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Relationships between Social Norms, Social Network Characteristics, and HIV Risk Behaviors in Thailand and the U.S

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Abstract

Objective—Social norms have been associated with a wide range of health behaviors. In this study, we examined whether the social norms of HIV risk behaviors are clustered within social networks and whether the norms of network members are linked to the risk behaviors of their social network members.

Design—Data were collected from the baseline assessment of 354 networks with 933 participants in a network oriented HIV prevention intervention targeting injection drug users (IDUs) in the Philadelphia, US and Chiang Mai, Thailand.

Main Outcome Measures—Four descriptive HIV risk norms of sharing needles, cookers, and cotton and front or back-loading among friends who inject were assessed.

Results—Three of four injection risk norms (sharing needle, cookers, and cotton) were found to be significantly clustered. In Philadelphia, one network member's (the index participant) norms of sharing needles and front or back-loading were found to be significantly associated with the network members' risk behaviors, and the norm of sharing cotton was marginally associated.

Conclusion—The results of this study suggest that among injection drug users, social norms are clustered within networks; social networks are a meaningful level of analyses for understanding how social norms lead to risk behaviors, providing important data for intervening to reduce injection related HIV risks.

Keywords

Social Norms; Social Networks; HIV; injection drug use; prevention

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In this study, we examined how social norms of HIV risk behaviors are structured within social networks and how these norms may be linked to subsequent risk behavior. A critical issue in altering health behaviors is how individual-level behavior change can be leveraged into group or community level change. How can a minority of individuals who have adopted a new set of health behaviors lead to acceptance and adoption of these behaviors within the larger community (Prislin & Christensen, 2005)? One conceptual approach to community level change is through social diffusion, wherein prominent individuals within a group, known as early adopters, first embrace a new behavior (Rogers, 2003). It has been hypothesized that successful social diffusion early adopters lead others to change their behavior. In this manner, the new behavior is diffused through the community. Social diffusion has been used to evaluate changes in antibiotic prescribing practices, uptake of medical technology, and the spread of fads and new commercial products (Jacobsen & Guastello, 2007; Hashimoto et al., 2006; Van den Bulte & Lilien, 2001).

Investigators have utilized the process of social diffusion information for planned behavioral interventions. Opinion leader models of health behavior change have utilized influential individuals to diffuse changes in health behaviors. In the field of HIV prevention, community opinion leaders' models of behavior change have been successful in reducing risk behaviors in many but not all studies (Elford, Bolding, & Sherr, 2004; Kelly et al., 1991; Sikkema et al, 2005). Although several opinion leader interventions have been successful in altering health behaviors, it is unclear whether involving opinion leaders is critical to promote behavior changes and what social structures are involved in the adoption of risk reduction and maintenance of behavior change.

Social norms are a key component of several common theories of health behaviors (Bandura, 1986; Fishbein, Middlestadt, & Hitchcock, 1994). Norms have been found to be associated with numerous health behaviors, including smoking (Buttross & Kastner, 2003), alcohol consumption (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007), exercise (Okun et al., 2003; Sorensen et al., 2007), dietary practices (Eisenberg, Neumark-Sztainer, Story, & Perry, 2005), substance use (Simons, Neal, & Gaher, 2006), and adolescent sexual behaviors (Buhi & Goodson, 2007). One of the most successful examples of community-level behavior change has involved altering social norms. In many countries, there have been profound norm changes regarding the acceptance of second-hand smoke (Chapman, Borland, & Lal, 2001; Walsh & Tzelepis, 2003; Borland et al., 2006; Brownson, Eriksen, Davis, & Warner, 1997).

There are other recent examples of the strong influence of social norms on health behaviors. A study by Storey and Shoemaker (2006) in Indonesia found that the region-wide financial crisis of 1997 lead to a substantial increase in the cost of family planning programs and reduced access to services. However, there was little impact of these impediments on use of contraceptives. The authors attributed the continued use of contraception to the establishment of pro-family planning social norms, and concluded that these norms were sufficiently robust to withstand severe economic change. One appealing aspect of norm change interventions is that often norms are self-maintaining and hence, the common problem of decay or relapse is avoided. However, few studies have examined how norms are socially organized and how their organizational structure can be used to introduce and disseminate changes in health behaviors.

One recent approach to changing social norms was to present the target audience with descriptive data on the group's social norms in hopes that this information would influence risk behaviors. This approach has been used to reduce alcohol consumption on college campuses (Perkins & Craig, 2006; DeJong et al., 2006). There are mixed results on the effectiveness of this approach (Clapp & Lange, 2006). One key question in developing social norm interventions is whether the actual norms of the referent group influences health behaviors or whether alternately the only pathway between norms and behavior is through the

individual's perceptions of their reference group's behaviors. If the pathway is only through perceptions of descriptive social norms, then interventions could focus on simply changing individuals' perceptions of the frequency of the behaviors. However, if the pathway includes descriptive norms, which are based on a shared understanding within the referent group, then social norm interventions would need to address group level norms.

In studying social norms, it is important to determine the appropriate reference group or groups (Rimal, Lapinski, Cook, & Real, 2005). It is likely that the student body as a whole is not the influential referent group on college students' level of alcohol consumption. Rather some individuals, groups, or cliques may have more influence than others have. In a study of alcohol consumption among college students, Reifman and colleagues (2006) reported that not all peer network members had an equal influence on alcohol consumption. Only the drinking patterns of "drinking buddies" prospectively predicted level of drinking. This association was statistically significant even after adjusting for individuals' baseline level of drinking. In a study of high school students and peer influence, Brown (2004) identified several unique cliques within high schools. Social network analyses may be one useful method of identifying referent groups.

Social network analyses assess patterns of social interactions and perceptions of social support from key relationships. Network analysis provides a fruitful strategy to examine the structure of norms in naturally occurring groups and the influences of these norms on the group members' behaviors (Rothenberg et al., 1998; Morris, Zavisca, & Dean, 1995; Friedman et al., 1997). Social network analyses have been used to help explain why there are different rates of HIV and other infectious diseases within and between populations. Network structures such as density and size have been linked to HIV serostatus among drug users and other populations (Latkin, Forman, Knowlton, & Sherman, 2003a; Latkin, Sherman, & Knowlton, 2003b; Miller & Neaigus, 2001; Neaigus et al., 1996; Costenbader, Astone, & Latkin, 2006). Personal networks are often the sources for health information and normative influences (Latkin et al., 2003a; Latkin et al., 2003b). Rothenberg (2007) suggests network structure and geographic factors may lead to the maintenance of the HIV epidemics in urban areas of in the US.

Social network analysis is useful in conceptualizing how norms may be altered by key early adopters and then noticed and subsequently maintained by the remaining majority of network members. Within networks, some members of reference groups may be more influential in promoting new norms, having their influence exerted through several mechanisms. Differential affiliation theory suggests that similar others may be affiliated together (Thornberry & Krohn, 1997). Differential affiliation by norms may help to explain the heterogeneity and perpetuation of some health behaviors, with norms promoting the maintenance of the health behavior. Referent group members often have high credibility based on similarity and are more influential than other individuals outside of the social group (Terry & Hogg, 2000). Investigators have found that information provided by reference group members is more actively processed and remembered than information that is external to the reference group (Van Knippenberg, Terry, & Hogg, 2000).

Network analysis can provide insights into how behavior change among a few network members may diffuse to others and become the norm within the network. In mathematical modeling of networks, Kincaid (2004) found that network structure, especially the bounds of networks, had a strong influence on the network members' adoption of new behaviors. The network structures help to explain why the behaviors of a small minority within a network could lead to a behavior change within a sub-network with strong links to the minority, based on computer modeling rather than a sample of participants.

In the current study, we examined how HIV risk behavior norms are structured within social networks. The study examined the relationship between perceived norms, risk behavior, and the actual behavioral norms of drug network members in a cross-sectional study of injection drug users in the U.S. and Thailand. We examined the relationship between group norms and risk behaviors by examining the relationship between norms and behaviors within small social networks of drug users who frequently interact. We first examined whether social norms of injection risk behaviors clustered by networks and second, whether the reported norms of a network member would be associated with the risk behaviors of other group members even after accounting for the member's own perceptions of the group's norms. We also examined cultural differences in how norms cluster and their association with behavior reported by Thai and North American injection drug users.

Method

The present analysis was conducted using baseline data collected from the HIV Prevention Trials Network (HPTN) protocol 037 of a Phase III, randomized controlled HIV prevention intervention targeting IDUs and their risk network members in the United States and Thailand. All study protocols and procedures were approved by IRBs at Johns Hopkins University, University of Pennsylvania, the Royal Thai Ministry of Public Health and Chiang Mai University. Each site maintained a study-specific community advisory board and a Data Safety and Monitoring Board monitored the study outcomes, adverse events, and social harms. On-site study monitoring was performed in accordance with the Division of AIDS, NIAID/NIH policies. Independent study monitors visited the sites on a routine basis to verify compliance with human subjects and other research regulations, assess adherence to the study protocol and procedures manual, and confirm data quality and accuracy.

Recruitment

IDUs in Philadelphia were recruited via community outreach in neighborhoods with high concentrations of drug use, drug sales, and AIDS cases. In Thailand, participants were also recruited via community outreach in the city of Chiang Mai and surrounding villages in areas of high drug use. Data collection began in December 2002 and ended in August 2006 in Philadelphia. Data were collected between March 2004 and November 2006 in Thailand. Participants were compensated \$25 in Philadelphia and \$8.50 in Thailand after completing the baseline survey.

Eligibility criteria

As the study was a network intervention, "index" participants were the individuals recruited by the outreach workers. If they met study eligibility requirements, the indexes subsequently recruited members of their social networks into the study. These network members did not recruit additional participants. Study eligibility criteria for index participants included: age 18 or older, injected drugs at least 12 times in the prior three months, not enrolled in methadone maintenance treatment in the last 3 months, HIV negative antibody test results within 60 days prior to randomization, willingness to identify and attempt to recruit at least two eligible HIV risk network members, and recruit at least one eligible risk network member.

Eligibility requirements for the network members included, age 18 or older, recruited for the study by an eligible index participant, and injected drugs with or had sex with the index participant who recruited them within the prior three months.

Measures

Although interventions may alter injunctive norms, we decided to focus our assessment on descriptive norms because we had risk behavior data that closely corresponded with descriptive

norms. The four descriptive norm questions that corresponded to specific drug injection risk behaviors were: (1) How many of your friends who shoot drugs use a needle after someone else, without bleaching or cleaning?; (2) How many of your friends who shoot drugs use a cooker that someone else has already used?; (3) How many of your friends who shoot drugs use filter cotton that someone else has already used?; (4) How many of your friends who shoot drugs use drugs that are front-loaded or back-loaded with a shared syringe? For front-loading, the drug solution is squirted from one syringe into another syringe through the front of the recipient syringe after removing the needle. For back-loading, the solution is squirted into the back of the syringe after removing the plunger.

Social norms were answered on a 5-point Likert scale: “all”, “most”, “about half”, “some” and “none”. Social norms were coded as scores from 1 (= “none”) to 5 (= “all”). Individuals who responded to questions with “don’t know” were coded as missing. Although the “don’t know” category may represent important information about social norms, this group was too small to conduct meaningful analyses. Moreover, the infrequent reports of “don’t know” indicated that injection behaviors are often social and that it is likely that we enrolled drug network members who inject together.

In a separate section of the survey, participants were asked about their own risk behaviors with the questions: (1) “Did you use a needle after someone else in the last month?”; (2) “In the last month, how many times did you use a cooker that others had used?”; (3) “In the last month, how many times did you use cotton that others had used?”; (4) “In the last month, how many times did you use a front/back-loaded syringe?” For each risk behavior, counts were dichotomized into “any” or “none”.

Analyses

Between-site differences of risk behaviors were compared using chi-square tests; t-tests were used to test for differences in means of the descriptive norms. To assess the evidence for clustering of norms within networks, we used a simple one-way ANOVA method, with networks as groups. As the mean network size is small and the scores are not Gaussian, statistical significance was assessed against a bootstrap sampling distribution. The bootstrap method resampled network member norms at random with replacement, keeping index norms and network size fixed.

Since social norms and their paired risk measures refer to the same HIV behavior, we were interested in examining if self-reported social norms from IDUs were associated with self-reported HIV risk behaviors. Further, we wanted to assess whether the social norms and/or behaviors of the network’s index further correlated with member’s risk behaviors. We fit two hierarchical models for examining member risk behaviors. We first examined the relationship between network members’ social norms and their risk behaviors (Model 1). Next, we included the indexes’ social norms into the model to assess whether the influence of social norms occurs solely through an individual network member’s perceptions of their reference group’s behavior or if the index norms have an independent effect on the network members’ behavior (Model 2). Because social norms were coded as scores from 1 to 5, the Odds Ratios (OR) for the social norms measures were then interpreted as the increase in odds of reporting a risk behavior for an increase of 1 in the corresponding social norm. The models for member behaviors were fit separately for each of the research sites, and then combined over sites. SAS 9.3.1 was used to fit these logistic regression models, with GEE methods used to account for correlation between network members from the same network.

Sample

There were 1088 participants with norms data (232 index and 429 member participants in Philadelphia; 182 index and 245 member participants in Chiang Mai). After restricting the sample to network members who were IDUs, there were 993 participants among 414 networks. Sixty networks (29 in Philadelphia; 31 in Chiang Mai) whose network members had a solely sexual relationship with the index were therefore excluded from the analyses. Models were fitted on the 354 networks (with 933 participants) that contain at least one IDU network member (203 index and 385 member participants in Philadelphia; 151 index and 194 member participants in Chiang Mai).

Results

Table 1 & 2 present the demographic, risk behaviors and norms for IDU-related risks. As seen in Table 1, participants in Chiang Mai were significantly likely to be younger, married, and employed. They had significantly less formal education, injected less frequently, and were less likely to report being in drug treatment or homeless in the prior six months. The mean age for the Philadelphia participants was 40 (Median 41) and 31 (Median 29) for those from Chiang Mai. Participants in Philadelphia were much more likely to report sharing cotton (43% versus 15%, $p < .0001$). This difference may be due in part to the higher purity of drugs in Thailand, which may mean less necessity to use a filter. There was also significantly less front- or back-loading of syringes in Chiang Mai (22% versus 8%, $p < .0001$). The mean norm scores in Philadelphia and Thailand were not statistically different for sharing needles and cookers, with relatively less endorsement of sharing needles. Perceptions of peers and self-reports of sharing cotton and sharing through front/back loaded syringe were less common in Thailand than in Philadelphia. Table 3 presents the bootstrap ANOVA analyses clustering of the norms by network. For three (sharing needles, cookers, and cotton) out of the four norms there was significant clustering by network; that is, the variance within networks was less than between networks. For one item, front- or back-loading, there was no evidence of network clustering. The dependent variables in Table 4 are the four injection risk behaviors reported by network members. In Table 4, Model 1 presents the increase in Odds Ratios of the network members' risk behaviors associated with their own social norms. Model 2 assesses the increase in odds associated with both the indexes' and the network members' norms. In the first model, the network members' norms for separate sites and pooled were significantly associated with the four injection risk behaviors ($p < .05$ for all four behaviors). For each level increase in the social norms for shared needles, there is an increased odds of 1.58 of the member reporting sharing needles. The corresponding increase in ORs for shared cookers, shared cotton and front- or back-loading were 1.52, 1.62 and 1.81, respectively. In Model 2, the network members' norms remained significantly associated with the risk behavior ($p < .01$ for all four behaviors). There were site differences with the indexes' norms significantly associated with needle sharing and front- or back-loading in Philadelphia but not in Chiang Mai. A similar pattern was observed in sharing cotton, albeit marginally significant. Although sharing cookers was not significant at the Philadelphia site, it was statistically significant in Chiang Mai.

Discussion

The results from this study documented that norms of several HIV risk behaviors of sharing injection equipment are clustered within social networks. There are several important implications from this finding. First, the results suggest that since norms are clustered by networks, then it may be feasible to identify groups of individuals who endorse and promote norms of high-risk injection behaviors through network sampling. Moreover, the clustering indicates that it may be feasible to identify and intervene with high-risk networks. In addition,

in modeling distributions of social norm variables, network level factors should be taken into consideration.

An important implication from these findings is that social networks may be a useful vehicle for sustained behavior change. Prior research suggest that not only are members of referent groups perceived as credible sources of information as compared to non-group members, messages that are perceived to be from representatives of the group are more thoroughly processed and retained (Rimal et al., 2005; Van Knippenberg et al., 2000). One potential approach to norm change would be to train specific network members to discuss frequently safer injection behaviors and to model publicly these behaviors. These practices would increase the saliency of the norms and may enhance descriptive risk reduction norms.

We analyzed only descriptive norms. We do not know if promoting prescriptive norms would result in behavior change. However, prior studies have suggested that descriptive norms tend to be stronger correlate of HIV risk behavior as compared to prescriptive norms (Rivas & Sheeran, 2003). These data also indicate that in addition to risk behaviors being linked to individuals' perceptions of their network's behavior, the social norms of the group is associated with their risk behavior, even after accounting for individuals' perceptions of their group norms. In the pooled sample, indexes' social norms significantly correlated with network members' sharing cookers and cotton and front- or back-loading. The association between indexes' social norms and network members' syringe sharing was significant in the Philadelphia site for 3 of the 4 risk behaviors. In general, the associations between the indexes' norms and the network members' behavior in Thailand were less pronounced, with only one significant association. This lack of an association may indicate that the oppressive "war on drugs" in Thailand, or other social factors, disrupted injection networks. Consequently, members may know little about each other's risk behaviors. In this context, individuals' perceived norms may have greater influence than the norms of other network members. An alternative explanation is that the norm question did not precisely correspond to this injection risk behavior. Therefore, the items may be measuring slightly different but overlapping behaviors.

In developing social norm interventions, it is important to consider that social norms are not one-dimensional nor do all referent group members endorse the prevailing norms. Norms may be conflicting based on membership in different referent groups. For example, the family referent group may promote abstinence, whereas peers may promote the norm of substance use. Conditionality of norms is another critical issue (Coleman, 1990). Many studies find high rates of condom use with casual partners, yet the transition from casual to steady or main partner may occur within a couple of weeks. The majority of injection drug users endorse the proscriptive norms that one should never share needles, but this norm is not absolute. There are more lenient needle sharing norms when a needle is inoperable or when the injection episode is with a sexual partner. Norms also may vary by saliency, polarity, and intensity (Jasso & Opp, 2002). Several studies suggest that norms are most influential when they become salient. Peers educators and cues in the social and physical environment may be effective in promoting risk reduction by highlighting the salience of the social norm of not sharing injection equipment.

The study findings are limited by the cross-sectional study design and the sampling strategy. One of the study's strengths was that these data were not solely based on self-reports. The analytic models included the reports of the risk behaviors and the social norms of both the network members and the index participants. Even if the index participants somehow cued the network members to provide certain responses, the data still demonstrate social influence within the networks. As the study was conducted in two different cultures with the same findings, the results suggest that social norms are influential in diverse settings. Another study

limitation was that we did not recruit all the members of the identified social network, and hence the network social norms were based on the index member. While it would be ideal to include a range of network members, it is likely to be impossible to recruit all the network members of naturally occurring groups. It would be valuable to examine how norms cluster in bounded networks such as classrooms, yet even in these groups there may be sub-networks and cliques with differing norms and health behaviors. It should be also noted that both the indexes' and network members' social norms and their risk behaviors could have been influenced by unmeasured exogenous factors.

The current study results suggest that social norms of HIV injection risk behaviors are clustered and are not only strongly associated with an individual's own risk behaviors, but they are also affected by their index member's social norms. The present study was cross-sectional, but social norms collected after the implementation of the network based intervention in HPTN 037 will allow us to examine whether the intervention influenced social norms, and further, whether changing social norms led to a reduction in HIV risk behaviors. In addition, we can further study how and when norms predict future risk behaviors. With a greater understanding of the social structuring of norms and their relationship to health behaviors, we may be able to design network and community-level interventions that are not only powerful, but also lead to sustained behavior change.

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Table 1

Characteristics of Chiang Mai and Philadelphia participants

Baseline Characteristics	Chiang Mai N(%) ^a	Philadelphia N(%) ^a	Chi-square (p- value)
Age (years)			<.0001
18 to 20	44/345 (13%)	8/588 (1%)	
20+ to 30	152/345 (44%)	111/588 (19%)	
30+ to 40	77/345 (22%)	166/588 (28%)	
40+ to 50	55/345 (16%)	212/588 (36%)	
Over 50	17/345 (5%)	91/588 (15%)	
Marital Status			<.0001
Single	172/345 (50%)	368/588 (63%)	
Married	103/345 (30%)	60/588 (10%)	
Living with partner/not married	38/345 (11%)	42/588 (7%)	
Divorced or separated	29/345 (8%)	97/588 (17%)	
Widowed	3/345 (1%)	21/588 (4%)	
Education			<.0001
No schooling	74/345 (21%)	1/588 (<1%)	
Primary schooling	140/345 (41%)	11/588 (2%)	
Secondary schooling	112/345 (33%)	555/588 (77%)	
Vocational or trade schooling	14/345 (4%)	14/588 (2%)	
Graduate/professional schooling	5/345 (2%)	88/588 (18%)	
Employment			<.0001
Full-time	205/345 (59%)	50/588 (9%)	
Part time or Occasional	103/345 (29%)	62/588 (10%)	
Unemployed	37/345 (11%)	476/588 (81%)	
Homelessness in the last 6 months	47/345 (14%)	152/588 (26%)	<.0001
Drug treatment in the last 6 months	5/345 (1%)	155/588 (26%)	<.0001
Injection frequency per day (# of times)			<.0001
0	55/345 (16%)	12/587 (2%)	
1 – 2	253/345 (73%)	294/587 (50%)	
3 – 5	33/345 (10%)	222/587 (38%)	
>5	4/345 (1%)	59/587 (10%)	
Injected cocaine in the last month	0/249 (0%)	209/588 (36%)	<.0001
Injected amphetamines in the last month	59/345 (17%)	9/588 (2%)	<.0001

^aData presented include number of respondents out of total sample who provided data.

Table 2

HIV risk behaviors and norms among Thai and U.S. Participants

Baseline Characteristics	Chiang Mai N(%) ^a	Philadelphia N(%) ^a	Chi-square & t- test (p-value)
Shared Needles	158/345 (46%)	222/588 (38%)	0.0158
Shared Cooker	177/345 (51%)	348/588 (59%)	0.0192
Shared Cotton	51/345 (15%)	255/588 (43%)	<.0001
Front/Back-loaded Syringe	27/345 (8%)	131/588 (22%)	<.0001
Norms			
Norm score of sharing needles	2.0627	2.1489	0.3082
Norm score of sharing cookers	2.7478	2.7772	0.7442
Norm score of sharing cotton	1.7566	2.6196	<.0001
Norm score of front/back-loaded syringe	1.345	1.813	<.0001

^aData presented include number of respondents out of total sample who provided data.

ANOVA analyses clustering of social norms by social network-^{*}

	Social norm items (proportion of friends who inject who)	Philadelphia			Chiang Mai			Total		
		N	Mean	p-value	N	Mean	p-value	N	Mean	p-value
	Share needles	571	2.14	0.025	364	2.03	0.120	935	2.10	0.012
	Share cooker	588	2.76	0.003	372	2.72	0.130	960	2.75	0.003
	Share cotton	587	2.61	0.008	372	1.74	0.036	959	2.27	0.001
	Frontload/backload	566	1.81	0.344	373	1.34	0.078	939	1.63	0.427

* The p-values are calculated from 10,000 bootstrap samples. Index participants in each sample are assigned the same number of member participants as they have in the original sample by simple random sampling with replacement.

Table 4

Models for Network Member Risk Behaviors as Predicted by Their Own Corresponding Social Norms and the Norms and Behaviors of Their Index

Behavior	Model 1		Model 2	
	OR	<i>p</i> -value	OR	<i>p</i> -value
Own Social Norm (scale 1–5)				
Shared Needle	1.58	<.0001	1.56	<.0001
Shared Cooker	1.52	<.0001	1.46	<.0001
Shared Cotton	1.62	<.0001	1.59	<.0001
Shared F/B Syringe	1.81	<.0001	1.74	<.0001
Index Social Norm (scale 1–5)				
Shared Needle			1.14	0.172
Shared Cooker			1.22	0.014
Shared Cotton			1.19	0.066
Shared F/B Syringe			1.31	0.031