Association of Co-Occurring Psychosocial Health Problems and Increased Vulnerability to HIV/AIDS Among Urban Men Who Have Sex With Men

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Objectives. We measured the extent to which a set of psychosocial health problems have an additive effect on increasing HIV risk among men who have sex with men (MSM).

Methods. We conducted a cross-sectional household probability telephone sample of MSM in Chicago, Los Angeles, New York, and San Francisco.

Results. Psychosocial health problems are highly intercorrelated among urban MSM. Greater numbers of health problems are significantly and positively associated with high-risk sexual behavior and HIV infection.

Conclusions. AIDS prevention among MSM has overwhelmingly focused on sexual risk alone. Other health problems among MSM not only are important in their own right, but also may interact to increase HIV risk. HIV prevention might become more effective by addressing the broader health concerns of MSM while also focusing on sexual risks. (*Am J Public Health.* 2003;93:939–942)

One of the unforeseen consequences of the HIV/AIDS epidemic has been an unprecedented proliferation of data measuring the health status of men who have sex with men (MSM). The extent to which MSM experience other dangerous psychosocial health problems has often been measured by AIDS researchers as a means of explaining the distribution and consequences of HIV infection. One of the striking findings of the literature describing the prevalence of substance abuse,[1–3] partner violence,[4–6] depression,[7] and childhood sexual abuse[8] among MSM has been the extent to which MSM experience these health problems, especially in comparison with other community-based samples of men.

Another striking property of these psychosocial health problems as they manifest among MSM is their tendency to be interrelated. For example, some of the earliest research on the HIV/AIDS epidemic among MSM focused on the importance of nonintravenous substance abuse in explaining the distribution of HIV infection in this population.[9] Similar connections are found in the relationships between HIV infection and partner violence,[4] childhood sexual abuse,[8] and depression[10] and between these 3 psychosocial health problems themselves.[11]

The tendency for health problems to interact with and amplify each other is hardly restricted to gay male populations.[12,13] But the existing literature raises the possibility that MSM populations in the United States experience multiple serious health problems, of which HIV/AIDS is only the most recognized. In addition, the HIV/AIDS epidemic may be interrelated with other health problems found among MSM. However, research on the effects of these health conditions has emphasized testing of the relationship between a specific health problem and HIV/AIDS rather than testing for the additive effect of multiple health problems, a phenomenon known in the public health literature as a "syndemic."[14,15] In this study, we analyzed a large-scale household-based sample of urban MSM in the United States to test whether an additive interplay among a set of dangerous psychosocial health conditions is driving the HIV/AIDS epidemic among gay men.

METHODS

Sampling

The sampling frame construction methods have been described in detail elsewhere,[16] as have the demographics and distribution of HIV infection within the sample.[17] Briefly, we defined geographical areas of 4 large US cities (Los Angeles, San Francisco, Chicago, New York) identified as being relatively rich in MSM residents. We used random-digit-dial methods to sample households in these areas, with interviews being conducted by telephone from November 15, 1996, through March 1, 1998.

Men aged 18 years or older who had had sex with a man since age 14 or who defined themselves as gay or bisexual were eligible for interviewing. If a household contained more than 1 man who met these inclusion criteria, one of them was randomly selected to be interviewed.

We completed 2881 interviews (78% of eligible households) lasting an average of 75 minutes. We confirmed HIV serostatus for a subsample of respondents using OraSure (Epitope: Portland, Ore) oral HIV testing.[18]

Measures

The set of demographic variables used in this analysis included age (coded as 18–29, 30–39, ≥40), education (less than college graduate, college graduate), race/ethnicity (White, African American, Latino, other), income (<$40 000/year, $40 000–$80 000/year, ≥$80 001/year) and HIV serostatus. High-risk sex was defined as unprotected anal intercourse with a partner of known discordant or unknown status, on the basis of respondents' answers to questions about their 4 most recent sex partners.

In measuring a set of 4 psychosocial health problems, we relied on standard measures used in the field.[3,4,8,19] We measured polydrug use as use of 3 or more recreational drugs (e.g., marijuana, cocaine, crack cocaine, heroin, hallucinogens, inhalants, amphetamines, methamphetamine, MDMA ["ecstasy"], barbiturates or tranquilizers, painkillers) in the past 6 months.[16] We used Center for Epidemiological Studies–Depression scores as the measure of

depression, with scores greater than 22 indicating depression.[20] We measured partner violence as the experience of any form of violence—symbolic (e.g., "verbally threatened you," "stalked you"), physical (e.g., "hit you," "kicked you"), or sexual (e.g., "forced you to have sex")—in the past 5 years with a primary partner.[4] We defined childhood sexual abuse as the experience of being "forced or frightened by someone into doing something sexually" with a partner more than 10 years older than the respondent when the respondent was aged 16 years or younger.[8]

Statistical Analysis

The primary goal of this analysis was to test whether a set of psychosocial health problems within MSM communities results in increased vulnerability to HIV infection. We approached this analysis in 2 ways. First, we used a set of multivariate logistic regression models to create separate profiles of MSM who reported high levels of polydrug use, depression, partner violence, or childhood sexual abuse. Each of these models used the same set of demographic and behavioral predictor variables. We ran the same logistic model for each of the health problems (polydrug use, depression, partner violence, childhood sexual abuse) but excluded measures of a given problem from the logistic regression models of that problem.

Table 1 lists significant multivariate associations. Examination of independent associations allowed a test of whether the health problems described in this article are additive. In addition, we calculated count scores based on the number of health problems each respondent had reported, yielding scores ranging from 0 to 4. We calculated rates of HIV infection as well as high-risk sex (unprotected anal sex with a partner of known serodiscordant or unknown status) for each possible count score, using *z* tests for linear trend to test the statistical strength of these associations.

TABLE 1—Multivariate Logistic Regressions Predicting Intersecting Health Problems: Urban Men's Health Study: San Francisco, Los Angeles, Chicago, New York, 1996–1998

Predictors	Odds Ratio (95% Confidence Interval)			
	Polydrug Use	Depression	Childhood Sex Abuse	Partner Violence
Age, y				
18–29	2.38 (1.77, 2.84)*	…	…	1.66 (1.23, 2.24)*
30–39	1.97 (1.55, 2.52)*	…	…	1.71 (1.35, 2.17)*
≥ 40	1.00	…	…	1.00
Education				
Did not graduate college	…	…	…	…
Graduated college	…	…	…	…
Race/ethnicity				
White	…	…	1.00	…
African American	…	…	1.66 (1.09, 2.52)*	…
Latino	…	…	1.81 (1.31, 2.50)*	…
Other	…	…	1.08 (0.72, 1.63)	…
Income, $				
< 40 000	…	1.87 (1.41, 2.47)*	…	…
40 000–80 000	…	1.19 (0.88, 1.62)	…	…
> 80 000	…	1.00	…	…
HIV serostatus				
HIV negative	1.00	…	…	1.00
HIV positive	2.05 (1.60, 2.64)*	…	…	1.49 (1.15, 1.93)*
High-risk sex	1.88 (1.40, 2.52)*	…	1.39 (1.03, 1.89)*	1.64 (1.22, 2.22)*
Health problems				
Polydrug use	(excluded)	1.43 (1.11, 1.85)*	…	2.21 (1.74, 2.81)*
Depression	1.37 (1.06, 1.77)*	(excluded)	1.90 (1.50, 2.41)*	1.60 (1.25, 2.06)*
Childhood sex abuse	…	1.91 (1.50, 2.42)*	(excluded)	1.90 (1.50, 2.42)*
Partner violence	2.24 (1.76, 2.84)*	1.61 (1.26, 2.06)*	1.99 (1.57, 2.52)*	(excluded)

Note. *$P < .05$. All *P* values are 2-tailed.

RESULTS

Tables describing the demographic profiles of this sample have been published elsewhere.[16,17] Briefly, the sample was predominately of European American ethnicity, although with substantial participation of men of color (21% of the sample), a wide range of ages (16% were older than age 50 years), and a wide income distribution (42% earned less than $40 000/year). The majority (84%) of the sample identified themselves as gay.

Table 1 presents the results of 4 multivariate logistic regression models that identify the independent associations—with control for important demographic and behavioral variables—of polydrug use, depression, childhood sexual abuse, and partner violence among urban MSM. Notable in this table is the extent to which each of these psychosocial health conditions appears as an independent correlate of the others in the multivariable models. For example, childhood sexual abuse is independently associated with depression and partner violence; depression is independently associated with childhood sexual abuse, polydrug use, and partner violence; polydrug use is independently associated with depression and partner violence; and partner violence is independently associated with childhood sexual abuse, depression, and polydrug use.

Each of these associations is in the expected positive direction. Of the 6 distinct possible associations between these 4 health conditions, only 1—that between childhood sexual abuse and polydrug use—failed to achieve a statistically significant association at the multivariate level. The relationship between childhood sexual abuse and multiple drug use was, however, significantly and positively associated at the bivariate level (odds ratio [OR]=1.42; 95% confidence interval [CI]=1.12, 1.81; $P<.01$).

In addition, we ran the same models reported in Table 1 (entering polydrug use, depression, childhood sexual abuse, and partner violence, as well as the set of demographic variables), using HIV infection and high-risk sexual behavior as dependent variables. Both polydrug use (OR=2.2; 95% CI=1.7, 2.8) and partner vio-

TABLE 2—Number of Psychosocial Health Problems by HIV Infection and by Sexual Risk (n = 2674): Urban Men's Health Study

	No. of Psychosocial Health Problems			
	0 (n = 1392), %	1 (n = 812), %	2 (n = 341), %	3 or 4 (n = 129), %
High-risk sex	7.1	11.2	15.8	22.5
HIV prevalence	13.0	20.9	27.2	22.4

Note. All associations are/were significant at $P < .001$. All P values are 2-tailed.

lence (OR=1.5; 95% CI=1.2, 1.9) were significantly associated with HIV seropositivity, whereas depression (OR=1.2; 95% CI=0.9, 1.9) and childhood sexual abuse (OR=1.1; 95% CI=0.9, 1.5) had positive but nonsignificant associations with HIV seropositivity. Using the same approach, we found that polydrug use (OR=2.0; 95% CI=1.5, 2.7), partner violence (OR=1.7; 95% CI=1.3, 2.3), and childhood sexual abuse (OR=1.4; 95% CI=1.1, 1.9) were significantly associated with high-risk sexual behavior, with depression having a positive but nonsignificant association with such behavior (OR=1.1; 95% CI=0.8, 1.5). After adjustment for each of the health and demographic variables, the relationship between HIV seropositivity and high-risk sex remained significant (OR=1.7; 95% CI=1.2, 2.3).

We next turned to the question of whether the interconnection of these health problems amplifies vulnerability to HIV infection and likelihood of engaging in high-risk sexual behavior (the primary mechanism for the transmission of HIV infection in this population). Table 2 shows the relationship between each count score for number of health problems and the prevalence of HIV infection and high-risk sexual behavior. Greater numbers of health problems were significantly and positively associated with HIV infection and current high-risk sexual practices (for both factors, z test for linear trends was significant at $P < .001$). We reran these analyses with a multivariate logistic regression model, controlling for the demographic variables in Table 1, and obtained the same general set of findings. A greater number of psychosocial health problems was associated with ascending odds ratios for having high-risk sex (1 problem=1.6; 95% CI=1.2, 2.1; 2 problems=2.4; 95% CI=1.6, 3.4; 3 and 4 problems=3.5; 95% CI=2.2, 5.6; $P < .01$) and ascending prevalence rates for HIV infection (1 problem=1.8; 95% CI=1.4, 2.3; 2 problems=2.7; 95% CI=2.0, 3.6; 3 and 4 problems=2.2; 95% CI=1.4, 3.5; $P < .001$) compared with the group of men with no self-reported psychosocial health problems.

DISCUSSION

This analysis of these data supports the view that additive psychosocial health problems—otherwise known collectively as a syndemic—exist among urban MSM and that the interconnection of these problems functions to magnify the effects of the HIV/AIDS epidemic in this population. A variation of this question has been empirically tested since the very earliest days of the HIV/AIDS epidemic, in that substantial literature now exists on the relationship between substance use and HIV/AIDS, depression and HIV/AIDS, childhood sexual abuse and HIV/AIDS, and violence and HIV/AIDS. Our analysis extends this literature to show that the connection among these epidemic health problems and HIV/AIDS is far more complex than a 1-to-1 relationship; rather it is the *additive interplay* of these health problems that magnifies the vulnerability of a population to serious health conditions such as HIV/AIDS.

The relationship between number of health problems and HIV seroprevalence is somewhat attenuated at the highest number of problems. This attenuation may be the result of higher mortality among HIV-positive men with a great number of additional health problems, the effects of HIV-related morbidity, the possibility that a threshold on the effect of HIV seropositivity is reached at 2 or more problems, or some combination of all of the above. In addition, it may well be that as HIV-positive men enter the health care system for treatment of HIV infection,[16] they also seek care for other health problems. If so, the relationship between number of health problems and HIV infection would be less direct than the relationship between current number of health problems and current high-risk sexual practices, because some of the HIV-infected men would have had the chance to resolve some of their other health problems. Nonetheless, greater numbers of psychosocial health problems are associated with higher prevalence rates for high-risk sexual behavior and HIV infection.

The data presented here should be interpreted with the following limitations in mind. These data were drawn from a household-based sample of urban men who identified as having had sex with other men. As such, the sample excludes MSM who reside in rural or suburban areas, as well as men who did not identify as having had sex with other men since age 14 years or who did not identify themselves as gay or bisexual. Although participation rates in the study among eligible men was high (78%), the refusal of some men to participate may have introduced some biases. The data described here were collected through self-report measures only. Finally, the cross-sectional design restricts our analysis to the identification of correlational relationships, thereby limiting our ability to make causal attributions.

These data hold important implications for public health efforts designed to enhance health among populations that experience a syndemic interplay of health problems. First, the question should be raised as to whether this sort of interplay among health problems is unique to urban MSM, or whether this phenomenon is also found among the other major risk groups for HIV/AIDS who live in large urban centers (i.e., intravenous drug users, high-risk heterosexuals). If we conclude that populations suffering from syndemics are especially vulnerable to HIV infection, it might be wise to consider whether other populations that may experience syndemics—but that have been protected so far from the worst effects of the HIV/AIDS epidemic by virtue of their rural residence—can be identified for heightened HIV prevention efforts. Populations that may fit this profile include Native American residents of rural reservations, residents of impoverished regions of Appalachia, and migrant agricultural workers.

The second set of implications regarding this analysis concerns the dominant approaches to HIV prevention practice. HIV prevention work has tended to proceed on the assumption that HIV/AIDS is the preeminent health problem

facing at-risk communities and has generally operated with limited regard to the other health problems facing such communities. However, if it is indeed true that it is the additive effect of interrelated psychosocial health conditions that increases vulnerability to HIV infection, it may be possible to enhance the efficacy of HIV prevention efforts by working to support a broader health movement within vulnerable communities. That is, by working in tandem with organizations addressing mental health, violence, and substance abuse problems within a community, it may be possible to increase the efficacy of HIV prevention efforts and related health promotion efforts.

Although there is now substantial evidence to demonstrate that HIV-preventive behavioral interventions for MSM do have some positive effects,[21] why have the effects not been even greater? An understanding of the behavioral effects of syndemics may help answer this question. The existence of syndemics may make it difficult for some MSM to respond to the messages of standard HIV prevention programs. Put another way, men who are mired in the combined effects of depression, substance abuse, and violence may not have the capacity to reduce their sexual risk. Intervention designs that include partnerships with other health promotion organizations within MSM communities can be evaluated to test not only for increased efficacy on the part of HIV prevention interventions in such partnerships, but also for whether such work is especially efficacious among MSM who are battling multiple health problems.

Finally, these data suggest that syndemic conditions are understudied phenomena in public health research. If so, the basic research questions concerning the formation, maintenance, and function of syndemics and the consequent production of maladies represent long-overdue foci of study. In particular, it would be useful to identify the social conditions that are likely to give rise to and maintain syndemics. The lifelong effects of social marginalization or stigma may work to create high occurrence of psychosocial health problems among urban MSM, problems that in turn function in an additive manner to raise levels of high-risk sexual behavior and thus HIV infection itself. We note that the sample described in this article is predominately middle class and of European American heritage. Thus, in some other populations, greater understanding of the mechanisms of disease interplay might also include study of the effects of malnutrition, stress, poverty, and racism, as well as homophobia. Research questions should address the basic public health question regarding syndemics: What are the best approaches to disrupting syndemics so that the health of vulnerable populations is enhanced? ■

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Contributors

R. Stall, T.C. Mills, J. Paul, L. Pollack, D. Binson, D. Osmond, and J.A. Catania designed the study, constructed the questionnaire, oversaw the fieldwork, and completed the data collection. J. Williamson, T. Hart, L. Pollack and R. Stall analyzed the data. T.C. Mills, J. Paul, G. Greenwood and R. Stall lead the analysis teams for the study of depression, childhood sexual abuse, partner violence, and substance abuse. All authors participated in designing the overall approach to the data analysis and in writing the article. J.A. Catania served as the principal investigator for this study and oversaw all aspects of the study, analysis, and writing of the article.

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Human Participant Protection

Interviewing procedures (and verbal informed consent procedures) were reviewed and approved by the committee on human research, University of California, San Francisco.

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