrigan

Abstract

Male partners of female sex workers are rarely targeted by HIV prevention interventions in the commercial sex industry, despite recognition of their central role and power in condom use negotiation. Social networks offer a naturally existing social structure to increase male participation in preventing HIV. The purpose of this study was to explore the relationship between social network norms and condom use among male partners of female sex workers in La Romana, Dominican Republic. Male partners (n=318) were recruited from 36 sex establishments to participate in a personal network survey. Measures of social network norms included 1) perceived condom use by male social network members and 2) encouragement to use condoms from social network members. Other social network characteristics included composition, density, social support, and communication. The primary behavioral outcome was consistent condom use by male partners with their most recent female sex worker partner during the last 3 months. In general, men reported small, dense networks with high levels of communication about condoms and consistent condom use. Multivariate logistic regression revealed consistent condom use was significantly more likely among male partners who perceived that some or all of their male social network members used condoms consistently. Perceived condom use was, in turn, significantly associated with dense networks, expressing dislike for condoms, and encouragement to use condoms from social network members. Findings suggest that the tight social networks of male partners may help to explain the high level of condom use and could provide an entry point for HIV prevention efforts with men. Such efforts should tap into existing social dynamics and patterns of communication to promote pro-condom norms and reduce HIV-related vulnerability among men and their sexual partners.

Keywords

Dominican Republic; HIV; social networks; norms; commercial sex work; male clients; women

© 2009 Elsevier Ltd. All rights reserved.

Clare Barrington, University of North Carolina at Chapel Hill Chapel Hill, NC UNITED STATES [Proxy] clarebarrington@gmail.com.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Introduction

The Dominican Republic (DR) has a long history of innovative HIV prevention programs in the female commercial sex industry. An environmental-structural intervention integrating community solidarity and government policy strategies demonstrated significant reductions in sexually transmitted infections (STI) and increases in condom use among female sex workers in the DR (Kerrigan, Moreno, Rosario, Gomez, Jerez, Barrington et al., 2006). Continued HIV-related vulnerability, however, as documented by the frequency of STI and gaps in consistent condom use with regular partners, indicates the need to continue building upon these efforts. Dominican women working in the sex industry have articulated the need to directly address the sexual behaviors of men, within and beyond the sex establishment (Kerrigan, Moreno et al., 2003). The non-governmental organizations that implemented the aforementioned environmental-structural HIV prevention program in the DR, the Centro de Orientación e Investigación Integral and the Centro de Promoción y Solidaridad Humana, have also utilized theater and street outreach to reach men. While these activities have been met with high levels of acceptance, they have not been conducted in a systematic fashion and have never been evaluated for their influence on HIV risk behaviors. This study sought to understand how the dynamics of social influence processes among men may abet or impede sexual risk reduction practices in order to develop more effective HIV prevention interventions.

Male clients of female sex workers

Male clients of female sex workers (both paying and non-paying) who have unprotected sex with multiple, concurrent partners are especially vulnerable to infection with HIV and other sexually transmitted infections (Hor, Detels, Heng, & Mun, 2005; Wang et al., 2007). They have also been referred to in the epidemiological literature as a “bridge population” in the transmission of HIV due to their central role in sexual networks that include a range of partners (e.g., wives, girlfriends, sex workers) with varying levels of condom use (Chetwynd & Plumridge, 1994; Lowndes et al., 2000; Mills, 2000). Traditional approaches to HIV prevention in the context of female sex work generally place the responsibility for condom use solely on the woman. In turn, such efforts fail to address the gender, economic, and social inequalities implicit in the relationships between sex workers and their clients and other sex partners (Lowndes et al., 2000). Additionally, norms of masculinity across and within cultures may increase pressure to engage in sexual risk behaviors and/or impede HIV prevention efforts to reduce these behaviors among men (Courtenay, 2000; UNAIDS, 2001).

While investigators have emphasized the need to include male clients in HIV prevention interventions (Fajans, Ford, & Wirawan, 1995; Lowndes et al., 2000; Wilson, Chiroro, Lavelle, & Mutero, 1989), few empirical intervention studies have been conducted with this population (Leonard et al., 2000; Lowndes et al., 2007; Walden, Mwangulube, & Makhumula-Nkhoma, 1999). Lowndes et al. (2007) reported significant reductions in STI and increases in condom use among male clients in Benin following an intervention entailing outreach by male peer educators in sex establishments and a free STI clinic for men. As peer based approaches inherently rely on connections between individuals as a way to reach and influence people, the results from Benin highlight the potential impact of HIV prevention efforts to reach men through their existing social networks. Following the previously mentioned environmental-structural HIV prevention intervention in the DR (Kerrigan et al., 2006), qualitative interviews and focus groups were conducted with ninety male clients of female sex workers to identify approaches to improve their participation in prevention efforts (Catino et al., 2003). The majority of male clients expressed openness to participating in HIV/STI prevention efforts, which according to them have historically targeted women. Many participants suggested tapping into their existing social networks to facilitate outreach efforts, which motivated the

need to improve understanding of social networks and social influence patterns among men in this setting.

Social networks and sexual risk behaviors

The relationships and interactions that occur within social networks are considered critical to understanding sexual behavior and HIV risk (Bond, Valente, & Kendall, 1999; Friedman et al., 2001; Latkin & Knowlton, 2000; Youm & Laumann, 2002). These interactions inform perceptions of the “normal” or most prevalent behaviors among network members, referred to as descriptive norms, and perceptions of acceptable behaviors, referred to as injunctive norms (Cialdini, Reno, & Kallgren, 1990). Cialdini et al. (1990) have proposed that descriptive norms motivate behavior by conveying the idea of what is normal and inspiring others to do the same, while injunctive norms motivate people to do what they perceive they should do in order to avoid social sanction. Both descriptive and injunctive norms have been associated with public (e.g., needle sharing) and private (e.g., condom use) HIV-related behaviors (Buunk & Bakker, 1995; Davey-Rothwell & Latkin, 2007a; Hawkins, Latkin, Mandel, & Oziemkowska, 1999; Latkin, Forman, Knowlton, & Sherman, 2003b). Interventions that strive to alter social network norms to promote HIV protective behaviors have been proposed as a sustainable way to change behavior by tapping into naturally existing social structures and forms of interaction to stimulate normative influence processes (Celentano et al., 2000; Latkin et al., 2003b).

Few studies have specifically examined the influence of norms on the sexual behaviors of male partners of female sex workers. Ford et al. (2002) conducted a study among male clients of female sex workers in Bali that measured two perceived condom norms: 1) friends use condoms with sex workers and 2) friends give advice to use condoms. These investigators found significant associations between both measures of perceived condom norms and condom use. Although this study offers insight into the potential influence of perceived norms on sexual risk behaviors among male clients, the perceived norms were not measured in reference to specific social network contacts, but rather at the more general level of “friends”.

While the literature includes several studies examining associations between peer or social network norms and sexual risk behaviors, the question of which social network characteristics (i.e. size, composition, cohesion) influence perceptions of normative beliefs and behaviors within networks has received less attention (Boer & Westhoff, 2006; Davey-Rothwell & Latkin, 2007b; Latkin et al., 2003b). Identifying the social network characteristics that contribute to perceptions of network norms can improve understanding of how these norms influence behavior and provide insights for the development of social network-based HIV prevention interventions. Social network cohesion, for example, reflects the density of ties in the network, as well as the strength of ties between network members, and is an indicator of the potential availability of social support (Carpentier & White, 2002; West, Barron, Dowsett, & Newton, 1999). While the content of cohesive ties can be beneficial for health outcomes by providing opportunities for social interaction (Carpentier & White, 2002) and promoting healthy norms (Kawachi & Berkman, 2001), cohesive networks can also perpetuate the norms that HIV prevention efforts are trying to change, especially in terms of gender and sexual behavior (Latkin et al., 2003b; Reid, 2000).

In addition to the potential role of structural network properties in shaping perceived norms, communication between social network contacts has been proposed as the overarching mechanism through which social networks inform the development of normative perceptions and influence behavior, especially private behaviors such as condom use (Hogg & Reid, 2006; Rimal & Real, 2003). Talking or joking about condoms and sexual risk behaviors reflect what Noar and colleagues (2006) refer to as “warm up” discussions that may create the opportunity for more persuasive communication, such as encouragement to use condoms (Noar, Carlyle & Cole, 2006). Studies have reported both positive and negative associations

between communication and HIV-related behaviors among drug using populations, highlighting the need for context-specific research (El-Bassel, Gilbert, Wu, & Chang, 2006; Kang, Deren, Andia, Colon, & Robles, 2005; Latkin et al., 2003a).

The purpose of this study was to improve understanding of social network influences on sexual risk behavior among the male partners of female sex workers in La Romana, DR. The three study aims were to: 1) describe the individual and social network characteristics of male partners; 2) examine the association between social network norms and consistent condom use and 3) identify social network characteristics that are associated with perceived condom use.

Methods

Study setting

HIV prevalence among 15 to 49 year olds in the DR is estimated to be 1.0% (CESDEM, 2003). Heterosexual sex is the most common route of transmission, accounting for 76.0% of HIV cases (DIGECITSS, 2006b). The most recent national level estimates indicate that median HIV prevalence is 2.3% among pregnant women, 3.6% among female sex workers, and 4.0% among STI patients (DIGECITSS, 2006a). While these data reflect an overall stabilization, and even possible decline in HIV prevalence across these groups, they also highlight the continued disproportionate burden of HIV among female sex workers in the DR compared to the general population (DIGECITSS, 2000).

La Romana, the third largest city in the DR, is located on the southeastern coast with a population of approximately 200,000. With the largest sugar mill in the country, a port for cruise ships, and proximity to prime tourist locations on the eastern coast, La Romana is one of the most economically active cities in the DR. It also has a very active commercial sex industry with over 100 commercial sex establishments. The clientele is predominantly Dominican, though many sex establishments in La Romana also have occasional foreign clients. The most recent HIV prevalence estimates for La Romana, based on sentinel surveillance, indicate HIV 2.8% prevalence among pregnant women and 4.7% among female sex workers (DIGECITSS, 2006a).

Participants and Recruitment

Three hundred eighteen male partners of female sex workers recruited from thirty-six commercial sex establishments participated in a personal network survey. Eligibility criteria for the sex establishments included: 1) involvement in the HIV prevention intervention implemented by the Centro de Orientacion e Investigacion Integral, 2) at least five women working on the premises, and 3) charging a fee to have sex with or take out a woman from the establishment. These criteria allowed for the inclusion of both direct (e.g. brothels) and indirect (e.g. bars and discos) sex establishments, as well as the newer modalities of establishment, including car washes and *centro cervceros* or beer centers, that are popular in the DR. Selection criteria for male participants in the study included being at least 18 years of age, a current resident of La Romana, and being a regular partner, defined as having had penetrative sex with a woman who worked at the establishment where he was recruited at least three times in the last three months. The analysis herein includes only male partners who have at least one male social network contact who was perceived to have sex with female sex workers. Our focus on the regular paying and non-paying partners of female sex workers was motivated by the significantly lower rates of consistent condom use in these relationships and the need to address barriers to consistent condom use in relationships characterized by trust and intimacy (Kerrigan, Ellen et al., 2003b; Murray et al., 2006).

All sex establishments were visited prior to recruitment to seek approval from management and support from female sex workers and other employees in the recruitment process. Recruitment was conducted from Thursday to Sunday between 5pm and 10pm to capture the busiest times with the largest number of potential participants. Each establishment was visited at least twice. Potential participants were approached by a peer educator from Centro de Orientación e Investigación Integral, or female sex workers or male employees of the establishment, and referred to study interviewers who confirmed eligibility and initiated informed consent. Interviewer-administered surveys with eligible consenting men were carried out in a private location of the participant's choosing, including a nearby cafeteria, the study's project vehicle, or storage areas of the establishments in the case of employees. On average, interviews lasted 35 minutes (range 18 – 90). Participants received the Dominican peso equivalent of five US dollars upon completing the survey.

Study interviewers included three female and two male university students or graduates from La Romana. Interviewers were trained in personal network survey administration and research ethics over a two month period, with extensive practice interviewing. Instruments were pre-tested and revised prior to starting data collection. The Institutional Review Boards of The Johns Hopkins Bloomberg School of Public Health in the US and the Instituto Dermatológico y Cirugía de la Piel Dr. Huberto Bogaert in the DR approved this study.

Measures

Consistent condom use with most recent regular female sex worker partner

The primary outcome was assessed based on the proportion of times that condoms were used out of all sex acts with this partner during the last 3 months. This proportion was dichotomized as “consistent condom use” (100%) or “inconsistent condom use” (anything less than 100%) as this is the behavior promoted through HIV prevention efforts in the context of commercial sex in the DR.

Social network characteristics

After preliminary ethnographic research identified relatively small social networks, a name generator was developed to identify a maximum of eight contacts. The name generator included three questions to identify the people with whom study participants 1) talked, 2) went out drinking or partying and/or 3) spent time most often. Age, gender, and marital status of all network contacts were measured to assess the composition of the network. Network density was defined as the number of existing ties between network contacts out of all possible ties, and a matrix listing all network contacts was used to identify connections. The proportion of existing ties out of all possible ties was calculated to reflect density. Finally, an aggregate measure of social support was calculated based on yes/no responses to whether each contact was a trusted friend, provided advice, and would lend money (range 0 – 9; Cronbach's alpha = 0.74). The social support measure was dichotomized at the median for all social network contacts into high social support (3 or more) and low social support (0 - 2), and categorized into “none”, “some”, or “all” network contacts provide high social support.

Communication about condoms

Two questions assessed communication about condoms within the network. First, participants were asked how often they talked about condoms with their social network contacts on a 4-point response scale ranging from never to frequently, and this was dichotomized into “frequently/sometimes” or “rarely/never”. Second, participants were asked if any male social network contacts had ever said that they didn't like to use condoms. The numbers of social network contacts who frequently/sometimes talk about condoms and who had ever expressed dislike were categorized into “none”, “some”, or “all”.

Social network norms

Two questions were used to assess descriptive norms. First, participants were asked if each of their male social network contacts had sex with female sex workers (yes/no). Next, they were asked if each of their male contacts who had a regular female sex worker partner used condoms with that partner (4-point response scale, 1=never/4=always). This measure was dichotomized to reflect the number of male contacts perceived to always use condoms with regular female sex worker partners. The injunctive norm was measured by asking how often each social network contact had encouraged the participant to use condoms with female sex workers on a 3-point scale (1=never/3=many times). Encouragement was then dichotomized as “never” or “ever”. All three norm measures were categorized as “none”, “some”, or “all”.

Individual and relational factors

Participants were asked how many different sex partners they had had in the last three months. The length of relationship with the current regular female sex worker partner was used as a proxy for relationship intimacy. Condom self-efficacy was measured with a 3-item scale assessing perceived difficulty using condoms with female sex workers in different scenarios: 1) when drinking alcohol, 2) with a female sex worker he really likes, and 3) with a trusted female sex worker. Participants responded on a 3-point response scale from “very” to “not at all” difficult (range 0–9; Cronbach’s $\alpha = 0.77$); this scale was dichotomized into low (3-7) versus high (8-9) self-efficacy. Additional individual factors related to HIV included alcohol consumption frequency (“at least a few times a week” vs “less than a few times a week”) and frequency of visits to commercial sex establishments (daily or less than daily). Finally, socio-demographic variables included participant’s age (years), highest educational level (number of years), and marital status.

Analysis

Descriptive statistics including frequency distributions, means, medians, and range were calculated to characterize the study sample. Continuous variables were examined for normalcy; skewed variables were dichotomized at the median. Bivariate and multivariate logistic regression were used to assess unadjusted and adjusted associations between independent variables and the two outcomes, consistent condom use and perceived condom use among male social network contacts, controlling for individual, relational, and socio-demographic characteristics. When perceived condom use was used as an outcome, it was dichotomized to reflect the perception that all male contacts always used versus some or none. Variables that were significant at the $p < 0.10$ level in bivariate analysis were included in the multivariate models and all individual and network variables were entered into the model simultaneously. Due to the potential lack of independence among male partners recruited at the same commercial sex establishments, standard errors were adjusted using the Huber-White robust variance estimator in all multivariate analyses (Rogers, 1993). All analyses were conducted in SPSS version 15 and Stata version 10.

Results

The first aim of the study was to describe the individual and social network characteristics of male partners of female sex workers. The median age of study participants was 27 years (range 18 to 60 years). Almost half (46.9%) had at least a 9th grade education. Nearly 40.0% of the participants were married or living with a partner. Over 90.0% of participants reported having a job (data not shown). The most common categories of employment were motorcycle taxi drivers, construction, service industry and working in a commercial sex establishment.

Overall, 64.5% of the study participants reported using condoms consistently with their most recent regular female sex worker partner during the last 3 months. The median number of sex partners during the last 3 months was 3.0 (range 1.0 – 16.0). The median length of time since the first sexual act with the most recent regular female sex worker partner was 3 months (range 3 days to over 5 years). With regard to condom self-efficacy, the median level was 8.0 (range 3.0 to 9.0), indicating that most participants did not perceive themselves to have difficulty using condoms if they so desired. The majority of study participants (78.6%) reported consuming alcohol “at least a few times a week”. Finally, visiting commercial sex establishments was a common occurrence for most study participants; 36.8% reported visiting the sex establishment where recruited on a daily basis.

With regard to social network characteristics, median social network size was 3 (range 1 – 8). The majority of social networks (84.3%) were composed of all men. The median age of social network contacts was 29 years (range: 15.5 to 58.5). Over half of the study participants (53.4%) reported that some of their social network contacts were married. Most study participants (73.9%) reported having dense social networks where all contacts knew each other. In addition, nearly 60% of participants reported receiving high levels of social support from all of their social network contacts.

Most study participants (61.4%) talked about condoms frequently or sometimes with all of their contacts. Nearly half of all men in the survey (48.2%) reported that none of their male social network contacts had ever said they did not like to use condoms. With regard to perceived normative behaviors, the majority of study participants (74.8%) perceived that all of their male social network contacts went out with female sex workers. Less than half (41.5%) of male partners perceived that all of their male contacts always used condoms with a regular female sex worker partner. Most study participants (70.4%) reported receiving encouragement to use condoms from all social network contacts.

Social Network Influences on Condom Use

The second aim of the study was to examine the association between descriptive and injunctive social network norms and consistent condom use with the most recent regular female sex worker partner (Table 2). In bivariate analysis, unadjusted associations (at the $p < 0.10$ level) were found between consistent condom use and age, number of sex partners, condom self-efficacy, alcohol consumption, and length of relationship. Perceived consistent condom use by some or all of male contacts and communication about condoms with all social network contacts were significantly associated with consistent condom use.

In the multivariate logistic regression model, male partners were five times more likely to report consistent condom use if they had high condom self-efficacy compared to low condom self-efficacy (OR 5.01, 95% CI=2.51– 9.99). Male partners who had 4 or more sex partners in the last 3 months were significantly less likely to report using condoms consistently compared to male partners with 1-3 partners in the last 3 months (OR 0.45, 95% CI=0.26-0.78). There was also a significant negative association between having been in a relationship with the current regular female sex worker partner for more than 3 months and consistent condom use (OR 0.45, 95% CI=0.25–0.81). Finally, male partners who drank alcohol less than a few times a week were nearly three times more likely to report using condoms consistently than male partners who drank at least a few times a week (OR 2.77, 95% CI=1.28-6.02).

With regard to the social network measures, perceived condom use and communication about condoms remained significant in the multivariate model. Male partners who perceived that some or all of their male social network contacts always used condoms were significantly more likely to report consistent condom use than male partners who perceived that none of their male contacts used condoms consistently (some: OR=3.10, 95% CI=1.52–6.32; all: OR=3.42, 95%

CI=1.80-6.51). Finally, consistent condom use was over three times more likely among men who talked about condoms with all of their social network contacts (OR=3.18, 95% CI=1.63-6.20).

Finally, the third study aim was to identify which social network characteristics were associated with perceived condom use with regular female sex worker partners among all-male social network contacts (Table 3). Older age was significantly associated with perceiving that all social network contacts always use condoms. Having four or more sex partners in the last three months was negatively associated with perceiving that all male social network contacts always used condoms with regular female sex worker partners. Perceived condom use among male social network contacts was significantly associated with social network contacts being married, providing social support, and encouraging condom use with female sex workers. Additionally, male partners whose entire network knew each other or whose male contacts expressed dislike for condoms were significantly less likely to perceive that all of their male contacts always used condoms.

Adjusted odds ratios for the associations between social network characteristics and perceived condom use are also presented in Table 3. Perceived consistent condom use with regular female sex worker partners among all male social network contacts was significantly associated with encouragement to use condoms (OR 3.15, CI= 1.73 – 5.73), network density (OR 0.57, CI=0.34 – 0.94), and all contacts saying they do not like condoms (OR 0.24, CI=0.11 – 0.51). At the individual level, having four or more sex partners in the last 3 months had a significant negative association with perceived condom use among male social network contacts (OR 0.46, CI=0.25 – 0.83).

Discussion

Overall, our study results indicate that even without being the direct target population of a concentrated HIV prevention intervention in La Romana, the majority of male partners of female sex workers reported using condoms consistently with their most recent regular female sex worker partner. The majority of men also perceived that at least some of their male social network contacts always used condoms with regular female sex worker partners and provided encouragement to use condoms. While resistance to condom use has traditionally been identified as a barrier to HIV prevention related to dominant norms of masculinity (UNAIDS, 2001), our results suggest that in this setting, using condoms appears to have become acceptable and perhaps the expected behavior, even in the context of long-term sexual relationships between men and their regular female sex worker partners.

One possible explanation for the condom use rate is that longstanding, multi-level HIV prevention interventions in the commercial sex industry of the DR have created pro-condom norms that have diffused to both women and men (Kerrigan, Ellen et al., 2003a; Kerrigan et al., 2006). Additionally, the finding that the majority of male partners talked about condoms and had received encouragement to use condoms from their social networks suggests that in this culture small groups of men may have developed their own approaches to supporting each other to protect themselves from HIV without extensive external intervention. Given the small size and dense nature of networks in this context, it is likely that once new norms and behaviors are introduced, they are reinforced by the network. Friedman et al. (2004) have referred to such organic forms of health promotion as “invention”, in reference to a population of injection drug users in a New York City neighborhood with declining HIV prevalence. This foundation of “invention” could provide a critical starting point for more targeted HIV prevention efforts with men.

While the majority of participants reported using condoms consistently with their most recent regular female sex worker partner, another important finding from this study is that a substantial portion of the men reported high numbers of sex partners in the last three months. Men who reported having 4 or more sex partners in the last three months were significantly less likely to report using condoms consistently with their most recent regular female sex worker partner. Consistent condom use was also significantly less likely among men with higher alcohol consumption frequency. These results highlight the continued vulnerability to HIV infection among men who are engaged in the commercial sex industry and their sex partners.

In examining the association between social network norms and consistent condom use, we found a significant positive association between perceived condom use among male social network contacts and reported consistent condom use by male partners. Our finding is consistent with previous studies documenting positive associations between descriptive network norms and sexual risk behaviors and intentions among heterosexual men and women and injection drug users (Buunk & Bakker, 1995; Dedobbeleer, Morissette, & Rojas-Viger, 2005; El-Bassel et al., 2006; Latkin et al., 2003b).

We also found that male partners who talked about condoms with all of their network contacts were significantly more likely to report using condoms consistently. Of note, we did not find that men who received encouragement to use condoms with female sex workers were more likely to report using condoms consistently. Encouragement to use condoms has been associated with condom use with female sex workers among male clients in Bali, and with other HIV protective behaviors among injection drug users (Davey-Rothwell & Latkin, 2007a; El-Bassel et al., 2006; Ford et al., 2002; Latkin et al., 2003b). One possible explanation for the lack of association between encouragement and consistent condom use is that injunctive norms may be less likely to exert an influence over a private behavior, such as condom use, because the threat of sanction for going against the group norm is weakened due to the fact that the behavior cannot be observed (Bendor, 2001; Lapinski & Rimal, 2005). Another consideration is that encouragement, which is one-way attempted influence, is resisted more than other indirect forms of influence such as talking and knowing the descriptive norms.

The third study aim was to identify social network characteristics associated with perceived condom use. We found that male partners who received encouragement from all of their social network contacts were significantly more likely to perceive that their male contacts used condoms consistently. Additionally, male partners whose male social network contacts all expressed dislike for condoms were significantly less likely to perceive that these contacts always used condoms. Encouragement to use condoms and expressing dislike for condoms reflect two different forms of interpersonal communication, which has been suggested as the prime source of information for the development of normative perceptions of private behaviors such as condom use (Hogg & Reid, 2006; Lapinski & Rimal, 2005). Therefore, rather than viewing descriptive norms as more influential on behavior than injunctive norms, we should perhaps view these two measures as complementary to one another. HIV prevention efforts with men can incorporate both types of norms through communication strategies that highlight direct descriptions of personal behavior as well as discussion of the normative expectations of condom use in this social context.

The finding that perceived condom use was significantly less likely in networks where everyone knew each other may reflect the premise from diffusion of innovation theory that dense networks may be slower to adopt innovations (Rogers, 2003). One challenge in interpreting results regarding network density is that we only measured the existence but not the nature of ties (e.g. positive or negative, strong or weak). Given the fact that La Romana is a small city where most men reported having dense social networks, the question arises as to whether density reflects real closeness and availability of social support or if it is simply a

reflection of people just knowing each other for a long time. While we did not find a direct association between network density and condom use, another area for future research is exploring how density may moderate the influence of norms on behavior.

The results of this study should be interpreted keeping in mind certain limitations. First, the cross-sectional nature of the survey does not allow us to identify causal relationships; men who use condoms consistently may recall more communications with their network and perceive more condom use within their networks. Second, the sample was not randomly selected and may not be generalizable to the broader population of male sex partners of female sex workers. For example, it is possible that our study included more social and extroverted men who were willing to talk about their sexual behavior. Finally, despite our use of multiple measures, the reliance on self-reports of condom use could be biased, especially given the long history of condom promotion in the commercial sex industry in the DR. A previous study among the regular paying male partners of female sex workers in the capital city of Santo Domingo, however, reported a consistent condom use rate of 62% in a similar intervention context to the current study (Kerrigan, 2000; Murray et al., 2006).

Our results suggest that HIV prevention efforts that tap into existing social networks and communication patterns among male partners of female sex workers to promote pro-condom norms could be a viable way to reduce HIV vulnerability among individuals involved in the commercial sex industry and their sex partners. Social network interventions have achieved reductions in HIV risk behaviors among vulnerable male populations in Russia and Bulgaria (Amirkhanian et al., 2005; Kelly et al., 2006). The environment of commercial sex establishments in the DR with blaring music and high levels of alcohol consumption may challenge their appropriateness for venue-based interventions. Network-based HIV prevention efforts, however, could cross the border of the establishment and respond to the specific social reality of men, in particular those who resist pro-condom norms and other HIV protective behaviors, to promote HIV protective behaviors.

Acknowledgments

We would like to thank the study participants for sharing their time and stories with us. This study was supported by a New and Minority Investigator Award from the Fogarty AIDS International Training and Research Program at the Johns Hopkins Bloomberg School of Public Health. We would like to acknowledge the contribution of Santo Rosario, Executive Director of the Centro de Orientacion e Investigacion Integral (COIN). Marc Boulay and Rajiv Rimal of the Johns Hopkins Bloomberg School of Health also contributed to the development of this study.

References

- Amirkhanian YA, Kelly JA, Kabakchieva E, Kirsanova AV, Vassileva S, Takacs J, et al. A randomized social network HIV prevention trial with young men who have sex with men in Russia and Bulgaria. *Aids* 2005;19(16):1897–1905. [PubMed: 16227798]
- Bendor J. The Evolution of Norms. *American Journal of Sociology* 2001;106(6):1493–1545.
- Boer H, Westhoff Y. The role of positive and negative signaling communication by strong and weak ties in the shaping of safe sex subjective norms of adolescents in South Africa. *Communication Theory* 2006;16:75–90.
- Bond KC, Valente TW, Kendall C. Social network influences on reproductive health behaviors in urban northern Thailand. *Social Science & Medicine* 1999;49(12):1599–1614. [PubMed: 10574232]
- Buunk BP, Bakker AB. Extradynamic Sex: The Role of Descriptive and Injunctive Norms. *The Journal of Sex Research* 1995;32(4):313–318.
- Carpentier N, White D. Cohesion of the primary social network and sustained service use before the first psychiatric hospitalization. *Journal of Behavioral Health Services & Research* 2002;29(4):404–418. [PubMed: 12404935]

- Catino, J.; Moreno, L.; Rosario, S.; Gomez, B.; Jerez, H.; Barrington, C.; Kerrigan, D. Sharing the Responsibility of HIV/STI Risk Reduction: Strategies to work with male clients of female sex workers in the Dominican Republic; 8th World STI/AIDS Congress; Punta del Este, Uruguay. December 2003;
- Celentano DD, Bond KC, Lyles CM, Eiumtrakul S, Go VF, Beyrer C, et al. Preventive intervention to reduce sexually transmitted infections: a field trial in the Royal Thai Army. *Archives of Internal Medicine* 2000;160(4):535–540. [PubMed: 10695694]
- CESDEM. Encuesta Demografica y de Salud 2002: Informe Preliminar sobre VIH/SIDA. Santo Domingo: 2003.
- Chetwynd J, Plumridge E. Knowledge, attitudes and activities of male clients of female sex workers: risk factors for HIV. *N Z Medical Journal* 1994;107(985):351–353.
- Cialdini R, Reno R, Kallgren C. A focus theory of normative conduct: recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology* 1990;58(6):1015–1026.
- Courtenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Social Science & Medicine* 2000;50(10):1385–1401. [PubMed: 10741575]
- Davey-Rothwell MA, Latkin CA. Gender differences in social network influence among injection drug users: perceived norms and needle sharing. *Journal of Urban Health* 2007a;84(5):691–703. [PubMed: 17682947]
- Davey-Rothwell MA, Latkin CA. HIV-related communication and perceived norms: an analysis of the connection among injection drug users. *AIDS Education Prevention* 2007b;19(4):298–309.
- Dedobbeleer N, Morissette P, Rojas-Viger C. Social network normative influence and sexual risk-taking among women seeking a new partner. *Women & Health* 2005;41(3):63–82.
- DIGECITSS. Vigilancia centinela de la infeccion VIH. Informe de monitoreo 10mo ano. Encuesta de seroprevalencia del VIH segun poblacion y puestos. Dominican Republic: Direccion General de Control de Infecciones de Transmision Sexual y SIDA; Santo Domingo: 2000.
- DIGECITSS. Encuestas de seroprevalencia de la infeccion VIH basadas en puestos centinela: Informe Final. Dominican Republic: Direccion General de Control de Infecciones de Transmision Sexual y SIDA; Santo Domingo: 2006a.
- DIGECITSS. Situacion Actual del VIH/SIDA en la Republica Dominicana, ano 2006. Direccion General de Control de Infecciones de Transmision Sexual y SIDA; Santo Domingo: 2006b.
- El-Bassel N, Gilbert L, Wu E, Chang M. A social network profile and HIV risk among men on methadone: do social networks matter? *Journal of Urban Health* 2006;83(4):602–613. [PubMed: 16755389]
- Fajans P, Ford K, Wirawan DN. AIDS knowledge and risk behaviors among domestic clients of female sex workers in Bali, Indonesia. *Social Science & Medicine* 1995;41(3):409–417. [PubMed: 7481934]
- Ford K, Wirawan DN, Muliawan P. Social influence, AIDS/STD knowledge, and condom use among male clients of female sex workers in Bali. *AIDS Education Prevention* 2002;14(6):496–504.
- Friedman SR, Flom PL, Kottiri BJ, Neaigus A, Sandoval M, Curtis R, et al. Consistent condom use in the heterosexual relationships of young adults who live in a high-HIV-risk neighbourhood and do not use "hard drugs". *AIDS Care* 2001;13(3):285–296. [PubMed: 11397330]
- Friedman SR, Maslow C, Bolyard M, Sandoval M, Mateu-Gelabert P, Neaigus A. Urging others to be healthy: "intravention" by injection drug users as a community prevention goal. *AIDS Education and Prevention* 2004;16(3):250–263. [PubMed: 15237054]
- Hawkins WE, Latkin C, Mandel W, Oziemkowska M. Do actions speak louder than words? Perceived peer influences on needle sharing and cleaning in a sample of injection drug users. *AIDS Education and Prevention* 1999;11(2):122–131. [PubMed: 10214496]
- Hogg MA, Reid SA. Social identity, self-categorization, and the communication of group norms. *Communication Theory* 2006;16:7–30.
- Hor LB, Detels R, Heng S, Mun P. The role of sex worker clients in transmission of HIV in Cambodia. *International Journal of STD & AIDS* 2005;16(2):170–174. [PubMed: 15807948]
- Kang SY, Deren S, Andia J, Colon HM, Robles R. Egocentric HIV risk networks among Puerto Rican crack users in New York and in Puerto Rico: impact on sex risk behaviors over time. *AIDS Education & Prevention* 2005;17(1):53–67. [PubMed: 15843110]
- Kawachi I, Berkman LF. Social ties and mental health. *Journal of Urban Health* 2001;78(3):458–467. [PubMed: 11564849]

- Kelly JA, Amirkhanian YA, Kabakchieva E, Vassileva S, Vassilev B, McAuliffe TL, et al. Prevention of HIV and sexually transmitted diseases in high risk social networks of young Roma (Gypsy) men in Bulgaria: randomised controlled trial. *BMJ* 2006;333(7578):1098. [PubMed: 17040924]
- Kerrigan, D. Individual, Relational, and Environmental-Structural Determinants of Consistent Condom Use Among Female Sex Workers and their Regular Partners in the Dominican Republic. Johns Hopkins School of Public Health; Baltimore, MD: 2000.
- Kerrigan D, Ellen JM, Moreno L, Rosario S, Katz J, Celentano D, et al. Environmental-structural factors significantly associated with consistent condom use among female sex workers in the Dominican Republic. *Aids* 2003a;17(3):415–423. [PubMed: 12556696]
- 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* 2003b;17(3):415–423. [PubMed: 12556696]
- Kerrigan D, Moreno L, Rosario S, Gomez B, Jerez H, Barrington C, et al. Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican Republic. *American Journal of Public Health* 2006;96(1):120–125. [PubMed: 16317215]
- Kerrigan, D.; Moreno, L.; Rosario, S.; Gomez, B.; Jerez, H.; Weiss, E., et al. The Impact and Cost-Effectiveness of Two Environmental-Structural HIV Prevention Interventions on HIV-related Risk among Female Sex Workers in the Dominican Republic. Horizons Program; Washington D.C.: 2003.
- Lapinski MK, Rimal RN. An explication of social norms. *Communication Theory* 2005;15(2):127–147.
- Latkin C, Forman V, Knowlton A, Sherman S. Norms, social networks, and HIV-related risk behaviors among urban disadvantaged drug users. *Social Science & Medicine* 2003a;56(3):465–476. [PubMed: 12570967]
- Latkin CA, Forman V, Knowlton A, Sherman S. Norms, social networks, and HIV-related risk behaviors among urban disadvantaged drug users. *Social Science & Medicine* 2003b;56(3):465–476. [PubMed: 12570967]
- Latkin C, Knowlton A. New directions in HIV prevention among drug users Settings, norms, and network approaches to AIDS prevention (SNNAAP): A social influence approach. *Advances in Medical Sociology* 2000;7:261–287.
- Leonard L, Ndiaye I, Kapadia A, Eisen G, Diop O, Mboup S, et al. HIV prevention among male clients of female sex workers in Kaolack, Senegal: results of a peer education program. *AIDS Education and Prevention* 2000;12(1):21–37. [PubMed: 10749384]
- Lowndes CM, Alary M, Gnintoungbe CA, Bedard E, Mukenge L, Geraldo N, et al. Management of sexually transmitted diseases and HIV prevention in men at high risk: targeting clients and non-paying sexual partners of female sex workers in Benin. *Aids* 2000;14(16):2523–2534. [PubMed: 11101064]
- Lowndes CM, Alary M, Labbe AC, Gnintoungbe C, Belleau M, Mukenge L, et al. Interventions among male clients of female sex workers in Benin, West Africa: an essential component of targeted HIV preventive interventions. *Sexually Transmitted Infections* 2007;83(7):577–581. [PubMed: 17942573]
- Mills S. Back to behavior: prevention priorities in countries with low HIV prevalence. *Aids* 2000;14 (Suppl 3):S267–273. [PubMed: 11086870]
- Murray L, Moreno L, Rosario S, Ellen J, Sweat M, Kerrigan D. The Role of Relationship Intimacy in Consistent Condom Use Among Female Sex Workers and Their Regular Paying Partners in the Dominican Republic. *AIDS and Behavior*. 2006
- Noar SM, Carlyle K, Cole C. Why communication is crucial: meta-analysis of the relationship between safer sexual communication and condom use. *Journal of Health Communication* 2006;11(4):365–390. [PubMed: 16720536]
- Reid E. Incorporating social capital into development practice: The HIV epidemic. *Development Bulletin* 2000;52:21–23. [PubMed: 12179441]
- Rimal RN, Real K. Understanding the Influence of Perceived Norms on Behaviors. *Communication Theory* 2003;13(2):184–203.
- Rogers, EM. Diffusion of innovations. Vol. 5th ed. Free Press; New York: 2003.
- Rogers W. Regression standard errors in clustered samples. *Stata Technical Bulletin* 1993;13:19–23.
- UNAIDS. Working with men for HIV prevention and care. 2001. (No. 92-9173-123-4)

- Walden VM, Mwangulube K, Makhumula-Nkhoma P. Measuring the impact of a behaviour change intervention for commercial sex workers and their potential clients in Malawi. *Health Education Research* 1999;14(4):545–554. [PubMed: 10557524]
- Wang B, Li X, Stanton B, Fang X, Lin D, Mao R. HIV-related risk behaviors and history of sexually transmitted diseases among male migrants who patronize commercial sex in China. *Sexually Transmitted Disorders* 2007;34(1):1–8.
- West E, Barron DN, Dowsett J, Newton JN. Hierarchies and cliques in the social networks of health care professionals: implications for the design of dissemination strategies. *Social Science & Medicine* 1999;48(5):633–646. [PubMed: 10080364]
- Wilson D, Chiroro P, Lavelle S, Mutero C. Sex worker, client sex behaviour and condom use in Harare, Zimbabwe. *AIDS Care* 1989;1(3):269–280. [PubMed: 2488289]
- Wood W, Lundgren S, Ouellette J,S,B, Blackstone T. Minority Influence: A Meta-Analytic Review of Social Influence Processes. *Psychological Bulletin* 1994;115(3):323–345. [PubMed: 8016284]
- Youm Y, Laumann EO. Social network effects on the transmission of sexually transmitted diseases. *Sexually Transmitted Disorders* 2002;29(11):689–697.

Table 1

Description of the population of male partners of female sex workers, La Romana, Dominican Republic (N=318)

Characteristic	Median (range) and/or % (N)
<i>Socio-demographic characteristics</i>	
Age (years):	27.0 (18.0 – 60.0)
18 - 27	52.8 (168)
28 or older	47.2 (150)
Highest educational level:	8.0 (0.0-16.0)
0-8 th grade	53.1 (169)
9 th grade or higher	46.9 (149)
Marital status:	
Single/Divorced	60.1 (191)
Married/Living with partner	39.9 (127)
<i>Individual & relational factors related to HIV</i>	
Consistent condom use	
No	35.5 (113)
Yes	64.5 (205)
Number of sex partners in the last 3 months:	3.0 (1.0 – 16.0)
1 - 3	51.6 (164)
4 or more	48.4 (154)
Length of relationship with regular sex worker partner (months):	3.0 (0.1 – 60.8)
3 months or less	61.3 (195)
More than 3 months	38.7 (123)
Condom self efficacy:	8.0 (3.0 – 9.0)
Low (3-7)	46.5 (148)
High (8-9)	53.5 (170)
Alcohol consumption:	
At least a few times a week	78.6 (250)
Less than a few times a week	21.4 (68)
Frequency of visit to sex establishment:	
Daily	36.8 (117)

Characteristic	Median (range) and/or % (N)
Less than daily	63.2 (201)
<i>Social network characteristics</i>	
Number of social network contacts:	3.0 (1.0 – 8.0)
1	11.9 (38)
2	30.6 (97)
3	29.9 (95)
4	15.4 (49)
5 or more	12.2 (39)
All social network contacts are male	2.5 (1.0-8.0)
No	15.7 (50)
Yes	84.3 (268)
Age of social network contacts	29.0 (15.5-58.5)* 2 missing
28 years and under	51.6 (163)
Over 28 years	48.4 (153)
Marital status of social network contacts	1.0 (0.0-7.0)
None	23.6 (75)
Some	53.4 (170)
All	23.0 (73)
None	
Some	
All	
Density	1.0 (0.0-1.0)
Not all social network contacts know each other	26.1 (83)
All social network contacts know each other	73.9 (235)
Social network contacts provide high level of social support	2.0 (0.0-8.0)
None	5.3 (17)
Some	36.2 (115)
All	58.5 (186)
<i>Communication</i>	

Characteristic	Median (range) and/or % (N)
Number of contacts who talk frequently/sometimes about condoms:	2.0 (0.0 – 7.0)
None	12.9 (41)
Some	23.3 (74)
All	63.8 (203)
Male contacts who have said they don't like using condoms	1.0 (0.0-6.0)
None	45.6 (145)
Some	34.0 (108)
All	20.4 (65)
<i>Perceived social network norms</i>	
Male social network contacts who go out with sex workers:	2.0 (1.0 – 7.0)
Some	25.2 (80)
All	74.8 (238)
Male social network contacts who always use condoms with regular sex worker partners:	1.0 (0.0 – 5.0)
None	32.4 (103)
Some	26.1 (83)
All	41.5 (132)
Social network contacts who have encouraged condom use with sex workers:	2.0 (0.0 – 8.0)
None	6.0 (9)
Some	23.6 (75)
All	70.4 (224)

Table 2

Odds ratios for associations between social networks and consistent condom use among male partners of female sex workers, La Romana, Dominican Republic (N=318)

Characteristic	Unadjusted OR	CI	Adjusted OR	CI
Age:				
28 years or older	1.78	1.08 - 2.93	1.47	0.85 - 2.53
Highest educational level:				
9 th grade or higher	1.11	0.69 - 1.81		
Marital status:				
Married/living with partner	0.85	0.52 - 1.38		
Number of sex partners in the last 3 months:				
4 or more	0.38	0.23 - 0.63	0.45	0.26 - 0.78
Condom self-efficacy:				
High	6.84	3.97 - 11.78	5.01	2.51 - 9.99
Alcohol consumption:				
Less than a few times a week	2.82	1.37 - 5.81	2.77	1.27 - 6.02
Length of relationship:				
More than 3 months	0.62	0.42 - 0.93	0.45	0.25 - 0.81
Number of contacts:				
3 or more	1.06	0.60 - 1.88		
Density:				
All network members know each other	1.04	0.64 - 1.67		
Social support:				
Some	1.05	0.44 - 2.48		
All	1.47	0.59 - 3.69		
Number of contacts who talk about condoms:				
Some	1.85	0.98 - 3.51	1.76	0.82 - 3.80
All	3.61	2.08 - 6.30	3.18	1.63 - 6.20

Characteristic	Unadjusted OR	CI	Adjusted OR	CI
Number of male contacts who go out with sex workers:				
All	0.90	0.53 - 1.52		
Number of male contacts who always use condoms with regular sex worker partners:				
Some	2.89	1.74 - 4.79	3.09	1.52 - 6.32
All	5.69	3.00 - 10.76	3.42	1.80 - 6.51
Number of contacts who encourage condom use with sex workers:				
Some	0.88	0.34 - 2.24		
All	1.14	0.50 - 2.57		

Note. Only variables significant in the bivariate analysis were included in the final adjusted model.

Table 3

Odds ratios for associations between social network characteristics and perceived consistent condom use by male social network contacts among male partners of female sex workers, La Romana, Dominican Republic (N=318)

Characteristic	Unadjusted OR	95% CI	Adjusted OR	95% CI
≥ 28 years	1.58	1.01 – 2.47	1.50	0.97 – 2.33
≥ 9 th grade	0.70	0.45 – 1.20		
Married/Lives with partner	1.07	0.68 – 1.69		
Had ≥ 4 sex partners in last 3 months	0.41	0.26 – 0.65	0.45	0.25 – 0.82
Median age of network contacts ≥ 29	1.37	0.88 – 2.15		
All contacts are married	1.88	1.11 – 3.18	1.33	0.61 – 2.93
All contacts are male	0.81	0.44 – 1.48		
All contacts provide high level of social support	1.80	1.13 – 2.85	1.32	0.75 – 2.31
Density	0.61	0.37 – 1.00	0.57	0.35 – 0.94
All contacts talk about condoms	1.47	0.92 – 2.35		
All male contacts don't like using condoms	0.31	0.17 – 0.60	0.24	0.11 – 0.52
All contacts encourage condom use with female sex workers	3.16	1.83 – 5.44	3.26	1.91 – 5.56

Note. Only variables significant in the bivariate analysis were included in the final adjusted model.